In the name of safety: identifying, understanding and stopping low-value safety practices

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Submitted in accordance with the requirements for the degree of Doctor of Philosophy

The University of Leeds

School of Psychology

June 2023

The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

The survey study reported in Chapter 2 has been published:

- Halligan, D., Janes, G., Conner, M., Albutt, A., Debono, D., Carland, J., ... & Lawton, R. (2022). Identifying safety practices perceived as low-value: an exploratory survey of healthcare staff in the UK and Australia. *Journal of Patient Safety*. doi: 10.1097/PTS.0000000000001091

AA, GJ and RL contributed to the conception of the survey study design. DH set up the study, gained ethical approvals, collected and analysed the data. DH drafted the publication and all authors provided comments and approved final versions.

Acknowledgements

I would like to start by saying a huge thank you to my wonderful supervisors, Rebecca Lawton, Mark Conner and Gillian Janes. This PhD has been a fantastic experience and I feel very lucky to have had the opportunity to work with you all. Thank you for your encouragement, patience and guidance. I really appreciate all your efforts.

Thank you to all the healthcare staff and patients who have taken part in my research, I am extremely grateful for your contribution and this thesis would not have been possible without you. Thank you also to The Healthcare Improvement Studies Institute for funding this PhD and welcoming me into a community of researchers.

I'd like to thank everyone in the Yorkshire and Humber Quality and Safety Research Group. I have loved being a part of this wonderful team. A special thank you to Jayne Marran, Hilary Thompson, Ali Cracknell, Frankie Hill, and everyone in the WEW theme for all their wisdom.

Thank you also to the amazing friends I have made over the last four years. Alice, Lauren and Emily – this PhD would have been a very different experience without you! Thank you for being such fantastic friends and providing so much fun during some stressful times. I'm so pleased to have met you.

Thank you to all my lovely friends and family who have supported me from the start of this PhD. Molly, Becky, Henry and especially Mum – I'm so grateful for your encouragement and I can't thank you enough for always putting things into perspective.

Finally, I'd like to thank my boyfriend Matthew for sharing this experience with me and for being a constant source of emotional and practical support. Thank you for all the cooking and for making me laugh throughout this process. It is truly appreciated.

I'd like to dedicate this thesis to my Dad.

Abstract

Low-value healthcare is a widely recognised problem that detracts from the quality of patient care and places additional pressure on an already over-stretched system. The majority of efforts to identify and remove low-value healthcare practices have focused on clinical practices such as unnecessary tests, treatments and procedures. There is a lack of research that has identified and de-implemented low-value non-clinical practices such as patient safety practices (PSPs) that contribute to the problem of 'safety clutter'. Eliminating PSPs that drain resources and increase the administrative burden on healthcare staff could release time to carry out practices that enhance patient safety. This PhD therefore aimed to understand how to identify and remove low-value PSPs in healthcare settings.

An exploratory survey study (Study 1) was carried out, asking healthcare staff to identify practices they perceived to be of low-value for safety. To identify potential practices for de-implementation, the most frequently mentioned PSPs from Study 1 were taken forward to a consultation exercise, during which healthcare professionals rated the practices to determine candidates for de-implementation. A systematic review and meta-analysis (Study 2) was also conducted to understand what types of interventions have been used in the past to de-implement low-value practices in healthcare and what effect they have had on patient safety measures. To explore the potential barriers and facilitators associated with de-implementation, an interview study (Study 3) was carried out, focusing on two PSPs: intentional rounding and double-checking medicines.

The final stage of this PhD involved co-designing a de-implementation

intervention with stakeholders targeting a specific form of double-checking medicines. Evidence from this thesis provides a novel way of involving healthcare staff in the identification and prioritisation of low-value PSPs for de-implementation. The findings have also contributed to understanding how theory can be applied to develop strategies to overcome challenges to de-implementation.

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List of Abbreviations

CB	Chris Bojke
DD	Deborah Debono
DH	Daisy Halligan
ERIC	Expert Recommendation for Implementing Change (ERIC) taxonomy
GJ	Gillian Janes
JC	Jane Carland
MC	Mark Conner
NHS	National Health Service
PSP	Patient Safety Practice
RL	Rebecca Lawton
WEW	Workforce Engagement and Wellbeing Theme
WHO	World Health Organisation
YHPSTRC	Yorkshire and Humber Patient Safety Translational Research Centre

Chapter 1

Introduction: Overview of the literature and thesis aims.

1.1 Chapter summary

This chapter provides an overview of the current literature outlining the problem of safety clutter in healthcare and the need to de-implement low-value practices to improve patient safety. Previous efforts to identify and remove low-value clinical practices are described and gaps in the literature are highlighted. The overarching aim of this thesis is to better understand the process of de-implementation in healthcare by exploring how to identify and remove low-value safety practices. The research methods used to explore the de-implementation of low-value safety practices are described in the thesis aims and objectives reported at the end of this chapter.

1.2 The problem of low-value clinical healthcare practices

The majority of clinical practice delivers high quality care and improves healthcare outcomes that represent excellent value for money (Braithwaite et al, 2020). However, over the past two decades, evidence has established that a significant minority of clinical care is low-value (Barratt & McGain, 2021). A ‘low-value healthcare practice’ is defined by MacLeod et al (2018), as ‘a test or procedure that delivers little or no clinical benefit and increases healthcare spending without improved health outcomes’ (p.201). The use of low-value healthcare practices increases pressure on the healthcare service and is associated with unnecessary follow-ups, decreased patient satisfaction and threatens the sustainability of the

healthcare system (Brownlee & Korenstein, 2021). For example, the overuse of diagnostic tests (also known as ‘over diagnosis’) can be defined as low-value care, including practices such as imaging for non-specific back pain and preoperative tests e.g. echocardiography or exercise stress tests (Müskens et al, 2022). Such unnecessary diagnostic tests can be associated with harmful outcomes for patients, for example, the inappropriate use of CT scans has been associated with an increased risk of cancer as a result of avoidable exposure to low-dose ionizing radiation (Eisenberg et al, 2011; Fraser & Reed, 2013).

Although there is no formal, agreed definition of over diagnosis and its associated overtreatment (Armstrong, 2018; Carter et al, 2015), it generally refers to occurrences where a diagnosis is given that is in line with care guidelines, however, the likelihood that the treatment will benefit the patient is low and may even cause harm (Moynihan, Doust & Henry, 2012). For example, some screening programmes have detected early cancers that will never cause symptoms or death and some sensitive diagnostic technologies exist that are able to identify very small abnormalities that will remain benign (Black, 1998; Jørgensen & Gøtzsche, 2009; Moynihan et al, 2014). Some of the potential consequences associated with unnecessary diagnoses and treatments include the negative psychological impact of disease labelling, increased clinical workload, the harms to the patient of unnecessary therapies and the cost of wasted resources that could have been allocated to treat genuine illness (Hicks, 2015; Hofmann & Welch, 2017).

Additionally, previous research has explored another form of low-value care: over prescribing, where patients are prescribed drugs they do not need, or where the potential harm outweighs the benefit of a medication

(Li et al, 2021; Makary, Overton, Wang, 2017; Rose, Crosbie & Stewart, 2021; Specialist Pharmacy Service, 2022). The use of unnecessary medications increases the risk of negative side effects for patients. For example, approximately 1 in every 1000 antibiotic prescriptions is linked with a serious complication for the patient, requiring urgent medical attention (Mafi et al, 2021). Additionally, the inappropriate prescribing of opioids or benzodiazepines can lead to dependency (Davies et al, 2022; Dempsey et al, 2014). To address the problem of over prescribing, deprescribing interventions have been developed that aim to safely withdraw inappropriate medication (Scott et al, 2015; Thio et al, 2018; Woodward, 2003). Another form of low-value care includes unnecessary procedures such as knee arthroscopy for knee pain, despite evidence indicating no benefit when compared with medical management (Berlin et al, 2020; Howard & Gross, 2018). Additionally, previous evidence has highlighted unnecessary caesarean sections as being of low-value (Althabe et al, 2004).

It has been estimated that as much as 30% of all healthcare provided is low-value and 10% is harmful (Braithwaite, Glasziou & Westbrook, 2020). Unnecessary healthcare also causes an estimated £300 million worth of prescribed medicines being wasted in the UK every year, resources that could alternatively be spent on carrying out more effective practices (Burton et al, 2019). As the NHS faces increased pressure due to rising demands (recently exacerbated by the Covid-19 pandemic), it is imperative that the system ‘does more with less.’ One way to achieve this is by stopping unnecessary practices that do not benefit patients, to facilitate the delivery of more efficient, high-quality care (Hurst & Williams, 2012).

1.3. Identifying low-value clinical practices

Recognition of the overuse of low-value care has resulted in an increase in activity trying to identify interventions for potential de-implementation that deliver minimal or no benefit, be it through overuse, misuse or waste (Garner et al, 2013). For example, The 'Choosing Wisely' Campaign (CWC), which began in the US in 2012, encourages patients and healthcare professionals to choose care that is evidence-based, free from harm and truly necessary (Parker et al, 2019). This campaign is now a global initiative involving 20 countries in which medical societies are asked to regularly identify practices commonly used in their specialty, the necessity of which should be discussed and questioned. These practices are then reviewed and compiled into lists where the 'top five' practices should not be used routinely or at all. Examples of some of the low-value practices previously identified include: prostate-specific antigen testing in patients who are not at increased risk of prostate cancer due to family history and using aspirin to reduce the chances of pregnant women developing blood clots (Choosing Wisely, 2018).

Similarly, the British Medical Journal (BMJ) has developed an initiative to identify areas of low-value in healthcare by launching the 'Too Much Medicine' campaign that aims to raise awareness and solve the problem of unnecessary use of medical interventions (BMJ, 2021). The campaign sign-posts clinicians to recent evidence on healthcare practices that may be unnecessary and conditions that may be over-diagnosed.

Additionally, NICE has used scientific evidence of cost-effectiveness to identify over 800 interventions for potential de-implementation based on them being a) not clinically effective, b) not supported by adequate evidence

or c) having a poor risk-benefit profile. Based on these criteria, NICE provides online recommendations, guidance tools and ‘do not do’ reminders to support clinicians in conducting best practice (Garner & Littlejohns, 2011).

Further to the global and national initiatives that have identified lists of low-value healthcare practices for removal, it is also important to highlight previous research that has tried to systematically identify low-value practices for potential de-implementation. For example, Elshaug et al (2012) used a multiplatform approach to search for and identify potential low-value healthcare practices for review and prioritisation. In this study, they conducted a broad literature search, a targeted database search and also opportunistic sampling to identify 156 potentially ineffective or unsafe practices that required further evaluation to determine their value. Practices identified by more than one search method were prioritised for further investigation to determine whether or not they should be de-implemented. Similar to the international campaigns outlined above, the practices identified by this study focused mainly on health technologies and treatments (clinical practices) such as using a chest X-ray to diagnose a respiratory infection or arthroscopic surgery for knee osteoarthritis (Haas et al, 2012).

Additionally, certain quality improvement initiatives have been adopted by healthcare organisations in an attempt to identify and eliminate waste (Rees & Gauld, 2017). For example, ‘Lean’ is a healthcare improvement initiative that was originally designed to improve the efficiency of the Toyota production system by reducing waste (Antony et al, 2019). The underlying principle of the initiative is that once an organisation understands what its customers perceive as valuable, it can work to eliminate process steps that do not add value (Womack & Jones, 1996). There are five main

principles of Lean: 1) specify value from the standpoint of the customer, 2) identify all the steps in the value stream and eliminate steps that do not create value, 3) make the steps flow smoothly towards the customer, 4) let customers pull value from the next upstream activity, and 5) begin the process again until a state of perfection is reached (Moraros et al, 2016; Shook & Marchwinski, 2014). Lean has since been extensively implemented in healthcare organisations to improve the quality and efficiency of a variety of clinical processes and practices such as reducing medical errors (Raab et al, 2006), reducing central line infections (Shannon et al, 2006) and streamlining the discharge process for patients (Antony et al, 2019). Previous evidence has demonstrated that applying Lean can successfully eliminate unnecessary steps in healthcare processes, improving system efficiency and patient outcomes (Ben-Tovim et al, 2008; Jimmerson et al, 2005; Matt, Arcidiacono & Rauch, 2018). However, the way that Lean has been implemented in healthcare has varied greatly and there is reason to suggest that some of its quality management techniques are not well aligned with the healthcare sector (Scherrer-Rathje, Boyle & Deflorin, 2009; Weiner et al, 2006). For example, certain Lean projects have failed due to a lack of: managerial support, organisational communication, and team autonomy (Scherrer-Rathje, Boyle & Deflorin, 2009). Additionally, previous research investigating the effectiveness of using ‘Lean’ to reduce waste in healthcare organisations is limited and has been criticised for using weak study designs and inappropriate analyses (Mazzocato et al, 2012). For example, Vest and Gamm (2009) reviewed evidence that tested the effectiveness of using Lean to make improvements in different healthcare settings and found that the majority of included studies routinely omitted statistical analysis, violated

statistical test assumptions, introduced selection bias and failed to include a comparison group. This indicates a lack of reliability in much of the available evidence testing the effectiveness of Lean.

In summary, there have been many efforts to identify low-value clinical practices in healthcare. It is also important to be aware of previous research that has sought to understand how to remove low-value practices from healthcare.

1.4 What is de-implementation?

1.4.1 The language of removing low-value clinical practices

In the past, quality improvement initiatives have primarily tried to improve healthcare through the implementation of new evidence (Burton et al, 2019). The process of letting go of healthcare practices, also known as ‘de-implementation’, is less understood, as is reflected in the absence of a consistent terminology around the subject (Bekelis et al, 2017; Davidoff, 2015). This was evidenced in a scoping review carried out by Niven et al (2015) which identified 43 unique terms for the process of stopping low-value healthcare practices.

This potential for confusion is further illustrated by Williams et al (2017) who give the terms ‘de-adoption’, ‘de-implementation’, ‘exnovation’ and ‘undiffusion’ the same definition of: ‘the process of removing a practice or technology previously introduced’ p.17. Bekelis et al (2017), on the other hand, differentiates the terms by defining ‘exnovation’ as: ‘scaling back on use’ whilst defining ‘de-adoption’ as: ‘abandoning use’. Establishing a common terminology for the topic of removing low-value practices is an important step in the development of clear processes that can be followed to

identify and remove low-value practices (Rooshenas et al, 2015). For the purpose of consistency, this thesis will refer to the process of removing, reducing, restricting or replacing low-value practices from healthcare settings as ‘de-implementation’ due to its frequent use within recent literature and its alignment with theoretical frameworks that will be discussed throughout this research (Augustsson et al, 2021; Grimshaw et al 2020; Hasson et al, 2018; Norton et al, 2020; Walsh-Bailey et al, 2021).

1.5 Theoretical differences between implementation and de-implementation

Evidence has demonstrated that, despite recent advances in research, often, patients do not receive treatments with proven effectiveness (Grol, 2001; Korenstein et al, 2011; McGlynn et al, 2003; Seddon et al, 2001).

Implementation science aims to promote the systematic uptake of evidence into practice and thereby improve the effectiveness of healthcare (Nilsen et al, 2013). It has been established that raising awareness of new, effective interventions is not enough to ensure its uptake into routine practice (Bauer & Kirchner, 2020). Strategies are therefore needed that target behaviour change amongst healthcare professionals (Craig et al, 2017). Behavioral theory can be used to explain the psychological processes that regulate behaviour change and are therefore useful when developing implementation interventions (Atkins et al, 2017). Nilsen et al (2020a) developed a taxonomy that describes the three overarching aims of theories, models and frameworks used in implementation science: 1) describing and/or guiding the process of translating research into practice, 2) understanding and/or explaining what influences implementation outcomes and 3) evaluating

implementation. Within each of these categories, theoretical approaches can be broken down further into: 1) determinant frameworks, 2) classic theories and 3) implementation theories. Table 1.1 describes where the different categories of theories sit, alongside some examples of models and frameworks.

Table 1.1 Categories of theoretical approaches used in implementation science (Nilsen et al, 2020a).

Aim of theoretical approach	**Category of theories/ models/ framework**	**Examples**
Describing/ guiding the process of translating research into practice.	Process models	Knowledge-to-action framework (Wilson et al, 2011); the Quality Implementation Framework (Meyers et al, 2012).
Understanding/ explaining what influences implementation outcomes.	Determinant theories	Theoretical Domains Framework (Cane et al, 2012); the Consolidated Framework for Implementation Research (Damschroder et al, 2009).
	Classic theories	Theory of Diffusion (Rogers, 2003); Psychological behaviour

		change theories e.g. Social Cognitive Theory (Bandura, 1977).
	Implementation theories	Normalisation Process theory (May & Finch, 2009); COM-B (Michie et al, 2011).
Evaluating implementation	Evaluation Frameworks	Precede-Proceed (Green & Kreuter, 2005).

Therefore, much previous research has been carried out, developing theory underpinning effective ways of supporting the implementation of evidence into practice (Braithwaite, Marks & Taylor, 2014). However, less is understood about how to de-implement ineffective or outdated healthcare practices and whether this process requires different approaches to those needed to facilitate the uptake of new procedures (implementation) (Gifford et al, 2012; Prasad & Ioannidis, 2014). Patey et al (2018) reported that, the majority of behaviour change theories, such as Social Cognitive Theory (Bandura, 1977) and the Theory of Planned Behaviour (Ajzen, 1991), do not distinguish between implementation and de-implementation, apart from Operant Learning Theory (OLT) (Skinner, 2005) which proposes that a behaviour will take place more often if it is followed by reinforcement and, conversely, a behaviour will occur less frequently if it is followed by punishment. Therefore, according to OLT, strategies for carrying out implementation and de-implementation should be different.

Patey et al (2018) explored how previous literature has used theory to reduce the frequency of certain behaviours by carrying out a critical interpretive synthesis. It was reported that the studies that applied behaviour change theories that did not theorise decreasing differently from increasing, substituted the undesired behaviour with a new desired behaviour, however, no study included a rationale for this. For example, Albright et al (1997) applied the Social Cognitive Theory (Bandura, 1977) to decrease fat intake amongst participants by promoting the substitution of negative plans, e.g. 'I will stop eating meat this week', with positive ones e.g. 'I will eat more fruits this week'. Similarly, Weber-Gasparoni et al (2013) used the Self-Determination Theory (Ryan & Deci, 2000) to recommend that parents replace sugary food and drinks with healthier ones to improve health amongst children. Therefore, there is a lack of previous research that has applied behavioural theory to reduce or stop a behaviour without substituting it for a different, desired behaviour. Although Patey et al (2018) demonstrate that the majority of behaviour change theories do not stipulate different approaches for implementation and de-implementation, the majority of studies included in Patey et al (2018)'s synthesis focused on stopping risky individual health behaviours such as unhealthy eating and smoking which are in stark contrast to low-value healthcare practices carried out by healthcare professionals. Future research may benefit from exploring the application of behaviour change theory in clinical settings to investigate whether different strategies are required to achieve de-implementation compared to those needed for implementation.

Patey et al (2021) also carried out a secondary analysis of a subset of intervention studies to investigate whether implementation and de-

implementation require different strategies. Intervention components, also known as ‘behaviour change techniques’ (BCTs) used in de-implementation and implementation interventions were extracted and compared. Some significant differences were found between BCTs reported in implementation and de-implementation interventions. For example, the BCT ‘feedback on behaviour’ was identified more frequently in implementation than de-implementation whereas ‘behaviour substitution’, ‘monitoring of behaviour by others without feedback’ and ‘restructuring social environment’ were identified more frequently in de-implementation. Therefore, there may be some differences between strategies used for implementation and de-implementation, however, the review did not establish which BCTs were more effective at supporting implementation or de-implementation. Patey et al (2021) highlights the possibility that the differences in BCTs used for implementation and de-implementation could be due to researchers having implicit theories about the differences between the two processes. Further research is therefore needed to establish which BCTs are most effective at achieving implementation and de-implementation to help explain the theoretical base for developing de-implementation interventions.

More recently, Ingvarsson et al (2022) carried out a scoping review that aimed to identify strategies that have been used to de-implement low-value care and to compare de-implementation strategies with implementation strategies, as specified in the Expert Recommendation for Implementing Change (ERIC) taxonomy. The ERIC taxonomy has been extensively used to develop implementation interventions (Perry et al, 2019; Rogal et al, 2017; 2019), however, it is not understood whether the same types of implementation strategies can be used to de-implement low-value

care practices using this taxonomy. The review identified 71 de-implementation strategies that have been used in previous literature. Of these, 66 could be mapped onto strategies found in the ERIC taxonomy (Perry et al, 2019). However, five of the identified de-implementation strategies could not be mapped onto the existing strategies in ERIC. These strategies included accountability tools (where healthcare professionals were held accountable for their decision to use a low-value practice via gatekeeping functions) and black box warnings (warning text on drug packages about the risks associated with the low-value drug). Therefore, Ingvarsson et al (2022)'s findings indicate that the majority of de-implementation strategies described in previous literature overlap with implementation strategies. However, some strategies were found to not be applicable for de-implementation purposes.

1.6 De-implementation theory

To date, the majority of research exploring the process of de-implementation has focused on specific clinical areas, for example, reducing CT scans in patients with minor head injuries (Curran et al, 2013). This limits the extent to which this knowledge can be applied to other forms of de-implementation. In an attempt to generate a more general understanding of the process of de-implementation, a scoping review was carried out by Nilsen et al (2020b) to identify previous research that had applied a theory, model or framework to address this gap in knowledge. The review identified just 10 studies, 5 of which applied an existing implementation theory, model or framework. Of these five studies, authors in general did not comment on the usefulness of the theory, model or framework for de-implementation

purposes. For example, Voorn et al (2018), applied Grol et al (2005)'s implementation model to a study that tried to de-implement low-value patient blood management techniques used in hospital settings. The de-implementation strategy comprised of: information provision, specification of the goal, feedback on own practice and a benchmark with a comparison to 'best practice' hospitals. This intervention was found to be ineffective at reducing low-value care compared to the control group. Voorn et al (2018) concluded that de-implementation may be influenced by factors that are less relevant during implementation.

The remaining five studies in Nilsen et al (2020b)'s scoping review developed their own specific frameworks to guide the de-implementation of low-value practices. Some of these studies made no reference to pre-existing theories, models or frameworks that influenced the development of their own theory (Parchman et al, 2017), however, others were influenced by a variety of behaviour change theories e.g. The Theory of Planned Behaviour (Ajzen, 1991) and implementation models e.g. Knowledge-to-Action model (Graham et al, 2006; Niven et al, 2015; Powell et al, 2013). This scoping review demonstrates that although there have been attempts to develop de-implementation theory, more research is required to understand the determinants of de-implementation across a variety of clinical contexts. However, it was found that the majority of theories, models and frameworks identified suggest the need for a multi-level understanding of the de-implementation of low-value care.

1.7 The Theoretical Domains Framework and De-implementation

To effectively de-implement a low-value practice, it is necessary to target behaviour change at the healthcare professional-level of the healthcare system. Achieving behaviour change is challenging, but evidence has shown that it is more effective if interventions are based on evidence-based principles of behaviour change (Abraham et al, 2009).

Parker et al (2022b) conducted a scoping review of previous studies that used theory to explain what influences efforts to reduce low-value care at the healthcare professional-level and found that the Theoretical Domains Framework (TDF) (Cane et al, 2012) was the most commonly used determinant framework, used by 22 out of 48 publications. The TDF provides researchers with theoretical guidance on the determinants of, and key prompts for, achieving behaviour change amongst healthcare professionals. The framework contains 14 domains that can be used to explain behaviour change and should be considered when designing interventions to achieve improved implementation. The list includes constructs such as ‘motivation and goals’, ‘social influences’, ‘beliefs about consequences’ and ‘beliefs about capability’ and has been used extensively to develop behaviour change interventions among healthcare professionals (French et al, 2012; Porcheret et al, 2014; Presseau et al 2017). All 14 domains of the TDF were identified in the 22 studies. Five domains were identified across the majority of the 22 studies: ‘environmental context and resources’, ‘social influences’, ‘knowledge’, ‘beliefs about consequences’ and ‘social/ professional role and identity. This review highlights the potential usefulness of the TDF in understanding factors that influence changing the behaviour of healthcare

professionals that could be applied to the development of an intervention targeting the de-implementation of low-value care (Nilsen et al, 2020b). However, this review did not examine which of the TDF domains were more effective than others at achieving de-implementation and so it is not possible to understand which strategies are most effective for de-implementation.

An example of how the TDF can be used in practice can be seen in a study by Taylor et al (2013) who employed the framework to develop an intervention in hospital settings that supported staff to change their behaviour to implement recommended practice. The target behaviour in this study was for healthcare staff to check the pH of a patient's gastric aspirate rather than using an X-ray to verify the position of the nasogastric tube. The latter method of checking the tube position is less reliable and is therefore more likely to result in an error that could seriously harm the patient (National Patient Safety Agency, 2011). TDF domains were mapped against barriers identified by healthcare staff. The research team then derived interventions, in consultation with staff, based on behaviour change techniques to overcome each key barrier. The intervention targeted overcoming key barriers to check the pH of a patient's gastric aspirate including: social influences, emotion, skills and beliefs about capabilities. Nine months after the intervention, there was a 59% increase in the occurrence of the target behaviour and a 65% decrease in the number of X-rays. This study demonstrates that developing behaviour change interventions based on the TDF can be effective among healthcare staff when seeking to substitute one behaviour for a preferred behaviour to improve patient safety. It may therefore be possible to apply Taylor et al (2013)'s use of behaviour change theory and stakeholder input to the design

of an intervention that would facilitate the de-implementation of another low-value practice.

Similarly, Barlow et al (2020), tested the effect of an intervention that aimed to reduce the number of unnecessary arthroscopies carried out in secondary care settings by substituting this low-value practice with a less harmful alternative. The intervention comprised of a programme that directly addressed barriers to the implementation of NICE guidance that knee arthroscopies should not be carried out on patients with knee osteoarthritis. Barlow et al (2020) used the TDF to develop behaviour change strategies that targeted specific barriers (e.g. perceived pressure from patients to do something) to de-implement unnecessary knee arthroscopies. The intervention provided an alternative 'Personalised Knee Improvement Programme' (P-KIP) that could act as a substitute to knee arthroscopy. P-KIP comprised group educational sessions, individual sessions with a dietician and physiotherapist and a follow-up clinic 6-months post-intervention. Time series analysis was used to demonstrate that P-KIP prevented 15.4 arthroscopies a month, equating to 184 arthroscopies a year in a single hospital. This again suggests that the TDF can be effective in addressing barriers to replacing a low-value practice with an alternative that is more beneficial to patients.

1.8 De-implementing low-value safety practices

As outlined above, the majority of previous evidence that has explored the process of de-implementation in healthcare has focused on the need to identify and remove low-value clinical practices such as tests and treatments (Bhatia et al, 2015; Brownlee et al, 2017; Verkerk et al, 2018). Less attention

has been given to the de-implementation of low-value non-clinical practices such as patient safety practices (PSPs). Over two decades ago, the publication of the “To Err is Human: Building a Safer Healthcare System” report prompted global investment in efforts to improve patient safety and made improving the quality of healthcare an urgent priority (Kohn, Corrigan & Donaldson, 1999; Leape & Berwick, 2005). This report, alongside others such as ‘An Organisation with a Memory’ (OWAM) (Donaldson, 2002) and ‘Crossing the Quality Chasm’ (Corrigan, 2005) placed patient safety onto policy agendas and made it a core feature of the NHS constitution (Vincent, Burnett & Carthey, 2013). These seminal reports also drew attention to the importance of learning from critical incidents, which led to the establishment of the National Reporting and Learning System for Patient Safety Incidents (NRLS) (Macrae, 2016). The NRLS prompted the development of incident reporting systems and worked to increase incident reporting from staff, to create a more open culture in which learning from errors could lead to improvements in practice. Some incident reports trigger further investigation to understand why the incident took place and what action needs to occur to reduce the likelihood of it happening again (Shojania, 2008). A core function of incident investigations is therefore to organize improvement activities which often comprises of a set of new recommendations. Over time, the introduction of these recommendations into practice has led to an increase in the number of rules, policies and required practices introduced into the system to reduce slips, lapses and mistakes in the processes (Rae et al, 2018). Such procedures are not always evidence-based, but may, over time, become embedded in the culture of the institution (Montini & Graham, 2015).

The implementation of some of these new policies and practices has led to improvements in safety, for example, there have been reductions in hospital-acquired conditions such as adverse drug events, infections and falls (Bates &Singh, 2018; Dzau & Shine, 2020; Kohn, Corrigan & Donaldson, 1999). However, there is also evidence that some of these PSPs lack a sufficient evidence base and can have unintended consequences (Lawton & Thomas, 2022; Shekelle et al, 2013). For example, the use of smart infusion pumps and certain interventions to improve hand hygiene compliance were found to have weak underlying evidence bases (Shekelle et al, 2013).

The need to question the value of PSPs has become more relevant due to increasing recognition of the problem of 'safety clutter' in organisations. According to Rae et al, (2018), 'safety clutter' is 'the accumulation of safety procedures, documents, roles and activities that are performed in the name of safety but do not contribute to the safety of operations' (P.2). Therefore, over time, safety rules and PSPs, often implemented in response to incidents, can create unnecessary burden on the performance of everyday activity which can negatively impact safety. More and more PSPs are added to healthcare systems, however, when they become outdated due to new evidence, there are rarely attempts to remove them from practice (Wachter, Pronovost & Shekelle, 2013).To build a safer healthcare system, reduce costs and improve the efficiency of care, it is therefore also important that strategies are developed that can identify and de-implement low-value PSPs (Norton et al, 2018).

Shekelle et al (2013) define a PSP as "a type of process or structure whose application reduces the probability of adverse events resulting from exposure to the health care system across a range of diseases and

procedures" (p.1). Based on this definition, Shekelle et al (2013) developed an evidence-based approach to critically appraise the value of PSPs to determine priorities for implementation. Using systematic search strategies and expert consultation, the research team produced lists of PSPs that were ready for adoption into healthcare and lists of PSPs that were not. Therefore, while there has been some research that has identified PSPs for adoption, and so by default those that are not, evidence exploring the removal of low-value PSPs is lacking. Making progress on this issue could reduce strain on the healthcare workforce and create the capacity needed for healthcare staff to deliver more effective, patient-centered care. The focus of this thesis will therefore be to identify candidate low-value PSPs for de-implementation and then to develop an intervention that will support healthcare staff in stopping the target practice.

1.9 Pragmatism

Epistemological perspective concerns the nature of knowledge and refers to the relationship of the researcher to what they are researching (Johnstone, 2004). The epistemological stance for the research conducted in this thesis is pragmatism. Pragmatism considers practical consequences to be important components of meaning and truth (Creswell, 2009). This epistemology is not committed to any one system of reality, which allows the researcher to choose the methods that are most suited to the particular research question they are investigating (Dures et al, 2011; Johnson & Onwuegbuzie, 2004). The pragmatic philosophy has informed much previous health services research to seek functional knowledge and understand the impact of research on practice (Biesta, 2010; Greene, 2008;

Murphy et al, 1998; Tashakkori & Teddlie, 2010; Teddlie & Tashakkori, 2010).

Based on the assumptions of pragmatism, this thesis used different qualitative research methods to explore healthcare professionals' and patients' perspectives on de-implementing low-value safety practices (Morse, 2009). Due to the lack of research that has previously explored the de-implementation of low-value safety practices, the researcher (DH) decided that the use of qualitative methods would be most appropriate to gain a rich and in-depth understanding of stakeholders' attitudes towards the de-implementation of low-value safety practices.

1.10 Thesis aims

This chapter has presented a general summary of the current literature on the problem of low-value care and the need to de-implement low-value PSPs that contribute to safety clutter. This thesis aims to answer the following research questions in order to address the remaining gaps in the literature:

1. Which safety practices are most commonly identified as being of low-value by healthcare staff?

2. Why are the identified low-value safety practices perceived to be of low-value?

3. What types of interventions have been previously used to de-implement low-value healthcare practices and what have their effects been on patient safety?

4. What are the main perceived barriers and facilitators to de-implementing low-value safety practices in healthcare?

5. How feasible is it to co-design a behaviour change intervention with patients and healthcare staff that aims to stop healthcare staff carrying out a low-value safety practice?

1.11 Thesis overview

A systematic review, two empirical research studies, a consultation exercise and a series of co-design workshops were carried out to address the above research questions. An international survey (Study 1) explored what practices healthcare professionals perceived to be low-value for safety and why. Using qualitative content analysis, the most frequently mentioned practices were identified and compiled into a list that required further evaluation to determine whether they were appropriate candidates for de-implementation. Thematic analysis was used to identify five cross-cutting themes that explained why healthcare staff perceived the practices to be low-value. This study is reported in Chapter 2 and addresses the thesis research questions: which safety practices are most commonly identified as being of low-value by healthcare staff and why are the identified low-value safety practices perceived to be of low-value?

Chapter 3 reports on a systematic review (Study 2) that aimed to understand what types of interventions have been previously used to de-implement low-value healthcare practices and what the effects of these interventions have been on patient safety (research question 3). This review also aimed to understand which BCTs have been most effective in enabling the de-implementation of low-value healthcare practices, which healthcare professional groups have been targeted by previous de-implementation interventions and which patient safety outcomes have been measured.

A consultation exercise based on Delphi principles is described in Chapter 4. A set of criteria were developed, based on previous de-implementation and implementation literature, and used to eliminate the most frequently identified PSPs from the UK list described in Chapter 2, in order to identify priority PSPs to consider further for potential de-implementation. These criteria included: specificity, evidence base, economic value, staff motivation and risk of increased harm. A panel of healthcare professionals were asked to rate the different PSPs on these criteria to decide which practices were most appropriate to consider for de-implementation. The results from the consultation exercise were used alongside an assessment of the current evidence underlying the PSPs to determine two low-value PSPs to take forward for further evaluation. Based on these findings, double-checking medicines and intentional rounding were taken forward.

Chapter 5 reports an online interview study (Study 3) conducted with sixteen NHS nurse managers to explore the possible barriers and facilitators to de-implementing double-checking medicines and intentional rounding. This study aimed to address the research question ‘what are the main perceived barriers and facilitators to de-implementing low-value safety practices in healthcare?’ As a result of this study, a target low-value PSP was taken forward to the intervention development stage of this thesis.

Chapter 6 describes a series of five workshops that were conducted with stakeholders (healthcare professionals, patients and unpaid carers) to design an intervention that aimed to support healthcare professionals in de-implementing a specific form of the target low-value PSP. This chapter aimed to address the research question ‘how feasible is it to co-design a

behaviour change intervention with patients and healthcare staff that aims to stop healthcare staff carrying out a low-value safety practice?'

The final chapter, Chapter 7, presents a general discussion. It begins by summarising the research questions this thesis set out to answer and then describes the research carried out to address each one. The key findings from each chapter are then summarised and a number of reflections are made. Following this, general limitations and possible directions for future research are outlined before some practical recommendations are made.

Chapter 2

Identifying low-value safety practices for potential de-implementation: An exploratory survey of healthcare staff in the UK and Australia

2.1 Chapter summary

This chapter describes the findings of a survey study, carried out in the UK and Australia, that asked healthcare staff to identify practices they perceived to be of low-value for patient safety. The practices most frequently identified by staff are discussed alongside several cross-cutting themes that provide some possible explanation as to why they were perceived to be of low-value. The findings from this study informed the development of subsequent research activities within this thesis including a consultation exercise, an interview study and a series of co-design workshops designed to address the research questions of this PhD.

2.2 Introduction

As outlined in Chapter 1, low-value care is one of the most pressing problems in global healthcare that raises costs, causes patient harm and detracts from the delivery of high-value care (Mafi & Parchman, 2018). The concept of low-value care is broad and practices listed as low-value vary greatly, ranging from imaging for headaches to knee arthroscopies (Schwartz et al, 2014; Verkerk et al, 2018). Determining whether a practice is low-value depends on how value is defined, for whom and the context in which the practice is carried out. For example, some interpretations of low-value are based solely on financial reasoning (Sacristan, 2020; Scott &

Duckett, 2015), whereas other literature defines low-value care as that which does not align with patient preferences (Born et al, 2017).

Evidence from studies across the world indicates that, on average, 30% of all healthcare provision is low-value (of minimal or no clinical benefit) and 10% is potentially harmful (Grimshaw et al, 2020; McGlynn et al, 2003; Runciman et al, 2012). Increased recognition of the problem of low-value care has prompted research to focus on the identification and cessation of medical tests, treatments and procedures that are not evidence-based, cause more harm than good or are duplicative of other practices (Elshaug et al, 2007; Elshaug et al, 2012, Garner et al, 2013; Niven et al, 2015; Pearson & Littlejohns, 2007). This awareness has also prompted the development of initiatives such as the 'Choosing Wisely' campaign that works with medical societies to produce recommendations of practices that clinicians should avoid (Levinson et al, 2015).

2.2.3 The problem of safety clutter

The publication of 'To Err is Human: Building a Safer Health System' prompted an increase in investment and research focusing on improving patient safety (Stelfox et al, 2006). This led to the introduction of patient safety practices (PSPs) that were designed to reduce the probability of adverse events resulting from exposure to the healthcare system. The implementation of some PSPs has improved safety, for example, several meta-analyses have reported an association with surgical checklist use and reductions in mortality, wound infection and pneumonia (Bergs et al, 2014; Borchard et al, 2012; Gillespie et al, 2014). However, the value of other PSPs that have been implemented in an attempt to address urgent quality and safety problems without a sufficient evidence base has been questioned

(Scott, 2009; Shekelle et al, 2013). For example, mandates to reduce physician work hours were previously introduced on the assumption that tired physicians are more likely to cause errors that cause harm (Auerbach et al, 2007). However, the evidence demonstrating that this practice enhances safety is indirect and tentative (Fletcher et al, 2004; Gaba & Howard, 2002; Shetty & Bhattacharya, 2007; Weinger & Ancoli-Israel, 2002). According to Rae et al (2018), over time, the accumulation of low-value PSPs generates clutter that drains time, resources and attention that could be better spent on carrying out practices that do enhance safety. Additionally, this build-up of low-value PSPs can remove professional autonomy and opportunity for healthcare staff to use their critical judgement to adapt to situations because they feel constrained by the different safety policies and procedures. Previous evidence has demonstrated that jobs with high demands (such as long hours or high workloads) and low levels of autonomy are conducive to increased employee stress and burnout, which can contribute to poor patient safety outcomes (Demerouti et al, 2001, Hall et al, 2016; Hall et al, 2019; Welp & Manser, 2016). Therefore, to increase the efficiency of the healthcare system, lessen the burden of safety clutter and improve the safety of care, there is a need to understand how best to identify and remove low-value PSPs (Norton et al, 2017).

2.2.4 Identifying low-value care practices

To date, the majority of previous research that has tried to identify areas of low-value care has focused on clinical practices i.e. tests and treatments specifically (Badgery-Parker et al, 2019; Elshaug et al, 2012; Kool et al, 2020). Although there have been some efforts to evaluate PSPs to establish which ones are most appropriate for adoption (Shekelle et al,

2013; Shojania et al, 2001), there is a lack of research that has tried to identify low-value PSPs for potential de-implementation. Making progress on this issue could reduce safety clutter and thereby increase capacity for staff to deliver more high-value, patient-centred care.

A first step toward de-implementation is therefore to identify low-value PSPs. There is no consensus on the best way to do this. Previous attempts to de-implement low-value clinical practices have used top-down approaches such as technology appraisals to decide which practices are least cost effective before developing guidelines to discourage their use (Pearson & Littlejohns, 2007). However, this approach has proved difficult to implement in the past (Rooshenas, 2015), something that Haas et al (2012) attribute to the process relying on the uptake of guidance at the healthcare professional level.

Consulting staff about their perspective on which PSPs may be appropriate opportunities for de-implementation may be a more effective way of identifying low-value PSPs for potential removal (Rae et al, 2018). Several de-implementation theories encourage the involvement of healthcare professionals in the detection of low-value care. For example, a systematic review found that, of 27 framework models of de-implementation, 20 included stakeholder input as a key part of the de-implementation process (Walsh-Bailey et al, 2021). For example, Grimshaw et al (2020)'s 'Choosing Wisely De-implementation Framework' provides theoretically-underpinned guidance on the recommended steps to take in order to establish which 'Choosing Wisely' recommendations to implement as local priorities by using a combination of evidence and stakeholder input.

Previous research has used a combined approach to working with

healthcare staff to identify clinical low-value practices. For example, Elshaug et al (2012) conducted a literature search, a targeted analysis of NICE “do not do” recommendations and opportunistic sampling to collect nominations for candidate practices to consider for de-implementation from clinical experts and stakeholder groups. Any services that appeared multiple times across the different elements of the combined approach were prioritised into a list of potentially ineffective or unsafe practices that required further consideration. Elshaug et al (2012) thereby provide a transparent tool that combines stakeholder input and current evidence to identify potentially ineffective healthcare practices. Therefore, it is possible to involve healthcare professionals to identify areas of low-value healthcare, however, more research is required to understand the most effective way of doing this to identify low-value PSPs.

In light of the above, no research has asked healthcare staff to identify low-value PSPs for potential de-implementation. With growing evidence of the need to remove unnecessary healthcare practices, alongside the acknowledgement that some PSPs have been implemented into healthcare settings without a solid evidence base for patient benefit, it is essential that low-value PSPs can be identified for potential de-implementation. This study therefore aimed to work with healthcare staff to identify practices that they perceive to be of low-value because they do not benefit patient safety. Also, in order to strengthen the rationale for de-implementation in healthcare and better understand the process from a theoretical perspective, this study also aimed to understand *why* healthcare staff perceive certain PSPs to be of low-value. It is hoped that this information will shed light on how to motivate healthcare professionals to engage with de-implementation efforts and to

identify some of the potential challenges of de-implementation at the organisation and system level of the healthcare system.

Based on the literature described above, this chapter aims to address the following two research questions:

1) What practices are most commonly perceived to be low-value for patient safety by healthcare staff?

2) Why are the identified practices perceived to be of low-value?

2.3 UK Study: Methods

2.3.1 Overview of methods

Prior to the start of this PhD, GJ, AA and RL developed and piloted a survey that asked healthcare staff to identify healthcare practices that they considered to be 'a waste of time' for patient safety. The final version of the survey was circulated on social media from April 2018 – January 2019 and generated responses from 287 participants. At the beginning of this PhD in February 2019, DH reviewed the survey responses and decided to re-circulate the survey on social media from September 2019 – November 2019, alongside distributing paper copies of the survey on hospital wards to increase the sample size. All survey data from April 2018 to November 2019 is included in the analysis.

2.3.2 Ethical approval

Ethical approval for this study was granted from the University of Leeds Ethics Committee (No: PSC-730, 26/07/2019) and the Health Research Authority (19/HRA/4755, 19/08/19).

2.3.3 Participants and setting

Purposive sampling was used to recruit any member of NHS healthcare staff based in the UK via social media. No specific group of healthcare professionals was targeted because the aim was to understand the variety of practices that are perceived as low-value across different healthcare occupations. Social media was used to promote participation of healthcare staff from across a variety of NHS Trusts. Links to the survey were posted on Twitter and Facebook because they have been successful participant recruitment tools when applied in previous applied health research (Choo et al, 2015; O'Connor et al, 2014, Pedersen & Kurz, 2016, Sinnenberg et al, 2017).

To promote the inclusion of staff who did not use social media, participants were also recruited in-person on wards in a medium-sized teaching hospital in the North of England.

2.3.4 Procedure

The online survey was circulated on Facebook and Twitter between April 2018 and November 2019. Additionally, DH distributed paper versions of the survey in person to 10 wards at a medium-sized hospital in the North of England (September – November 2019). Completed hard copy questionnaires were returned anonymously via sealed collection points. DH input the data from the paper surveys into an Excel spreadsheet which also contained the online responses for analysis.

2.3.5. Survey design

AA, GJ and RL worked with 59 healthcare staff and patients to develop the survey over four piloting phases. Patients were also involved in the survey development process in accordance with the UK Standards for Public

Involvement (2019) which highlight the importance of involving people who will ultimately be affected by the research findings in the earliest stages of the research. The de-implementation of low-value safety practices will impact patient care and so it was necessary to ensure patient perspectives ware taken into account during the early stages of survey design. Patients and healthcare staff provided feedback about the wording and ease of understanding of the questions. As the phrase 'low-value' was not widely understood, researchers tested different options e.g. 'I would like to stop doing the following safety practice even though I am supposed to because I don't think it benefits safety' until one phrase was identified that was commonly understood by the majority of participants. To capture healthcare staff's interpretation of 'safety practice,' we did not define this term in the survey. The final questionnaire (Appendix 2.1) included three demographic questions: job title, work setting, NHS region, and one main question: 'It is a waste of time doing 'X' because it doesn't make care safer. Please tell us what 'X' is below. You can list more than one answer'. After completing this question, participants had the option to be entered into a prize draw to win £100, £75 or £50 by supplying their email address which was stored separately from their response and deleted after the prize draw took place.

Following the first round of data collection (April 2018 – January 2019), DH and GJ attended a patient and public panel based at the Yorkshire and Humber Patient Safety Translational Research Centre (YHPSTRC) and asked how best to meaningfully involve patients and the public throughout the research. The panel conveyed that it would be more meaningful to involve patients later on in the process of de-implementation, when the target practice had been identified because most patients are generally

unaware of the PSPs that take place in hospital. However, the panel reported that patient perspectives would be very useful when considering the potential implications of stopping a target practice on a patient's experience of healthcare.

2.3.6. Analysis

Qualitative content analysis

DH read through all online and paper-based responses repeatedly to become familiar with the identified practices. Some participants submitted responses that contained multiple practices. These were identified and separated out into individual practices to ensure they were all included in analysis. DH then grouped similar practices together into broad categories using open coding (where codes are developed during the coding process rather than using predefined codes) (Maguire & Delahunt, 2017). Appendix 2.2 contains the final coding of all included practices. Uncertainty about the meaning of responses e.g. abbreviations, was clarified with a research nurse or relevant clinical specialist. Initial categorisation of practices was reviewed by supervisors, GJ (50%) and RL (50%) who agreed with 75% of the initial coding. Discrepancies were resolved through discussion. This was a challenging process because some practices could be categorised into multiple groups and some practices could be interpreted as having more than one meaning. For example, Table 2.1 shows some of the original categorisation of responses compared to the final categorisation of the same responses.

Table 2.1. Examples of the original categorisation of UK responses and their final categorisation.

Response	Original Categorisation	Final Categorisation
'Bare below the elbows'	Uniform regulation	Infection control
'Near miss recording'	Documentation	Incident reporting
'Patient (Bristol) safety check list'	Assessment	Paperwork (checklist)
'Giving the patients yellow 'Falls Risk' wristbands'	Equipment	Patient devices
'Doing skin bundles on patients who are mobile and independent four times a day.'	Blanket regulations	Routine risk avoidance care strategies

Using clinical input from a research nurse and other clinical specialists where necessary, DH, RL and GJ (who is also a Registered Nurse) reviewed the categorisation several times before reaching a consensus on the final practice categories. The responses were assessed against a set of criteria as follows and were removed from the analysis if they met any of these criteria: 1) couldn't think of an answer e.g. 'don't know', 2) misunderstood the question e.g. ''Nothing is a waste of time if it is essential for the patient.',3) disagreed with the question e.g. 'I believe nothing is a waste of time.' or 4) N/A i.e. participants wrote 'nothing, 'no' or 'N/A'.

When finalising the short-list of the most frequently reported safety practices, further responses were removed because they were either a) too vague i.e. lacked sufficient information to know what was being referred to e.g. 'ticking boxes' or b) they were not practices, but rather organisational policies or process e.g. 'some quality payment targets'.

All remaining practices were then reviewed again by DH who removed practices that did not meet the following definition of a PSP, “a type of process, structure [or behaviour] whose [purpose] is to reduce [directly or indirectly] the probability of adverse events resulting from exposure to the healthcare system”. Adaptations [in brackets] were made to the original definition by Shekelle et al (2013) to aid its application in this context. For practices that DH was uncertain about, RL and GJ jointly made a decision on whether they met the definition. Where RL and GJ disagreed, input from relevant clinicians i.e. a nurse, doctor or pharmacist was sought and a final consensus decision was made through discussion. The frequency of the remaining practices was then calculated (see Figure 2.1).

Thematic Analysis

After the initial elimination of practices that did not address the research question, the data were subject to a thematic analysis. DH, GJ and RL independently reviewed the responses and identified higher-order, cross-cutting themes based on those responses that provided insight into why healthcare staff perceived the practices identified to be of low-value. Following discussion, similar themes were merged, and theme labels were adjusted to reach consensus on the final, cross-cutting themes. DH then coded all responses into these themes.

2.4 Results

2.4.1 Participants

Five hundred and twenty-six healthcare staff from all NHS regions (including Scotland and Wales) completed the survey. Most participants worked in secondary (acute) care (n=366, 70%) and were based in the Yorkshire and

Humber NHS region (n=227, 43%). Nurses, pharmacists and doctors formed the majority of participants who completed this survey, however non-clinical staff were also represented. Across all professional groups, more surveys were completed online than in person. (Table 2.2).

Table 2.2: No. Participants by occupation (including proportion online and proportion of occupation by total sample)

Occupation	Online:	Total: (online and paper)
Nurse	99 (70%)	142 (27%)
Pharmacist	84 (98%)	86 (16%)
Doctor	71 (93%)	76 (14%)
Manager	19 (86%)	22 (4%)
Healthcare Assistant	17 (52%)	33 (6%)
Midwife	14 (93%)	15 (3%)
Student	11 (92%)	12 (2%)
N/A	10 (77%)	13 (3%)
Paramedic	10 (100%)	10 (2%)
Clinical Researcher	9 (69%)	13 (3%)
Occupational Therapist	5 (100%)	5 (1%)
Physiotherapist	5 (83%)	6 (1%)
Head of Department	4 (100%)	4 (1%)
Administrator	1 (33%)	3 (1%)
Director	3 (100%)	
Social Worker	0 (0%)	0
Other	65 (75%)	86 (16%)
Total	**427**	**526**

2.4.2 Survey results

Participants made a total of 663 suggestions of low-value safety practices for potential de-implementation. Of these suggestions, 82 were removed from analysis because they either: 1) were ‘unable to think of an answer’ (n=2), 2) ‘misunderstood’ (n=9), 3) ‘disagree’ (n=6) where the participant disagreed

with the question and 4) ‘N/A’ which included responses such as ‘no’ or ‘no comment’ (n=65) (see Figure 1). When finalizing the short list of the most frequently reported safety practices, a further 216 responses were removed because they (a) lacked sufficient information to know what was being referred to, for example, “ticking boxes” (n = 106), or b) were not practices, but rather organizational policies or processes (n = 110), for example, ‘some quality payment targets.’

At this point, all responses which did not meet the aforementioned PSP definition were removed (n=26). The flowchart in Figure 2.1 details the process for eliminating responses and arriving at the final UK shortlist of 339 practices. Table 2.3 displays the ten most frequently mentioned categories of PSPs perceived by survey participants to be low-value, alongside the most frequently occurring practice within each category. The full list of categories and practices can be found in Appendix 2.2.

Figure 2.1: Flowchart of UK responses.

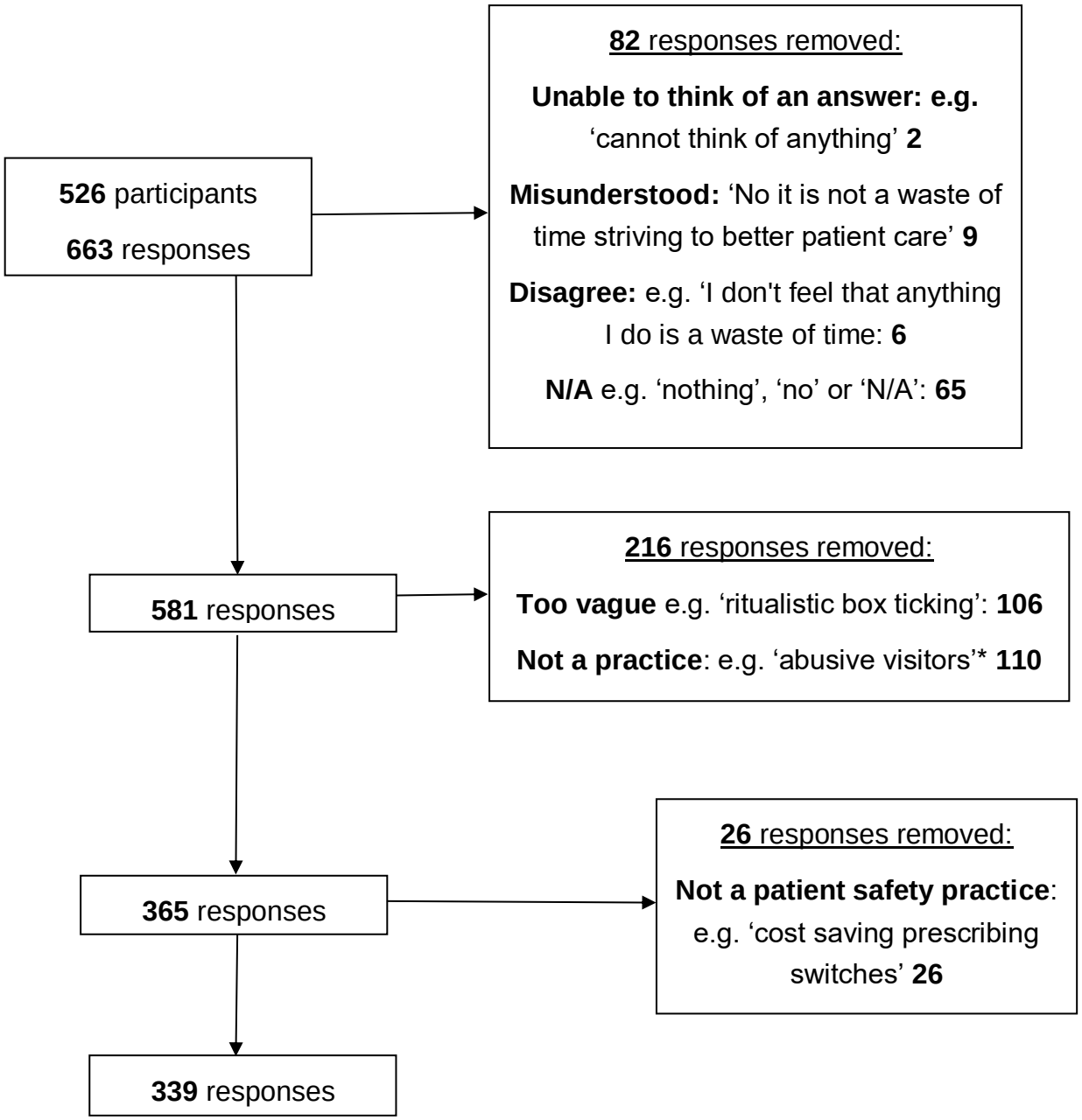


Table 2.3: Frequency of low-value safety practices by category and highest scoring example practices.

Category	Frequency	Example practice	Frequency
1. Paperwork	73		
(Assessments)	23	Falls risk assessment	5
(Duplication)	16	Writing the same information in different documents	16
(Audits)	12	Completing hand hygiene audits	6
2. Duplication	43	Double-checking medication	17
3. Intentional rounding	27	Intentional rounding*	27
4. Incident reporting	25	Completing incident reports	25
5. Medical tests procedures and treatments	23	Performing unnecessary ECGs	2
6. Routine risk avoidance care strategies	19	Checking pressure areas of independent patients	8
7. Infection control	17	Bare below the elbows	4
8. Training	12	Statutory & mandatory training	7

9. Organisation of medicines	9	Using medication compliance aids	8
10. Patient devices	7	Using green wristbands prior to surgery	5

* Intentional rounding is a structured process whereby nurses or healthcare assistants check on patients in hospitals, usually hourly, to assess their positioning, pain, personal needs and placement of items (Harris et al, 2019a).

2.4.3 Cross-cutting themes

Four cross-cutting themes were identified across the data to explain participants' perceptions of why these practices were low-value. Themes are presented in order of dominance with the most dominant themes discussed first.

1) Blanket policies

A blanket policy is a healthcare procedure that is universally applied across patient groups rather than adapted to suit individual patient need. Although blanket safety policies are implemented to mitigate preventable adverse events (such as thrombo-embolism or skin injury) in certain patient groups, some respondents perceived it a waste of time and resources to be mandated to carry out such checks on patients at very low-risk.

e.g. "*falls bundles for all over 65s*",

"*Turnarounds on independent patients*"

Some participants reported that, not only are some assessments carried out on patients who are unlikely to be at risk, but they are carried out multiple times on these patients. For example, "*doing skin bundles on patients who are mobile and independent four times a day.*" Participants

reported that as well as wasting resources, this undermined professional autonomy.

Similarly, participants suggested that some blanket policies, not only wasted staff time, but also had the potential to cause harm when carried out on patients who are unlikely to benefit. For example: "*routinely checking hourly on sleeping patients when there is no reason to think they will harm themselves during the night…shining a light on them just wakes them up*". Therefore, some responses stated that blanket policies can result in wasting healthcare staff time whilst simultaneously reducing the quality of care experienced by patients.

Some healthcare staff considered a task to be unnecessary because it did not have a visible, positive effect on patient safety but policy required it, e.g. "*Cursory double checks of medication administration that don't add anything safety-wise*".

These responses suggest that either healthcare staff believe they carry out certain practices for no safety benefit, perhaps not being fully informed of, or not fully understanding the benefits of these tasks.

2. Covering ourselves

Participants reported that some of the administrative tasks they are required to complete are a 'waste of time' because they take healthcare staff away from providing direct care, to produce evidence of completed safety-related tasks (e.g. safety checklists). While participants understood that many administrative tasks were introduced to reduce the risk of adverse events, they also conveyed beliefs that the volume of administrative tasks meant this strategy had become counterproductive and may detract from

rather than enhance patient safety, thereby contributing to the problem of safety clutter,

e.g. "*Filling in multiple forms to indicate care done… forms become more important than doing the care."*

This theme encompassed all responses that mentioned the administrative burden of recording completed care tasks at the expense of the quality of that care. Some participants perceived the focus to be more on reducing legal risk should an adverse event occur than increasing patient safety:

"Obsessive Admin[istration] - it doesn't change patient care but does cover our backs - at the cost of time.".

The responses categorised into this theme often mentioned that administrative tasks require a disproportionate amount of time to complete in comparison to direct patient care, e.g. *"80% of your time is spent on paperwork and 20% of your time spent on actual meaningful support!".* Therefore, healthcare staff may perceive a task to be unnecessary if the time it takes to complete outweighs the perceived potential patient safety benefit.

Additionally, some responses in this theme described some healthcare tasks as 'tick box exercises' that do not enhance patient safety but rather are mandated to demonstrate that the healthcare professional practiced appropriately. Responses that mentioned ticking boxes as a way of 'covering' healthcare professionals were included in this theme:

e.g. *"Ticking certain boxes that don't reflect clinical practice"*,

"Numerous tick boxes done 'in the name of safety' which are often not".

3. Not my job

Healthcare staff highlighted that carrying out tasks that are not part of their formal job role is a waste of time because it takes them away from their core caring duties and responsibilities. Many responses identified specific tasks often carried out by healthcare staff that are not their responsibility:

e.g. "making teas outside meal hours while domestics are working in the unit"

"'Trained nurses washing equipment and the environment"

Additionally, some participants reported that certain tasks, which are part of their job description, should be allocated to other staff/grades with a more appropriate skill-set, to ensure more specialised healthcare professionals have time to complete tasks that require specific expertise:

e.g. *"It is a waste of time having to do regular CD (*controlled drugs*) checks as pharmacists… this task could be done by pharmacy technicians and would save time for the pharmacists to focus on seeing patients."*

In this way, some participants felt that doing a task which could be completed by someone with more basic skills training was a waste of time. Therefore, whether a task is perceived as a 'waste of time' can also depend on who is performing it rather than the task itself.

4. Approaches to the implementation of safety practices

Some participants felt that the way certain practices are implemented can also detract from patient safety. A policy might be instigated, which, if carried out according to the guidelines, is effective and enhances patient safety. However, if that policy is disseminated without the appropriate guidance or implementation strategy, healthcare staff may carry out the

practice in a way that was not originally intended or not at all, potentially causing more harm than good (Soong et al, 2020). Participants identified that certain policies that are difficult to adopt can be perceived as low-value:

e.g. "*Policies and protocols at high-level without a real focus on implementation"*.

"top down edicts from NHSE/NHSI/CQC that don't take into account local context".

Therefore, participant responses indicated that the way a policy is implemented in practice can determine its perceived usefulness in enhancing patient safety. This theme also captured responses which highlighted the importance of taking local culture and context into consideration when trying to understand why a safety practice might be perceived as low-value.

2.5 UK study discussion

This study aimed to identify PSPs that UK healthcare staff perceived to be low-value. Previous research has used international campaigns and systematic search strategies to identify medical tests and treatments of potential low-value (Elshaug et al, 2012; Schuur et al, 2014), however, this study is unique because it used a staff-led approach to identify potential low-value PSPs.

The category 'Paperwork' was perceived by healthcare staff to represent the greatest 'waste of time' with the sub-category 'paperwork (assessments)' containing the most responses, which included practices such as 'falls' or 'pressure injury risk assessments'. 'Duplication' was also perceived by healthcare staff to waste time, with 'double-checking

medication' being the most commonly identified behaviour within this category. 'Intentional rounding' and 'incident reporting' were also frequently mentioned in the survey responses.

Previous evidence supports the questionable value of several of the practices identified by healthcare staff, at least in the way they are currently implemented. For example, the value of 'incident reporting' for improving patient safety has been questioned repeatedly (Brunsveld-Reinders et al, 2016; Shojania, 2008; Thomas et al 2011). This practice, although well-intended, and at the centre of many efforts to improve healthcare safety, suffers from a multitude of limitations including physician underreporting and, when incidents are reported, visible action in response to these is rare (Mitchell et al, 2016).

There is also limited research demonstrating the benefits of 'intentional rounding,' another practice identified as being of low value for patient safety in the present study. Intentional rounding is a structured process that involves nurses carrying out regular checks using a standardised protocol on patients to ensure they are comfortable and safe (Harris et al, 2019a). The evidence for 'intentional rounding' that does exist has been questioned due to issues of selection bias, potential conflicts of interest, study design and data analysis (Halm, 2009; Harris et al, 2019b; Snelling 2013).

One of the most frequently mentioned practices healthcare staff perceived to be 'a waste of time' was double-checking medication. This widely adopted procedure is used when administering specifically classified medicines to ensure the correct dose and drug is given to the correct patient at the right time. Despite evidence that double-checking makes healthcare

professionals feel safer when administering drugs in high-risk situations (O'Connell et al, 2013), it requires additional nursing resource and causes workflow interruptions that may introduce other risks (Mcleod et al, 2015). The evidence demonstrating that double-checking medication is associated with reduced harm compared to single-checking is inconclusive (Koyama, 2020). Therefore, the perceptions of healthcare staff regarding double-checking medication reported in this study align with existing evidence suggesting its potential low-value for patient safety, particularly when applied routinely to low-risk medicines, or not executed as intended (Westbrook et al, 2021).

The burden of excessive administrative work on healthcare professionals is recognised globally, with previous evidence demonstrating that a high administrative workload contributes to reduced professional autonomy and burnout amongst healthcare professionals (Ashton, 2018; Wright & Katz, 2018). Significant associations have been identified between burnout amongst healthcare professionals and poor patient safety outcomes (Hall et al, 2016; Hall et al, 2019; Panagioti et al, 2018). The present finding of 'Paperwork' being the most frequently identified category of low-value PSP is therefore aligned with previous evidence that has found an indirect association between administrative burden and negative patient safety outcomes (Doran et al, 2016; Hall et al, 2019; Panagioti et al, 2018). However, participants might have identified 'Paperwork' as a waste of time for safety for other reasons which were not apparent because the design of the survey did not prompt explanation of their identified practice. Thus further research to understand why healthcare staff perceive paperwork to be a waste of time for patient safety and how evidence of care could be

more efficiently captured without increasing the administrative workload of healthcare professionals is needed.

A strength of this survey is that its simple design prompted a large number of responses from a variety of different healthcare professional groups, increasing its representativeness. Also, using both online and paper-based data collection enabled the research team to engage with healthcare staff who did not use Facebook or Twitter. Finally, anonymity of responses is likely to have improved participation (Braun et al, 2020).

The limitations of this survey study must also be considered. Despite iteration during multiple rounds of piloting with staff and patients, a large proportion of the total number of responses were removed from the final results because they did not address the research questions i.e. 12% (n=82) responses were eliminated because they disagreed with the question, misunderstood, couldn't think of an answer or responded with an 'N/A'. Although this could have been due to healthcare workers' lack of familiarity with discussing de-implementation or the absence of an established terminology surrounding the subject (Davidoff, 2015), it may also have been due to confusion regarding the non-specific phrase 'a waste of time'.

An opportunity arose for DH to replicate the UK survey with a research group based at the University of Technology in Sydney, Australia. The research group (DD, JC, SSL, SM, NT, EI, CF, SSM) expressed an interest in applying the same methods used in the present UK survey study to an Australian healthcare service. It was agreed that DH would lead on adapting the survey, collecting the online data and analysing the responses while the Australian team would distribute and collect the paper survey responses in Australian hospitals and work with DH to review the coding of

Australian responses. The next section of this chapter will outline the Australian survey and findings.

2.6 Australian survey: methods

2.6.1 Ethical approval

Ethical approval was granted from the St. Vincent's Hospital Sydney Human Research Ethics Committee (HREC) (2020/ETH00072, 05/02/2020) and was ratified by University of Technology Sydney HREC (ETH20-4808, 02/03/2020).

2.6.2 Participants and setting

Purposive sampling was used to recruit healthcare staff based in Australia using Facebook and Twitter due to the success of this method during the UK survey. No specific target group of Australian healthcare professionals was chosen because the study aimed to understand the breadth of safety practices that can be perceived to be low-value by different groups of healthcare staff. Additionally, following the large number of responses that had to be removed from the UK results, it did not seem appropriate to limit the responses further by narrowing the inclusion criteria.

In addition to using social media, participants were also recruited from a medium-sized tertiary referral hospital in Sydney, Australia to promote inclusion of staff who did not use social media.

2.6.3 Procedure

The online survey was circulated via social media from May 2020 to November 2020. Paper versions were also distributed in person on nine wards during this time. Paper surveys were collected at the time of completion or from sealed collection points on wards. DD (registered nurse

and senior healthcare services researcher) and JC (senior healthcare services researcher) scanned completed paper surveys to DH who transferred the data onto an Excel spreadsheet containing the online responses.

2.6.4 Survey design

DH worked with DD to make context-related modifications to the original UK survey questions e.g. participants were asked which Australian state they work in (Appendix 2.3). Following the large proportion of responses which had to be removed from the UK data because they did not address the research questions, the main question was adapted [adaptations in brackets]: *"It is a waste of time doing 'X' because it doesn't make care safer. Please tell us what 'X' is below. You can list more than one answer. [Please try and be as specific as possible in your answer]".* Two additional questions were also added i.e. "*Please write any further comments in the box below, in particular, why you think 'x' is a waste of time*." This question was added to encourage participants to explain why they perceived the practice to be of low-value. The second additional question was "*What do you do to work around 'X*?" The responses for this question are not included here because the findings do not address the objectives of this PhD and it was agreed prior to data collection that the Australian team would analyse these responses as part of a separate project. Once participants had completed the survey, they had the opportunity to be entered into a prize draw to win $100, $75 or $50 by supplying their email address which was stored separately from their response and deleted after the prize draw took place.

2.6.5 Analysis

Qualitative content analysis

DH read all responses repeatedly to become familiar with the identified practices. Responses which contained multiple practices were identified and separated out into individual practices to ensure they were all included in the analysis. DH then grouped similar practices into broad categories using open-coding. Any uncertainty about the meaning of responses was clarified with DD who had previously worked as a nurse in Australian healthcare services. To ensure consistency in the way that the UK and Australian responses were categorised, DH tried to use the same labels that were used to categorise the UK responses. However, on occasion, new categories e.g. 'Covid-related' and 'handovers' were developed or adjusted and this resulted in slight changes being made to the UK coding to ensure consistency.

Categorisation of practices at this stage was reviewed by DD and JC who acted as independent second reviewers and agreed with 77% of the initial codes (Table 2.4). Any discrepancies were resolved through discussion. At this point, practices categorised as 'unable to think of answer', 'misunderstood', 'disagreed', 'N/A', 'not a behaviour', 'too vague' were removed.

Table 2.4. Examples of the original categorisation of Australian responses and their final categorisation.

Response	Original Categorisation	Final Categorisation
"Smoking cessation clinical pathway."	Screening	Assessments
"Waiting for computer systems to load/ old technology to work"	Hospital software	Technology
"Issuing policy after policy post an adverse event…"	Developing protocols	Governance
"Cleaning of beds"	Hygiene	Task allocation

All remaining practices were then reviewed again by DH who removed practices that did not meet the aforementioned definition of a PSP. DD, JC and SSL together also reviewed the practices where DH was uncertain about whether they met the definition of a PSP (3%). Again, any discrepancies were resolved through discussion until an agreement was reached.

Thematic analysis

DH conducted free-text coding of the Australian data using the framework developed to analyse UK responses. DH also reviewed the responses to identify any additional cross-cutting themes which may not have been identified in the UK data. DD and JC reviewed DH's categorisation of responses to the cross-cutting themes. Disagreements on categorisation of responses were discussed to reach consensus on the final cross-cutting themes.

2.7 Results

2.7.1. Participants

The majority of the sample were nurses, doctors and managers, though non-clinical staff were also represented e.g. administrators and social workers.

Five hundred and fifteen healthcare staff completed the survey, producing 731 suggestions of practices perceived to be a waste of time for patient safety. Most participants worked in hospital settings (n=384, 74%) and were based in New South Wales (n=352, 68%). The flowchart in Figure 2.2 displays the process for screening responses and arriving at the final shortlist of 460 practices. Fewer responses were removed at the second stage in the Australian sample because the additional questions helped to identify practices more frequently. Table 2.6 displays the ten most frequently mentioned categories alongside the most frequently occurring practice within each category. The full list of categories and practices can be seen in appendix 2.4.

Table 2.5: No. Participants by occupation (including proportion online and proportion of occupation by total sample)

Occupation	Online:	Total: (online and paper)
Nurse	196 (85%)	213(44%)
Doctor	73 (100%)	73 (14%)
Manager	39 (98%)	40 (8%)
Other	35 (78%)	45 (9%)
Social Worker	22 (96%)	23 (4%)
Clinical Researcher	18 (78%)	23 (4%)
Director	14 (100%)	14 (3%)
N/A	13 (100%)	13 (3%)
Administrator	10 (44%)	23 (4%)
Midwife	10 (100%)	10 (2%)
Paramedic	8 (89%)	9 (2%)
Head of Department	7 (100%)	7 (1%)
Physiotherapist	6 (86%)	7 (1%)
Student	4 (100%)	4 (1%)
Pharmacist	3 (50%)	6 (1%)
Occupational Therapist	3 (100%)	3 (<1%)
Healthcare Assistant	2 (100%)	2 (<1%)
Total	**463**	**515**

2.7.2 Content analysis results

Figure 2.2: Australian Responses Flowchart

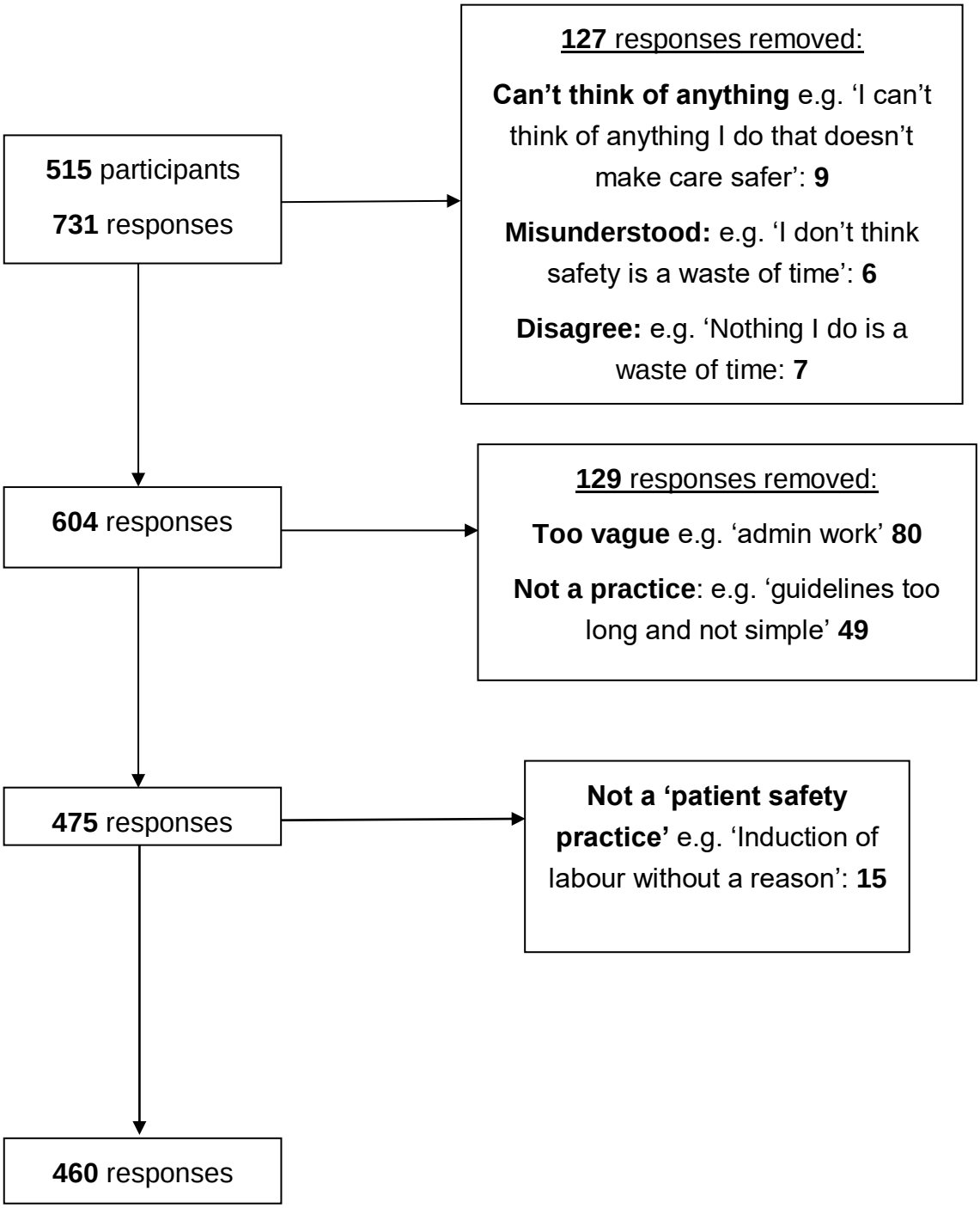


Table 2.6: Frequency of low-value safety practices by category and highest scoring example practices.

Category	Frequency	Example	Frequency
1. Paperwork	196		
(Assessments)	82	Waterlow assessment**	28
(Evidencing care)	32	Completing the intentional rounding document	16
(Checklists)	20	Safety checklists	14
2. Mandatory training	40	Hand hygiene training	8
3. Duplication	34	Duplicating information on multiple electronic and paper systems	9
4. Task allocation	21	Administrative tasks carried out by clinicians	8
5. Administrative tasks	19	Manually updating patient contact details	4
6. Communication issues	19	Ineffective communication with patients	5
7. Blanket policies	16	Carrying out routine assessments	6
8. Medical tests, procedures and treatments	13	Obsolete scans and tests	4
9. Incident reporting	10	Completing an incident report	7
10. Infection control	10	Wearing disposable plastic gowns over scrubs	3

**A Waterlow score is a routinely used practice that assesses the risk of pressure sore development in patients (Parboteeah et al, 2008).

2.7.3 Cross-cutting themes

The four cross-cutting themes identified in the UK data were also identified in the Australian data with the additional theme of 'lack of impact'. Table 2.7 contains representative quotes from the Australian data for the cross-cutting themes that matched the UK findings. Themes are presented in order of dominance with the most dominant themes discussed first.

Table 2.7: Representative quotes for each cross-cutting theme from the Australian data.

Cross-cutting Theme	Quote
Blanket policies	"*Doing falls risk assessment for obviously very low-risk patients.*" "*Doing tasks because the standards say so, rather than it's of benefit to care.*" "*We are tied to high frequency of patient risk assessments because of a previous incident, so a blanket rule is made for all patients which doesn't allow for low-risk*".
Covering ourselves	*"I think it is aimed at protecting the employer rather than the patient."* *"doesn't make patients safer, just shows that nurses have read the form & ticked the box so that they score 100% on the audits"*.
Not my job	"*Sorting out IT issues are an inefficient use of my time which should be spent on clinical rather than administration tasks."* "*Rosters can be created by admin[istration] staff; they do not need to be created by nursing managers."*
Approaches to implementation of safety practices	*"Expected to read 100's of policies with 30 to 60 pages that you will never remember."*

Lack of impact

The theme 'lack of impact' was identified when analysing the Australian data. Following its identification, the research team reviewed the UK data

again and found that, although less prominent, several UK responses were congruent with this theme.

Some healthcare staff noted that healthcare practices can be a waste of time if they do not lead to discernible action or change,

"*…writing these (*local operating procedures*)… makes no difference it's 'just another thing to read" (UK)*.

"The results of the screen do not result in any change to patient care or activation of any system or action" (Australia)

These examples highlight the lack of motivation that can be experienced by staff when completing tasks for seemingly no benefit (e.g. completing audits without implementing a plan to effect positive change). Additionally, some participants noted that certain practices can have a negative impact on staff: e.g.

"I feel it just tells staff that we are doing poorly at things and rarely has positive benefits or enforcement of better behaviours." (Australia)

Therefore, some practices can be seen to be low-value because they induce negative feelings amongst staff that are not conducive to facilitating improvements in care.

2.8 Australian survey discussion

This replication study aimed to adapt the original UK survey and ask Australian healthcare staff to identify PSPs that they perceived to be a waste of time for patient safety. The most frequently mentioned category of practices identified by Australian healthcare staff was 'Paperwork (assessments)' with 'Waterlow assessments' being the most commonly

identified practice within this category. This finding is consistent with previous research that has questioned the value of pressure injury risk assessment tools (Chou et al, 2013; Moore & Patton, 2019; Saleh, Anthony & Parboteeah, 2009). Several systematic reviews have produced inconclusive findings of the effectiveness of pressure injury risk assessment tools such as Waterlow assessments in reducing the incidence of pressure injuries (Gaspar et al 2019; Moore & Patton, 2019; Parboteeah et al, 2008). The available evidence in this area is low-quality and so more research is needed to understand if Waterlow assessments are more effective at reducing pressure ulcer incidence compared with alternatives such as clinical judgement (Moore & Patton, 2019). Participants in the present study alluded to several reasons explaining why they perceived the Waterlow assessment to be low-value: 1) it doesn't encourage comprehensive assessment, 2) it is carried out with unnecessary frequency and 3) it is carried out on patients at very low-risk. These underlying reasons highlight the importance of understanding the specific context in which a PSP is considered to be low-value because it is possible that Waterlow assessments could be perceived as valuable when carried out on certain patient groups or if it were carried out less frequently or if it were tailored to facilitate a more comprehensive assessment. This finding suggests that some healthcare staff perceived certain practices to be of low-value for safety that are not supported by a strong evidence base.

Mandatory training was also commonly identified as a low-value safety practice by participants. Mandatory training for healthcare professionals is required by commissioning bodies and non-adherence can negatively impact Care Quality ratings (Royal College of Nursing, 2021).

Hand hygiene training was the most frequently identified practice within this category. It has been well-established that effective hand hygiene training can improve hand hygiene practices among healthcare professionals and thereby reduce risk of infection in hospital settings (Martos-Cabrera et al, 2019). However, there is considerable variation in adherence to best hand hygiene practice amongst healthcare professionals globally, indicating the need for improvement efforts to prevent patient harm (Lambe et al, 2019; Musu et al, 2017; Pittet et al, 2009). Instead of investigating whether this practice is appropriate for de-implementation, it would be more useful to explore why healthcare staff perceived hand hygiene training to be of low-value and how it could be modified to become a less onerous task. Previous commentary has indicated that mandatory training takes too much time to complete and is carried out unnecessarily frequently, suggesting that the way a practice is implemented can detract from its perceived value (Gerada, 2019; MacDonald, 2019). This finding highlights that some practices identified in the present study as low-value PSPs will not be appropriate for de-implementation but should prompt investigation into how they can be implemented more effectively to streamline staff workload and free-up time that could be allocated to providing more effective and patient-centred care.

A possible strength of the Australian study is that the adaptations to the survey questions, designed to address the UK survey limitations, resulted in 12% more responses being included in the final list of practices. Although this is an improvement, a considerable proportion of responses still had to be removed from analysis because they did not answer the research aims. Future research may therefore benefit from working with healthcare

professionals and patients to develop survey questions that are more likely to generate responses that can be included in the final results.

2.9 General discussion

To develop an understanding of how the process of de-implementation may vary depending on geographical setting, it is useful to compare the survey findings produced in the UK and Australian healthcare settings. Several similarities exist between the two datasets, for example, ‘paperwork (assessments)’ was the most frequently identified category across both surveys. This reflects the global administrative burden that imposes documentation and reporting duties on clinicians due to mounting organisational policies and governmental reporting requirements (Heuer et al, 2016). The number of administrative duties placed on healthcare professionals has grown over the past few decades for many reasons, including the introduction of quality initiatives and an increased emphasis on value-based quality metrics (Porter, 2009). Heuer (2022) posits that some of the efforts to enhance healthcare quality that have involved measuring quality indicators have gravitated to a point where the costs now exceed the benefits derived and this excessive reporting may have a negative impact on quality. This was observed in the Netherlands where healthcare professionals were found to spend 52.3 minutes per day on quality registrations, however, clinicians only perceived 36% of these to be potentially useful for improving patient care (Zegers et al, 2022). To reduce this administrative burden, further research is required to understand exactly which forms of paperwork could be appropriate candidates for de-implementation. Alternatively, this problem could be alleviated in some

circumstances by reducing inefficiencies in certain administration processes or introducing more support staff in the clinical setting to remove some pressure placed on healthcare professionals (Mazur et al, 2019; Zegers et al, 2022).

Additionally, the category ‘duplication’ was frequently identified across the UK and Australian data, encompassing a variety of practices such as double-clerking of patients and documenting the same information in several formats. Duplication of effort can arise as a result of systems and processes in healthcare evolving over time instead of being designed and implemented for optimum efficiency (O’Connor et al, 2021; Vincent, Burnett, Carthey, 2014). Some duplication of effort can be valuable, for example, multiple patient identification checks to create redundancy in the system that can prevent unexpected interactions. However, other forms of duplication such as inputting identical patient notes into different electronic systems contributes to system inefficiency and potential risk due to human error. The most frequently identified form of duplication identified by UK participants was double-checking of medicines, whereas amongst Australian participants it was duplicating information on multiple electronic and paper systems. A possible explanation for the UK focus on a medication safety practice could be due to the larger proportion of pharmacists that completed the survey (16.3%) compared to the Australian sample (1.2%). However, further investigation is required to understand if healthcare professionals perceived this to be a more prominent problem in the UK compared to Australia and if so, why this might be. Future research should aim to explore exactly which forms of duplication should be removed from healthcare systems and what the implications of this could be on patient safety.

Additionally, healthcare professionals in both the UK and Australia perceived the practice of intentional rounding and the documentation of intentional rounding respectively as low-value PSPs. Intentional rounding was originally implemented to operationalise regular interaction between nurses and patients to make it easier to detect subtle changes and disturbances in the patient's condition that might arise day to day or hour by hour (Sims et al, 2018; Vincent, Benn & Hanna, 2010; Weick &Sutcliffe, 2001). This increased sensitivity to operations was designed to facilitate the early identification of problems so that healthcare staff could intervene before a patient's safety is compromised. In practice, however, intentional rounding often cannot be carried out in accordance with policy due to a lack of resources (Snelling, 2013). Harris et al (2019b) support this finding, reporting that although most occurrences of intentional rounding are evidenced, fidelity to the original intervention is generally low. This resonates with the 'work as imagined vs 'work as done' paradigm which states that certain healthcare practices are often not carried out in line with policy because their design does not account for local context and cultural characteristics (Braithwaite, Wears & Hollnagel, 2016). It is therefore possible that healthcare staff perceived intentional rounding to be of low-value for patient safety because it often cannot be conducted according to the policy, thereby decreasing its value. Further research is required to better understand the context in which intentional rounding is perceived to be of low-value and if it should be modified or removed from healthcare settings to improve patient safety. Exploring this issue using interviews or focus groups with nurses could produce richer data that will help to

determine whether this practice should be considered as a target practice for de-implementation.

It is important to interpret the findings of ‘paperwork’, ‘duplication’ and ‘intentional rounding’ within the wider context of current safety literature. Vincent, Burnett and Carthey (2014) highlight the importance of consistently measuring and monitoring past harm to support healthcare services in predicting and preventing adverse events that could occur without intervention. Historically, clinicians used their critical judgement to assess a patient’s risk of harm, however, due to the pressure on the healthcare system, in recent years, such tasks have been delegated to staff with less specialised skills e.g. healthcare assistants. These changes are often accompanied by checklists or assessments that reduce the necessity for an understanding of physiology or anatomy that a clinician would have. Consequently, checklists and assessments (some of which contribute to safety clutter) represent a large proportion of nurses and healthcare assistants’ workload (Redley & Raggatt, 2017). Some healthcare professionals might perceive this increase in administrative responsibilities to be a waste of time for patient safety because the impact of completing assessments and checklists on low-risk patients might not be apparent at the patient or healthcare professional-level of the healthcare system (Norton et al, 2020). However, the accumulation of frequent risk assessments over time might contribute to learning that takes place at an organisational-level to prevent future harm (Hollnagel et al, 2015). This could possibly explain why UK and Australian-based healthcare professionals both identified Waterlow assessments, falls risk assessments and VTE assessments as a waste of time for patient safety. Therefore, the benefit of certain risk

assessments for patient safety might not be visible to healthcare staff. Further research is therefore required to understand why healthcare professionals perceive some risk assessments to be of low-value and explore whether healthcare professionals are aware of the wider organisational-level benefits of completing some universal risk assessments.

It is also useful to highlight some of the differences identified between the UK and Australian findings. ‘Task allocation’ was one of the most commonly identified categories of practices in the Australian data, however, this category was not frequently identified by UK participants. Despite this, many UK responses were underpinned by the cross-cutting theme ‘not my job’ where participants identified certain tasks as low-value because they thought that the tasks should be carried out by other staff with a more appropriate skill-set. Therefore, although UK participants did not explicitly identify ineffective forms of task allocation as low-value PSPs, they alluded to the fact that tasks can become low-value if they are allocated to the wrong professional group. This suggests that, although there were differences in some of the most frequently identified categories of practices, many of the reasons underlying their identification appeared to be the same between the Australian and UK sample. However, further research is needed to understand why other practices such as ‘organisation of medicine’ and ‘patient devices’ were frequently identified in the UK data but not in the Australian data.

Several of the cross-cutting themes identified across the UK and Australian data align with existing literature relating to safety, risk management and de-cluttering. For example, the issue of completing excessive administrative

tasks at the expense of the quality of direct patient care described in ‘Covering ourselves’ aligns with previous research that has identified fearing litigation as a driver for the use of low-value care (Alber et al, 2017; Buist et al, 2016; Kool et al, 2020; Zikmund-Fisher et al, 2017). Producing evidence of completed safety tasks provides reassurance that a healthcare professional provided appropriate care to a patient; information that can be very useful when conducting incident investigations or dealing with complaints (Bromiley, 2008; Macrae, 2015). Therefore, healthcare staff may carry out PSPs that they know are not directly beneficial for patients, out of fear of not being able to demonstrate that they practiced appropriately in the event of an adverse event.

Similarly, the ‘Approaches to the implementation of safety practices’ theme aligns with previous evidence that has highlighted the importance of tailoring interventions to the specific context in which they are being delivered (Grimshaw et al, 2004; Taylor et al, 2013). Interventions that target specific barriers to change have been found to be more effective than those that are not (Baker et al, 2010). Additionally, previous research has found that implementation problems influence staff perception of the value of tasks (Munoz-Plaza et al, 2016).

Further, the theme ‘blanket policies’ is consistent with much previous research that has explored the tension between standardising practices and reducing the opportunity for healthcare staff to use their professional autonomy (Evetts, 2002; Martin et al, 2017). In order to reduce variation in practice, some practices are standardised, however, this can reduce the autonomy afforded to healthcare professionals to flex and adapt to local problems. Rae et al, (2018) recognise ‘generalisation’ as a mechanism that

generates safety clutter that can create the problem of indifferentiation amongst staff, where it is no longer clear which activities are high risk. This can lead to the unnecessary allocation of limited resources which can detract from the quality of other care practices.

Healthcare staff based in the UK and Australia were willing and able to identify practices that they perceived to be of low-value for patient safety. The resulting short-lists of practices can now be subjected to further evaluation to determine appropriateness for de-implementation. Participants provided information about why these practices were low-value for safety, often referring to their focus on risk management rather than patient outcomes, or the uniform and inappropriate use across all patients. Future studies are needed to explore the context and reasons why participants identify certain practices for de-implementation. However, this staff-led method offers a novel and potentially more context-sensitive method for identifying candidate safety practices for de-implementation within healthcare.

Chapter 3
A systematic review exploring the effects of de-implementing (remove, restrict, reduce or replace) low-value healthcare practices on patient safety.

3.1 Chapter summary

The findings from Study 1 (Chapter 2) provide insight into the types of practices healthcare staff perceived to be low-value for safety and why. In order to understand how such low-value practices could be removed from healthcare settings, it is useful to explore what interventions have been used by previous research to de-implement low-value care practices. Understanding what types of strategies have previously been effective at carrying out de-implementation in healthcare settings could be used to inform the design of an intervention that aims to de-implement a low-value patient safety practice (PSP). This chapter reports a systematic review and meta-analysis that aimed to address the third research question posed by this thesis: What types of interventions have been previously used to de-implement low-value healthcare practices and what have their effects been on patient safety? The findings from this review were used to inform the intervention development process that is reported later on in this thesis.

3.2 Introduction

De-implementation of low-value healthcare practices is needed to improve patient safety, reduce unnecessary spending and create a more sustainable healthcare service (Brownlee et al, 2017; Mafi & Parchman, 2018). Despite an increase in initiatives that raise awareness of low-value care practices and encourage healthcare professionals to stop using them, there has been little observable effect on healthcare professional behaviour (Brownlee &

Korenstein, 2021). Since the launch of the ‘Choosing Wisely’ campaign in 2012, there have only been modest reductions in rates of overuse for a small number of low-value services, with substantial declines in very few. For example, Rosenberg et al (2015) measured the impact of recommendations on seven low-value practices including ‘low back pain imaging without red-flag conditions’ and ‘use of antibiotics for acute sinusitis’. Trend changes across these practices were modest but showed a significant decrease for two recommendations: imaging for headaches (relative change= -10.1%, trend effect estimate = 0.99 (CI: 0.98-0.99) and cardiac imaging for low-risk patients (relative change = -10.2%, trend effect estimate =0.99 (CI: 0.99-0.99). Although the results were significant, the effect sizes were marginal and so may not represent clinically significant changes.

Recent evidence has therefore emphasised the need to understand what strategies are most effective in supporting healthcare professionals to stop carrying out low-value interventions (Niven et al, 2015; Patey et al, 2018; Walsh-Bailey et al, 2021). Research is beginning to investigate the extent to which established implementation strategies can be applied to de-implementation, with emerging evidence suggesting that the majority of strategies used to de-implement low-value practices can also be used to support implementation (Augustsson et al, 2021; Patey et al, 2021; van Bodegom-Vos et al, 2017). For example, Ingvarsson et al (2022) explored the extent to which previous literature has used strategies to de-implement low-value care that are included as part of the Expert Recommendation for Implementing Change (ERIC). The ERIC is an extensively used taxonomy that assists in the identification, selection and reporting of implementation strategies (Perry et al, 2019; Rogal et al, 2017; 2019; Yakovchenko et al,

2020). Ingvarsson et al (2022) reported that similar strategies have been used for de-implementation and implementation in previous literature, with the most commonly used de-implementation strategies relating to the ERIC categories of: training and education of stakeholders, the use of evaluative and iterative strategies and supporting clinicians.

However, a number of strategies were also identified that are unique to de-implementation, for example ‘accountability tools’ provide a gatekeeping function in holding clinicians accountable for their decision to use a low-value practice by asking them to justify their choice (Buckley et al, 2021; Ip et al, 2014). Additionally ‘black box warnings’ comprise written text on drug packages describing the risk of the low-value drug and so are only appropriate for de-implementation efforts (Seetasith et al, 2017). This is supported by van Bodegom-Vos et al (2017) who provide evidence that, although some drivers behind implementation and de-implementation may be the same, such as the perceived net benefit to patients (outcome expectations), others differ. For example, de-implementation efforts are more likely to be hampered by economic and political factors (motivational factors) such as a lack of cost-benefit considerations in care delivery than implementation efforts.

Although previous evidence has demonstrated that some learning from implementation science can be applied to de-implementation, there are fundamental differences between the two that need to be explored further. For example, ‘professionals’ fear of malpractice’ and ‘patient expectations’ are two determinants to de-implementation that previous literature have found to be much more prominent than in implementation literature (Augustsson et al, 2021; Leigh et al, 2022). More research is therefore

required to understand which strategies are most effective in successfully promoting de-implementation.

To date, research exploring strategies for de-implementing low-value care practices has been carried out across a variety of clinical fields (Ingvarsson et al, 2022). For example, Colla et al (2017) conducted a systematic review that explored the effectiveness of interventions designed to reduce low-value healthcare practices. Multicomponent interventions (interventions with at least two components e.g. education and decision-making support) targeting patient and clinician roles in overuse were found to be the most effective at reducing low-value care. Clinician decision support, performance feedback and education were all found to be promising strategies to use for de-implementation, however, effect sizes were not reported as part of this review, making it difficult to understand what types of e.g. clinician decision support would work best in certain circumstances. Colla et al (2017) highlight a lack of evidence testing the effectiveness of de-implementation interventions and encouraged future research to also consider the impact of de-implementation on the patient experience of care to determine potential unintended consequences.

Similarly, Rietbergen et al (2020) carried out a systematic review and meta-analysis testing the effect of de-implementation strategies designed to reduce low-value nursing procedures such as indwelling urinary catheter insertion, use of physical restraints and liver function tests. The majority of the strategies identified in the review that significantly reduced the use of a low-value nursing practice included an educational component, however, conclusions could not be drawn about which strategy was the most effective

due to a lack of high-quality studies that used the same intervention. Rietbergen et al (2020) encouraged further research in this area to report the results on the change in frequency of low-value nursing procedures more extensively, in order to understand which strategies are most effective in de-implementing low-value nursing practices.

Further, Tabriz et al (2022) reviewed previous literature on interventions that have been used to de-implement low-value care in oncology settings. Twelve studies were included, most of which (n=10) were multifaceted and used strategies such as audit and feedback, education and decision support tools to facilitate the de-implementation of low-value cancer services, for example, lung cancer screening for asymptomatic patients and prostate-specific antigen screening for average-risk men. Six of the included studies were effective in reducing low-value care in oncology settings. The most effective strategy was integration of a decision-support tool i.e. where providers are reminded via electronic health records systems and in real-time, of initiatives to avoid overuse. However, this review did not pool the findings of the studies that reported a significant effect using a decision-support tool due to heterogeneity of results and therefore it is unclear how the effectiveness of decision support-tools differs from other strategies. More research is needed so that strategies can be compared, although this review provides some insight into strategies that can be used to de-implement low-value care in oncology settings specifically.

Existing evidence has highlighted that de-implementation strategies should be theory-based to increase the likelihood of adherence, adoption and effectiveness (Eskes et al, 2019; Norton et al, 2020; van Bodegom-Vos et al, 2017). However, systematic reviews that have previously explored the

effectiveness of de-implementation interventions have either: not captured data on whether the included studies used theory to inform intervention design (Colla et al, 2017; Rietbergen et al, 2020; Sypes et al, 2020b) or have reported that none of the included studies used theory to inform the design of the interventions (Tabriz et al, 2022). Future research that explores the types of interventions that have been previously used to de-implement low-value healthcare practices may address this gap in the literature by examining whether theories, models or frameworks have been used to inform the intervention and how this has influenced its effectiveness.

Previous systematic reviews have focused on understanding which interventions are most effective at de-implementing low-value care practices in specific clinical settings (Orelio et al, 2021; Rietbergen et al, 2020; Tabriz et al, 2022). There is a lack of research that has: 1) explored the impact of de-implementing healthcare practices on patient safety and 2) identified the behavioural components that are most effective at de-implementing low-value care practices. Evidence is needed in this area to increase understanding of the potential consequences of de-implementation on patient safety and to inform the design of future interventions that aim to de-implement practices in a range of healthcare contexts.

This systematic review and meta-analysis therefore aims to address these gaps in the literature by exploring the effects of de-implementing low-value healthcare practices on patient safety with a particular focus on identifying which behavioural components are most effective at facilitating de-implementation. It is important to mention that, when planning this systematic review, DH explored the possibility of synthesising previous literature that had tested interventions designed to de-implement low-value

safety practices specifically due to this being the focus of this PhD. However, after conducting some initial searches, it became apparent that there was not enough literature in this area to make this the sole focus for the systematic review. Therefore, a broader focus was adopted, with the hope that learning from previous studies that have tried to de-implement more general healthcare practices could be used to inform a future intervention designed to de-implement a low-value safety practice.

3.2.1 Aims and research questions

The systematic review and meta-analysis reported in this chapter aim to address the following questions:

1) How effective are interventions that have been used to de-implement healthcare practices?

2) Which groups of healthcare professionals have been targeted by previous research that has used interventions to de-implement healthcare practices?

3) What are the main components of the behavioural interventions (including what behaviour change techniques (BCTs) were employed where possible) that have been used to de-implement healthcare practices?

4) Which low-value healthcare practices have previous interventions tried to de-implement?

5) How have the effects of de-implementation interventions on patient safety been measured?

3.3 Methods

3.3.1 Search strategy

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-analyses statement (Appendix 3.1). The protocol for this study was published on PROSPERO (Registration number: CRD42021183610). Search terms were built upon strategies used by previous literature (Niven et al, 2015) and included combinations of keywords for 'healthcare professionals' AND 'de-implementation' AND 'safety outcome' and 'intervention' (See Appendix 3.2 for search strategy). Seven electronic databases were systematically searched in April 2020 and updated in August 2021: PsycHINFO, EMBASE, AMED, MEDLINE, CINAHL, Web of Science and PubMed. Only studies published in English were included due to limited translation resources. Additionally, the Cochrane Library, Prospero and Google Scholar were used to search for relevant systematic reviews to ensure that no relevant studies that met the eligibility criteria were excluded from the review. Reference list and citation searches were conducted for all included studies. Searches were limited to retrieve articles published in the years following 2002. This time restriction was applied because the ABIM Foundation, American College of Physicians Foundation and the European Federation of Internal Medicine published a principle as part of the 'Physician Charter' in 2002 which set out a number of principles that healthcare professionals should follow to improve patient welfare and to improve the healthcare system (Brennan et al, 2002). A core principle was the "just distribution of finite healthcare resources" and physician responsibility for the "scrupulous avoidance of superfluous tests and procedures" (Born & Levinson, 2019, p.9). It is recognised that this was

one of the first efforts to support clinicians in avoiding low-value care and prompted the development of the 'Choosing Wisely' initiative in 2012 (Choosing Wisely, 2020). Therefore, the eligibility criteria only included articles written after the publication of the 'Physician Charter' (Brennan, 2002).

Following the original search that was carried out in April 2020, Rietbergen et al (2020), Augustsson et al (2021) and Orelio et al (2021) published systematic reviews that aimed to identify studies in which a low-value care practice had been de-implemented. When DH re-ran the search in August 2021, several additional search terms were added that had been included as search terms in these recently published systematic reviews to reduce the likelihood of missing relevant articles. Appendix 3.2 describes updated search terms following these additions in August 2021.

3.3.2 Eligibility criteria and study selection

As encouraged by the Centre for Reviews and Dissemination (2009),

the PICOS criteria (population, intervention, comparison, outcome and study design) was used to structure the review questions and refine the eligibility criteria. Table 3.1 outlines the eligibility criteria used for this review.

Following de-duplication, a single reviewer (DH) screened all titles and abstracts of retrieved citations against the inclusion criteria. A random sample of 20% of the titles and abstracts was screened independently against the same criteria by three second reviewers (RL, GJ, MC). Any disagreement or uncertainty regarding which studies to include or exclude was discussed until agreement was reached. DH then read and screened the included articles at full-text and all studies selected for inclusion were

independently screened using the eligibility criteria by a second reviewer (RL). Any uncertainty or disagreement was resolved through discussion.

Table 3.1 Eligibility criteria for the inclusion of articles

PICOS	Details of eligibility
Population	Articles were excluded if they did not target registered healthcare professionals or allied healthcare professionals who were based in healthcare settings.
Intervention	Inclusion of an intervention designed to directly or indirectly stop healthcare professionals from carrying out a practice (or reduce the frequency of it being carried out). Interventions needed to take place in primary, secondary, tertiary or community care settings.
Comparison	Not relevant.
Outcome	Any patient safety outcome, including (but not limited to) patient safety incidents, adverse events, readmission rates and error rates e.g. medication errors, morbidity and mortality rates. For the purpose of this review, articles were also included that measured only a behaviour/process if the authors explicitly referred to evidence that the process is associated with a patient safety outcome e.g. indwelling catheter prevalence rate and urinary tract infection (morbidity rates).
Study Design	Only peer-reviewed articles were included. Qualitative, quantitative and mixed-methods studies were included. Grey literature was excluded to provide an additional level of rigour.

Studies were excluded if any of the following applied:

- Not empirical studies published in peer-reviewed journals.
- Not published in English.
- Not published between the years 2002 and 2021.
- Focused on de-implementing either: 1) the use of restraints on patients or 2) the prescription of antibiotics via antibiotic stewardship

interventions because several recent systematic reviews have already been conducted on these particular practices (Abraham et al, 2020; Baker et al, 2021; Baur et al, 2017; Duxbury et al, 2019; Feazel et al, 2014; Feldstein et al, 2018).

3.3.3 Assessment of study quality

Study quality of the uncontrolled studies (uncontrolled before-after and observational designs) included in this review was estimated using the Newcastle-Ottowa scale (Wells et al, 2016). The Newcastle-Ottowa scale assesses the quality of papers based on three criteria: selection, comparability and outcome. The risk of bias of the controlled studies and interrupted-time series studies was scored using the Effective Practice and Organisation of Care (EPOC) tool (Cochrane Effective Practice and Organisation of Care, 2021). The EPOC tool is based on nine standardised criteria that are rated on a 3-point scale (low to high risk). Poor quality: 0 or 1 star in the selection domain OR 0 stars in the comparability domain OR 0 or 1 stars in outcome/ exposure domain. Fair quality: 2 stars in the selection domains AND 1 or 2 stars in the comparability domain AND 2 or 3 stars in outcome/ exposure domain. Good quality: 3 or 4 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/ exposure domain (Rietbergen et al, 2020; Wells et al, 2016). Initial quality assessment was completed by a single reviewer (DH) and then a second reviewer (RL) independently conducted a quality assessment on a random selection of 20% (n=5) of the included studies. Agreement on scores was found to be 80%. To resolve discrepancies, discussion was held between RL and DH to reach 100% agreement on the quality assessments.

3.3.4 Data extraction and synthesis

A standardised data extraction form was developed using Excel to capture relevant characteristics of the papers included in this review. The form was piloted independently on a random sample of 20% of the articles by three reviewers (RL, GJ and MC) and DH made changes to the table based on their feedback. Data were extracted for the following four areas (see Appendix 3.3 for full details of pre-defined data extraction points):

1. General information on the study including study country, aims/ objectives and study design.

2. Details about the de-implementation intervention e.g. type of intervention, behaviour change techniques (BCTs) used as part of the intervention, use of theory, mode of delivery. DH used the 'Behaviour Change Technique Taxonomy' (Michie et al, 2013) to code relevant BCTs used as part of the interventions. A second reviewer (RL) reviewed the identified BCTs and made suggestions for potential changes. Discrepancies were resolved by discussion.

3. The low-value practice. Three categories were developed to group similar low-value practices together: i) inappropriate prescribing of medicines i.e. overuse, inappropriate use, irrational use, overprescribing, ii) inappropriate use of a clinical procedure i.e. overuse, inappropriate use, irrational use, iii) inappropriate testing or screening. RL and GJ each independently verified 50% of the categorisations of each low-value practice. Discrepancies were resolved by discussion.

4. The outcome measure used to capture the effect of the intervention on patient safety. Patient safety outcomes i.e. measures that indicate the final

result of healthcare, such as an infection rate in adult in-patients 3 months post-intervention, were included as well as process outcomes that assess the delivery of healthcare services, such as indwelling urinary catheter prevalence rate 3-months post-intervention.

Data were extracted by a single researcher (DH), second reviewed by RL, GJ or MC, and discrepancies were resolved by discussion.

3.3.5 Meta-analysis

To test the effectiveness of the included de-implementation interventions, where reported, the outcome measure data of the controlled studies was analysed using Review Manager 5.4.1. The data were pooled using a random effects model and risk ratios were calculated with 95% confidence intervals. The I^2 statistic of Higgins (2003) was calculated to measure the heterogeneity between included studies. It was not possible to perform subgroup analyses because the number of studies included in the meta-analysis was too small. Three controlled studies (Giles et al, 2020; Jefferson & King, 2018; Pimlott et al, 2003) could not be included in the meta-analysis due to missing data.

3.4 Results

A total of 6,234 citations were identified following the removal of duplicates. After title and abstract screening, 98 articles met the eligibility criteria. Following full-text screening, 19 articles fulfilled the eligibility criteria and were included in the review. Five additional studies were identified through reference list and citation searches, resulting in a total of 24 articles being included in this review. The study selection process is outlined in Figure 3.1.

3.4.1. Study characteristics

The majority of included articles reported uncontrolled before-after study designs (50%, n= 12/24), targeted doctors only (54%, n= 13/24) and took place in secondary care settings (54%, n= 13/24). Many of the studies included in this review were conducted in the U.S.A (38%, n= 9/24) or Canada (25% n=6/24) and aimed to reduce the frequency of inappropriate prescribing of medicines (67%, n= 16/24). The key characteristics of included articles are outlined in Tables 3.2 and 3.3.

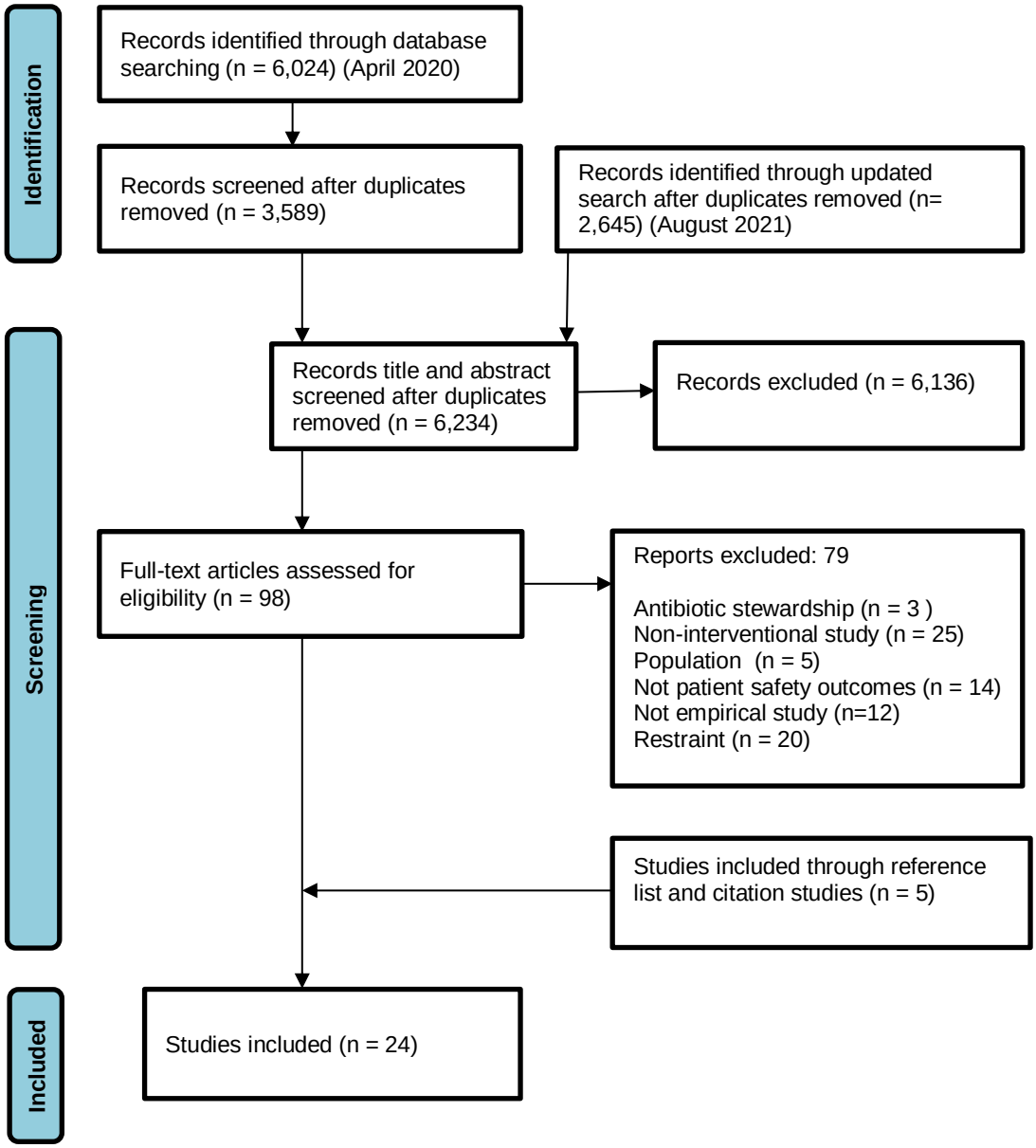


Figure 3.1 Flowchart summarising study selection

Table 3.2 Characteristics of the uncontrolled studies (N=15) (= patient safety outcome)**

Author, year (country)	Study design	Setting	Target group	Target behaviour category	Outcome measure	Before	After	Difference/statistical test result
Ahmad et al, 2015 (U.K.)	Uncontrolled before-after	Secondary care	Doctors	Inappropriate prescribing and tests (all)	The monthly mean of patient readmission rate.	18.8 ±2.1%	19.3±2.4%	Non-significant
Baer et al, 2011 (U.S)	Uncontrolled before-after	Secondary care	Doctors	Neonatal blood transfusions (2)	The percent of NICU patients receiving one or more red blood cell transfusions over 3 years	19%	13%	Significant (p<0.001)
Boyle et al, 2019 (U.S.)	Uncontrolled before-after	Secondary care	Doctors, Advanced practitioners	Opioid prescribing (1)	Reducing the number of opioid prescriptions per 100 patient ED discharges	12.5 (IQR 10-19)	9 (IQR 6-11)	28% reduction between pre and post intervention. Significant (p<0.001).
Bundeff & Zaiken, 2013 (U.S)	Uncontrolled before-after	Primary care	Doctors	Proton pump inhibitor prescribing (1)	Mean number of PPIs prescribed per patient on a monthly basis at baseline and follow-up.	25.6 (95% CI 23.1,28.1)	16.9 (95% CI 14.3, 19.5)	Significant (p<0.001)
Del Giorno et al, 2018 (Switzerland)	Uncontrolled before-after	Secondary care	Doctors	Proton pump inhibitor prescribing (1)	The rate of new PPI prescriptions amongst internal medicine patients at the beginning of the study (2014) and the end (2017).	18%	16%	Significant (p<0.001)

Illic et al, 2015 (Serbia)	Uncontrolled before-after	Nursing homes	Doctors	Medication prescribing (1)	The number of inappropriately prescribed drugs to nursing home residents according to the Beers criteria before and after the intervention	349	37	Significant (Z=4.629, p<0.00)
Jain et al, 2013 (U.S)	Uncontrolled before-after	Secondary care	Doctors	Stress ulcer prophylaxis prescribing (1)	The percentages of patients who were prescribed SUP before and after the intervention	74.1%	28.6%	Significant (p<0.001)
Keith et al, 2013 (Italy)	Interrupted time series	Primary care	Doctors	Medication prescribing (1)	The number of potentially inappropriate medications prescribed post-intervention (intervention group vs. control).			31.4% reduction was found in the intervention group vs 21.6% reduction in the control. Significant (p<0.001)
Laan et al, 2020 (Netherlands)	Interrupted time series	Secondary care	Nurses	Using indwelling catheters (2)	The change in inappropriate use of urinary catheters pre and post intervention (% with 95% CIs)	32.4% (27.3-37.8)	24.1% (20.0-28.6)	Incidence rate ratio 0.65, 95%CI 0.56-0.77. Significant (p<0.0001)
Lenz et al, 2021 (U.S)	Uncontrolled before-after	Secondary care	Nurses	Clostridioides difficile testing (3)	The mean number of monthly *C.Difficile* tests and the total number of CDI cases pre and post intervention **.	Tests per month: 37 Diagnoses per month: 19	Tests per month: 25 Diagnoses per month: 8	58% reduction in CDI diagnoses (no test of significance).
Luo et al, 2017 (China)	Uncontrolled before-after	Secondary care	Doctors	Prophylactic acid suppressant prescribing (1)	The frequency of inappropriate prophylactic acid suppressant use (no indication use) in surgical patients pre and post intervention.	178	123	Significant (P< 0.05)

Thakker et al, 2018 (Canada)	Uncontrolled before-after	Secondary care	Doctors, nurse practitioners	Indwelling catheter use (2)	Reduction in the rate of Urinary Tract Infections (UTIs) as a result of reducing the use of indwelling catheters. **	2.1%	1.1%	No test conducted.
Tyson et al, 2020 (U.S)	Interrupted time series	Secondary care	Nurses	Indwelling catheter use (2)	The reduction in the number of catheter-associated UTIs **	5.1 per 1000 catheter-days	2.0 per 1000 catheter-days	Significant (p<0.01)
Whitner et al, 2020 (U.S)	Uncontrolled before-after	Primary care	Doctors, nurse practitioners, clinical pharmacists, pharmacy residents	Non-steroidal anti-inflammatory drug (NSAIDs) prescribing (1)	Reducing the rate of inappropriate NSAIDS prescriptions.	27.6%	9.0%	Significant (p<0.0001)
Wong et al, 2010 (U.S)	Uncontrolled before-after	Primary care	Doctors	Short-acting B-Agonistics (SABA) prescribing (1)	The percentage of new SABA prescriptions dispensed for more than 1 SABA MDI per month	22.9%	9.7%	Significant (p<0.01).

Twelve of the included studies (50%, n=12/24) used uncontrolled pre-post designs and three (13%, n= 3/24) used interrupted time series designs. Of the fifteen uncontrolled studies, ten (67%, n=10/15) implemented an intervention that aimed to reduce inappropriate prescribing of medicines including opioids, proton pump inhibitors, non-steroidal anti-inflammatory drugs (NSAIDs), (Ahmad et al, 2015; Boyle et al, 2019; Bundeff & Zaiken, 2013; Del Giorno et al, 2018; Illic et al, 2015; Jain et al, 2013; Keith et al, 2013; Luo et al, 2017; Whitner et al, 2020; Wong et al, 2010) and three (20%, n=3/15) studies focused on reducing the use of indwelling urinary catheters (Laan et al, 2020; Thakker et al, 2018; Tyson et al, 2020). One study (7%, n= 1/15) aimed to reduce the number of blood cell transfusions taking place on a neonatal ward (Baer et al, 2011) and another (7%, n= 1/15) tried to reduce the frequency of *C.Difficile* tests (Lenz et al, 2021).

Twelve (80%, n =12/15) of the uncontrolled studies used interventions that targeted doctors (Ahmad et al, 2015; Baer et al, 2011; Boyle et al, 2019; Bundeff & Zaiken, 2013; Del Giorno et al, 2018; Illic et al, 2015; Jain 2013; Keith et al, 2013; Luo et al, 2017; Thakker et al, 2018; Whitner et al, 2020; Wong et al, 2010), ten (67%, n=10/15) took place in secondary healthcare settings (Ahmad et al, 2015; Boyle et al, 2019; Baer et al, 2011; Del Giorno et al, 2018; Jain et al, 2013; Laan et al, 2020; Lenz et al, 2021; Luo et al, 2017; Thakker et al, 2018; Tyson et al, 2020), three (20%, n=3/15) in primary healthcare settings (Bundeff & Zaiken, 2013; Keith et al, 2013; Whitner et al, 2020) and one (7%, n=1/15) in a nursing home (Illic et al, 2015). The majority (53%, n=8/15) of uncontrolled studies took place in the U.S (Baer et al, 2011; Boyle et al, 2019; Bundeff & Zaiken, 2013; Jain et al, 2013; Lenz et al, 2021; Tyson et al, 2020, Whitner et al, 2020; Wong et al, 2010). The

interventions tested in twelve (80%, n=12/15) of the uncontrolled studies produced a significant effect in reducing the frequency of a healthcare practice (Boyle et al, 2019; Baer et al, 2011; Bundeff & Zaiken, 2013; Del Giorno et al, 2018; Illic et al, 2015; Jain et al, 2013; Keith et al, 2013; Laan et al, 2020; Luo et al, 2017; Tyson et al, 2020; Whitner et al, 2020; Wong et al, 2010). The majority of the studies that produced a significant effect targeted the inappropriate prescribing of medicines by doctors only (67%, n=8/12) (Ahmad et al, 2015; Bundeff & Zaiken, 2013; Del Giorno et al, 2018; Illic et al, 2015; Jain et al, 2013; Keith et al, 2013; Luo et al, 2017; Wong et al, 2010). Other studies that produced a significant effect targeted neonatal blood transfusions (Baer et al, 2011) and inappropriate use of indwelling urinary catheters (Laan et al, 2020; Tyson et al, 2020).

Table 3.3 Characteristics of the controlled studies (N=9)

(* = study was excluded from the meta-analysis due to missing data. ** = patient safety outcome).

Author, year (country)	Study design	Setting	Target group	Target behaviour and category	Outcome measure	Before	After	Difference/statistical test result	Risk of bias
Althabe et al, 2004 (Argentina, Brazil, Cuba, Guatemala, Mexico)	Cluster-randomised controlled trial	Secondary care	Doctors	Non-emergency caesarean sections (2)	The reduction in rates of non-emergency caesarean section (mean difference in caesarean section rate change between groups) (with 95% CI).**	N/A	N/A	Relative rate reduction 7.3% (CI = 0.2-14.5). Significant (p<0.044).	Low
Desveaux et al, 2017 (Canada)	Cluster-randomised controlled trial	Nursing homes	Doctors, Pharmacists, Nurse practitioners, Nurse managers	Antipsychotic prescribing (1)	Antipsychotic medication prescribing at 6 months post-intervention between intervention and control group	N/A	N/A	Overall reduction in prevalence of APM prescribing: 1.9% (intervention group) and 0.9% (control group). Not significant.	Low
Giles et al, 2020* (Australia)	Cluster controlled pre-post design	Secondary care	Nurses, Nurse educators, Medical officers	Using indwelling catheter (IDC) (2)	IDC prevalence rate of IDC in adult inpatients pre and post-intervention.	12%	10%	Not significant	Low

Jefferson & King, 2018 (U.S)	Cluster controlled pre-post design	Secondary care	ICU ward staff	Performing daily laboratory tests (2)	The number of adverse events that occurred during the implementation of an intervention that aimed to reduce the number of unwarranted laboratory tests (intervention group vs control group).**			The comparison group observed 11 adverse events, whereas the intervention group observed 16. This difference was not significant.	Low
Martin et al, 2018 (Canada)	Cluster-randomised controlled trial	Community settings	Pharmacists	Medication prescribing (1)	The complete cessation of prescription fills for any of the 4 medication classes 6 months after randomisation.			At 6 months, 43% no longer filled prescriptions for inappropriate medication compared with 12% in the control group. Significant ($p<0.001$)	Low
Pettersson et al, 2011 (Sweden)	Cluster-randomised controlled trial	Nursing homes	Nurses, Doctors	Antibiotic prescribing for UTIs (1)	The reduction in quinolone prescription for patients with a UTI following the intervention			The intervention had no significant effect on reducing the proportion of quinolones.	Low
Pimlott et al, 2003* (Canada)	Randomised controlled trial	Primary Care	Doctors	Benzodiazepine prescribing (1)	The mean number and percentage of benzodiazepines prescribed by physicians before and after the intervention period.	29.5 (20.3%)	27.7 (19.6%)	Not significant	Low

Tadrous et al, 2020 (Canada)	Cluster-randomised controlled trial	Nursing homes	Doctors, pharmacists, nurses and support workers.	Antipsychotic prescribing (1)	Reducing inappropriate prescription of antipsychotics (linked to higher mortality amongst the elderly)	At 12 months, the number of residents with daily antipsychotic use in the past 7 days was 569 (25.2%) in the intervention group and 769 (25.6%) in the usual care group. (p = 0.49) No significant difference.	Low
Tamblyn et al, 2003 (Canada)	Cluster-randomised controlled trial	Primary care	Doctors	Inappropriate prescribing (1)	The number of new potentially inappropriate prescriptions per 1000 visits in treatment vs control	At 13 months, the number of inappropriate prescriptions per 1000 visits was 43.8 in the intervention group and 52.2 in the control group. Significant (RR:0.82, 95% 0.96-0.98).	Low

Nine of the included studies had a controlled design (38%, n=9/24), comprising six cluster-randomised controlled trials (25%, n=6/24) (Althabe et al, 2004; Desveaux et al, 2017; Martin et al, 2018; Pettersson et al, 2011; Tadrous et al, 2020; Tamblyn et al, 2003) and one randomised controlled trial (4%, n=1/24) (Pimlott et al, 2003). Of these nine controlled studies, six (67%, n=6/9) focused their intervention on reducing inappropriate prescriptions (Desveaux et al, 2017; Martin et al, 2018; Pimlott et al, 2003; Pettersson et al, 2011; Tadrous et al, 2020; Tamblyn et al, 2003), one (11%, n=1/9) on reducing unnecessary emergency caesarean sections (Althabe et al, 2004), one (11%, n=1/9) on reducing the use of indwelling urinary catheters (Giles et al, 2020), and one (11%, n=1/9) on reducing unnecessary laboratory tests for patients in intensive care (Jefferson & King, 2018). The interventions targeted doctors on their own (n=3/9, 33%) (Althabe et al, 2004; Pimlott et al, 2003; Tamblyn et al, 2003), or a mixture of staff groups (n=4/9, 44%) (Desveaux et al, 2017; Giles et al, 2020; Pettersson et al, 2011; Tadrous et al, 2020) and took place in secondary care settings (33%, n=3/9) (Althabe et al, 2004; Giles et al, 2020; Jefferson & King, 2018) and nursing homes (33%, n=3/9) (Desveaux et al, 2017; Pettersson et al, 2011; Tadrous et al, 2020). The majority of the controlled studies took place in Canada (56%, n= 5/9) (Desveaux et al, 2017, Martin et al, 2018; Pimlott et al, 2003; Tadrous et al, 2020; Tamblyn et al, 2003) and three (33%, n=3/9) reported a significant change in outcome measure (Althabe et al, 2004; Martin et al, 2018; Tamblyn et al, 2003). These three studies aimed to: reduce non-emergency caesarean rates (Althabe et al, 2004) and reduce inappropriate prescribing of medicines (Martin et al, 2018; Tamblyn et al, 2003).

3.4.2 Strategies used to reduce the frequency of healthcare practices

Table 3.4 Type of intervention used in the uncontrolled studies (N=15)

Author, year	Target group	Target low-value practice	Description of intervention strategy	Mode of delivery	Identified behaviour change techniques	Intervention informed by theory	Positive significant effect
Ahmad et al, 2015	Doctors	Inappropriate prescribing and tests.	Increasing the number of consultant ward rounds from twice-weekly to twice-daily.	Face-to-face	1) Social support (practical), 2) Restructuring the social environment, 3) Information about others' approval, 4) Instruction on how to perform the behaviour, 5) Prompts/cues.	No	No
Boyle et al, 2019	Doctors, Advanced practitioners	Opioid prescribing	Sharing individual and comparison prescribing data. Clinicians who prescribed more frequently than the mean were notified.	Face-to-face and electronic	1) Information about social and environmental consequences, 2) Prompts/ cues, 3) Feedback on behaviour, 4) Social comparison	No	Yes
Baer et al, 2011	Doctors	Neonatal blood transfusions	If a doctor ordered a blood product that did not comply with the guidelines, the clinician would have to give a reason to explain why it was being ordered outside of guidelines.	Electronic	1) Prompts and cues, 2) Instruction on how to perform the behaviour, 3) Monitoring of behaviour by others without feedback.	No	Yes

Bundeff & Zaiken, 2013	Doctors	Proton pump inhibitor prescribing	Doctors were electronically prompted by clinical pharmacists to use a PPI taper algorithm to help decide whether to taper a patient's prescription for PPIs.	Electronic	1) Prompts and cues, 2) Instruction on how to perform the behaviour, 3) Credible source, 4) Social support (practical).	No	Yes
Del Giorno et al, 2018	Doctors	Proton pump inhibitor prescribing	Educational meetings, materials and media communications to share best-practice guidelines. Also, all healthcare providers could access new PPI prescriptions via an online, centralised, transparent platform.	Electronic and face-to-face	1) Instruction on how to perform the behaviour, 2) Prompts and cues, 3) Monitoring of behaviour by others without feedback, 4) Social comparison.	No	Yes
Illic et al, 2015	Doctors	Medication prescribing	One-hour long lectures about specificities of pharmacokinetics and START/STOPP criteria in the elderly were delivered to healthcare professionals and brochures were given that contained the same information.	Electronic and paper-based	1) Instruction on how to perform the behaviour, 2) Information about health consequences, 3) Prompts and cues	No	Yes

Jain et al, 2013	Doctors	Stress ulcer prophylaxis prescribing	A one-off educational conference was held for residents that reviewed rates of SUP use and discussed ways to improve appropriate use of SUP.	Face-to-face	1) Instruction on how to perform the behaviour, 2) Feedback on behaviour	No	Yes
Keith et al, 2013	Doctors	Medication prescribing	1) Dissemination of a list of potentially inappropriate medications (PIMs) to always be avoided, combined with peer-to-peer interactive discussion, 2) annual reviews of PIM incidence data and 3) educational sessions on PIMS via academic detailing and case study reviews.	Electronic	1) Instruction on how to perform the behaviour, 2) Feedback on behaviour 3) Social comparison	No	Yes

Laan et al, 2020	Nurses	Using indwelling catheters	Educational meetings took place during which best practice relating to catheter use was discussed. Feedback reports were disseminated to staff that described recent catheter use for that ward. Posters and pocket cards were disseminated that stated lists of appropriate indications for catheter use.	Face-to-face	1) Instruction on how to perform the behaviour, 2) Feedback on behaviour (at group-level), 3) Prompts and cues	No	Yes
Lenz et al, 2021	Nurses	Clostridioides difficile testing	Developed a *C.difficile* screening tool that provided nurses with guidance on how to test stools and information about the laboratory policy regarding stool testing for *C.difficile*. Before implementation, staff were educated about the tool.	Paper-based	1) Instruction on how to perform behaviour. 2) Adding objects to the environment.	No	No

Luo et al, 2017	Doctors	Prophylactic acid suppressant prescribing	A clinical pharmacist 1) provided education sessions and handouts about SUP to surgeons, 2) reviewed patient notes and alerted surgeons if they identified an inappropriate SUP prescription 3) inappropriate SUP orders were identified and reported to hospital administration every week.	Face-to-face, paper-based and electronically	1) Instruction on how to perform behaviour, 2) Social support (practical), 3) Feedback on behaviour 4) Credible source. 5) Punishment	No	Yes
Thakker et al, 2018	Doctors, nurse practitioners	Using indwelling catheters	1) Nursing staff were educated about current guidelines for indwelling catheter use, 2) Staff were presented with baseline UTI rate alongside the frequency of indwelling catheter use, 3) Front-line staff were continually reminded about adhering to the guidelines in weekly meetings.	N/A	1) Instruction on how to perform behaviour, 2) Social support (practical), 3) Feedback on behaviour at group level, 4) Information on health consequences, 5) Prompts and cues	No	Yes

Tyson et al, 2020	Nurses	Using indwelling catheters	1) Implementation of twice-daily rounds where each patient with an indwelling catheter was evaluated for continued need, 2) feedback was given by peers through auditing processes where there were opportunities for earlier catheter removal, 3) audit results were presented monthly to facility leaders to aid with accountability, 4) staff were educated on urine culture stewardship.	Face-to-face	1) Instruction on how to perform behaviour, 2) Feedback on behaviour, 3) Information about health consequences, 4) Social support (practical)	No	Yes
Whitner et al, 2020	Doctors, nurse practitioners, clinical pharmacists, pharmacy residents	Non-steroidal anti-inflammatory drugs (NSAIDs) prescribing	Pharmacists provided education on appropriate NSAID prescribing during a one-off presentation delivered to prescribing providers.	Face-to-face	1) Instruction on how to perform the behaviour, 2) Credible source	No	Yes

Wong et al, 2010	Doctors	Short-acting B-Agonistics (SABA) prescribing	Guideline recommendations were faxed to providers who prescribed more than 1 SABA per month which included a request to reduce the prescribed SABA quantity. The form requested a reduction of the prescribed SABA quantity to less than or equal to 1 inhaler per month. Once the provider confirmed their decision with a pharmacist, a new SABA prescription was completed for a reduced quantity or original quantity.	Electronic	1) Instruction on how to perform the behaviour. 2) Feedback on behaviour. 3) Prompts and cues. 4) Credible source, 5) Social support (practical)	No	Yes

Table 3.5. BCTs included as part of uncontrolled studies interventions. * indicates a significant effect.

	Baer et al, (2011) *	Boyle et al, (2018)*	Bundeff et al, (2013)*	Del Giorno et al, (2018)*	Illic et al, (2015) *	Jain et al, (2013) *	Keith et al, (2013) *	Laan et al, (2020) *	Luo et al, (2017) *	Tyson et al, (2020)*	Whitner et al (2020)*	Wong et al, (2010) *	Ahmad et al (2015)	Lenz et al, (2021)	Thakker et al, (2018)
Info about others' approval													✓		
Instruction on how to perform the behaviour	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Info about social and environmental consequences		✓													
Info on health consequences					✓					✓					✓
Restructuring the social environment													✓		
Credible source			✓						✓		✓	✓			
Social comparison		✓		✓			✓								
Social support (practical)			✓						✓	✓		✓	✓		✓
Prompts and cues	✓	✓	✓	✓	✓			✓				✓	✓		✓

Self-monitoring of outcomes of behaviour															
Feedback on behaviour		✓				✓	✓	✓	✓	✓		✓			✓
Feedback on behaviour (at group level)															✓
Monitoring of behaviour by others without feedback	✓			✓											
Adding objects to the environment														✓	
Punishment									✓						

The types of interventions tested by the included uncontrolled studies varied greatly. Eleven interventions contained an educational component i.e. providing educational sessions or materials to healthcare staff (Del Giorno et al, 2018; Illic et al, 2015; Jain 2013; Keith et al, 2013; Laan et al, 2020; Lenz et al, 2021; Luo et al, 2017; Thakker, 2018; Tyson et al, 2020; Whitner et al, 2020; Wong et al, 2010). Four of the uncontrolled studies that targeted deprescribing of medicines (40%, n=4/10) provided feedback on the prescriber's behaviour (Boyle et al, 2019; Jain et al, 2013; Keith et al, 2013; Luo et al, 2017).

Of the uncontrolled studies that had a significant effect on improving a patient safety outcome following a de-implementation intervention (80%, n= 12/15), all used a multi-component strategy and did not use theory to inform the design of the intervention (Baer et al, 2011; Boyle et al, 2019; Bundeff & Zaiken, 2013; Del Giorno et al, 2018; Illic et al, 2015; Jain et al, 2013; Keith et al, 2013; Laan et al, 2020; Luo et al, 2017; Tyson et al, 2020; Whitner et al, 2020; Wong et al, 2010). Four studies used face-to-face methods only (33%, n= 4/12) (Jain et al, 2013; Laan et al, 2020; Tyson, 2020; Whitner et al, 2020) and four used electronic methods only (33%, n= 4/12) (Baer et al, 2011; Bundeff, 2013; Keith et al, 2013; Wong et al, 2010) (Table 3.4).

The BCT 'credible source' was included as part of the intervention of four of the studies that produced a significant effect (33%, n =4/12) (Bundeff, 2013; Luo et al, 2017; Whitner et al, 2020; Wong et al, 2010) and was not included by any of the studies that did not produce a significant effect. Additionally, the BCT 'social comparison' was included as part of the intervention for three studies that produced a significant effect (25%, n = 3/12) (Boyle et al, 2019; Del Giorno et al, 2018; Keith et al, 2013) and none of the interventions

that did not produce a significant effect. ‘Monitoring of behaviour by others without feedback’ was also included by two of the studies that produced a significant effect (16%, n = 2/12) (Baer et al, 2011; Del Giorno et al, 2018), but not by those which did not produce a significant effect. Therefore, as indicated by Table 3.5, in general, similar BCTs were included in the interventions that produced significant results and interventions that produced non-significant results. However, the BCTs ‘credible source’, ‘social comparison’ and ‘monitoring of behaviour by others without feedback’ were included in studies that produced a significant effect and not by those that did not produce a significant effect.

Table 3.6 Type of intervention used in the controlled studies (N=9)

Author, year	Target group	Target low-value behaviour	Description of intervention strategy	Mode of delivery	Identified behaviour change techniques	Intervention informed by theory	Positive significant effect
Althabe, 2004	Doctors	Non-emergency caesarean sections	A policy required a mandatory second opinion prior to carrying out a caesarean section. Guidelines were given to the doctor providing a second opinion to help them make a decision. Both physicians then discussed the case in relation to the guidelines.	Face-to-face	1) Information about others' approval, 2) Instruction on how to perform the behaviour 3) Credible source 4) Social support (practical)	No	Yes
Desveaux et al, 2017	Doctors, Pharmacists, Nurse practitioners, Nurse managers	Antipsychotic prescribing	A guide detailing a synthesis of available evidence on prescribing antipsychotics was distributed to providers. The guide contained prompts and encouraged staff to monitor drug vs non-drug therapy for effectiveness and adverse events.	Face-to-face	1) Instruction on how to perform the behaviour 2) Prompts and cues 3) Self-monitoring of outcomes of behaviour.	No	No

Giles et al, 2019	Nurses, Nurse educators, Medical officers	Using indwelling catheters	1) Intensive education workshops that outlined catheter guidelines, 2) champion meetings and 3) practice adherence audits and feedback, 4) posters and badges to prompt awareness of guidelines.	Face-to-face	1) Instruction on how to perform the behaviour, 2) Feedback on behaviour, 3) Prompts and cues, 4) Social support (practical), 5) Credible source.	No	No
Jefferson & King, 2018	ICU ward staff	Performing laboratory tests	An acute care nurse practitioner was present on daily ICU multidisciplinary rounds to facilitate the discussion of the laboratory testing needs for each patient for the following 24-hour period. Reminder cards were displayed on computers in nursing station which emphasised key information.	N/A	1) Social support, 2) Prompts/ cues, 3) Information about others' approval, 4) Credible source.	No	No
Martin, 2018	Doctors	Medication prescribing	Educational material given to physicians including a clear rationale for why deprescribing was being recommended.	Face-to-face or paper-based	1) Instruction on how to perform the behaviour, 2) Prompts and cues. 3) Information about health consequences.	No	Yes

Pettersson, 2011	Nurses, Doctors	Antibiotic prescribing for UTIs	1) Educational sessions with nurses and physicians. 2) Educational materials 3) Feedback on prescribing behaviour.	Face-to-face and paper-based.	1) Instruction on how to perform the behaviour, 2) Feedback on behaviour, 3) Social support (practical).	No	No
Pimlott et al, 2003	Doctors	Benzodiazepine prescribing	Mailed packages of feedback about the provider's prescribing and evidence-based educational materials.	Paper-based.	1) Instruction on how to perform the behaviour, 2) Feedback on behaviour.	No	No
Tadrous et al, 2020	Doctors, pharmacists, nurses and support workers.	Antipsychotic prescribing	Meetings, presentations, group visits provided by nurses or pharmacists providing tailored information to help support nursing home clinical staff to reduce the inappropriate prescription of antipsychotics. Academic detailers also responded to questions via email or telephone to support staff.	Face-to-face or electronic.	1) Instruction on how to perform the behaviour, 2) Social support (practical). 3) Credible source.	No	No

Tamblyn, 2003	Doctors	Inappropriate prescribing	Doctors received computerised decision-making support. When a clinically relevant prescribing problem was identified, the doctor would receive an alert that identified the nature of the problem, possible consequences and alternative therapy.	Electronic	1) Instruction on how to perform the behaviour, 2) Information on health consequences, 3) Prompts and cues.	No	Yes

Table 3.7. BCTs included as part of controlled studies interventions. * indicates a significant effect.

	Althabe, (2004)*	Martin, (2018)*	Tamblyn, (2003)*	Desveaux et al, (2017)	Giles et al, (2019)	Jefferson & King, (2018)	Pettersson, (2011)	Pimlott et al, (2003)	Tadrous et al, (2020)
Information about others' approval	✓					✓			
Instruction on how to perform the behaviour.	✓	✓	✓	✓	✓		✓	✓	✓
Information on health consequences		✓	✓						
Credible source	✓				✓	✓			✓
Social support (practical)	✓				✓	✓	✓		✓
Prompts and cues		✓	✓	✓	✓	✓			
Self-monitoring of outcomes of behaviour				✓					
Feedback on behaviour					✓		✓	✓	

The majority of the included controlled studies contained an educational component (n=5/9, 56%) (Giles et al, 2020; Martin et al, 2018; Pettersson et al, 2011; Pimlott et al, 2003; Tadrous et al, 2020). Decision-making support was also used by four (n=4/9, 44%) of the interventions (Althabe 2004; Jefferson & King, 2018; Tadrous et al, 2020; Tamblyn 2003).

Three of the controlled studies (33%, n= 3/9) implemented interventions that were effective at de-implementing a healthcare practice that was low-value for patient safety (Althabe et al, 2004; Martin et al, 2018; Tamblyn et al, 2003). Two of these studies (67%, n= 2/3) (Martin et al, 2018; Tamblyn et al, 2003) aimed to reduce the prescription of inappropriate medicines and one (33%, n= 1/3) aimed to reduce the number of non-emergency caesarean sections (Althabe et al, 2004). All three interventions were delivered using different modes of delivery. None of the included controlled studies used theory to inform the design of the intervention. All three studies tested interventions that targeted doctors' decision making. Two of the controlled studies that produced a significant effect (67%, n=2/3) (Martin et al, 2018; Tamblyn et al, 2003) included the BCT 'information on health consequences' which was not included in any of the non-significant interventions (Table 3.7).

3.4.1 Quality of the included studies

The risk of bias of the uncontrolled studies (N=12/24), assessed using the Newcastle-Ottowa scale, is shown in Table 3.8. Across all uncontrolled studies included in this review, the overall quality was estimated to be poor.

Table 3.8 Quality of uncontrolled studies assessed using the Newcastle-Ottowa scale

Author	Score Selection	Score comparability	Score Outcome	Overall quality
Ahmad et al, 2015	★★	-	★★	Poor
Baer et al, 2011	★★★★	-	★★	Poor
Boyle et al, 2019	★★★★	-	★	Poor
Bundeff & Zaiken, 2013	★★	-	★	Poor
Del Giorno et al, 2018	★★★★	-	★★	Poor
Illic et al, 2015	★★★★	-	★★	Poor
Jain et al, 2013	★★★★	-	★★	Poor
Lenz et al, 2021	★★★	-	-	Poor
Luo et al, 2017	★★★	-	★	Poor
Thakker et al, 2018	★★	-	★★	Poor
Whitner et al, 2020	★★★	-	★	Poor
Wong et al, 2010	★★★★	-	★★	Poor

The risk of bias of the controlled studies (N= 9/24) was estimated using the EPOC scale. Table 3.9 contains the scores of studies that were randomised trials, non-randomised trials and controlled before-after studies and Table 3.10 contains the scores of studies that used an interrupted time series

design (N=3/24). In accordance with the methods of a previous meta-analysis (Johnson & Panagioti, 2018), studies were classified as being at low-risk of bias overall if at least six individual criteria were assessed as having low risk; as having a moderate risk of bias overall if four or five individual criteria were assessed as low risk; and as having a high risk of bias overall if three or fewer individual criteria were assessed as low risk.

Table 3.9 Risk of bias ratings using the Risk of Bias Cochrane Effective Practice and Organisation of Care (EPOC) tool for included studies with a separate control group (n=9). Green: low risk of bias, red: high risk of bias, empty box: unclear risk of bias.

Author	Random sequence generation	Allocation concealment	Baseline outcome measurements similar	Baseline characteristics similar	Incomplete outcome data	Knowledge of the allocated interventions adequately prevented during the study	Protection against contamination	Selective outcome reporting	Other risks of bias	Overall score
Althabe et al (2004)										Low
Desveaux (2017)										Low
Giles et al (2019)										Medium
Jefferson (2018)										Medium
Martin (2018)										Low
Pettersson (2011)										Low
Pimlott (2003)										Low
Tadrous (2020)										Low
Tamblyn (2003)										Low

Generally, the risk of bias was estimated to be low amongst the controlled studies, because the overall risk of bias scores were ‘low,’ apart from two ‘medium’ scores.

Table 3.10 Risk of bias ratings using the Risk of Bias Cochrane Effective Practice and Organisation of Care (EPOC) tool for included studies with an interrupted time series design (n=3).
Green: low risk of bias, red: high risk of bias, empty box: unclear risk of bias.

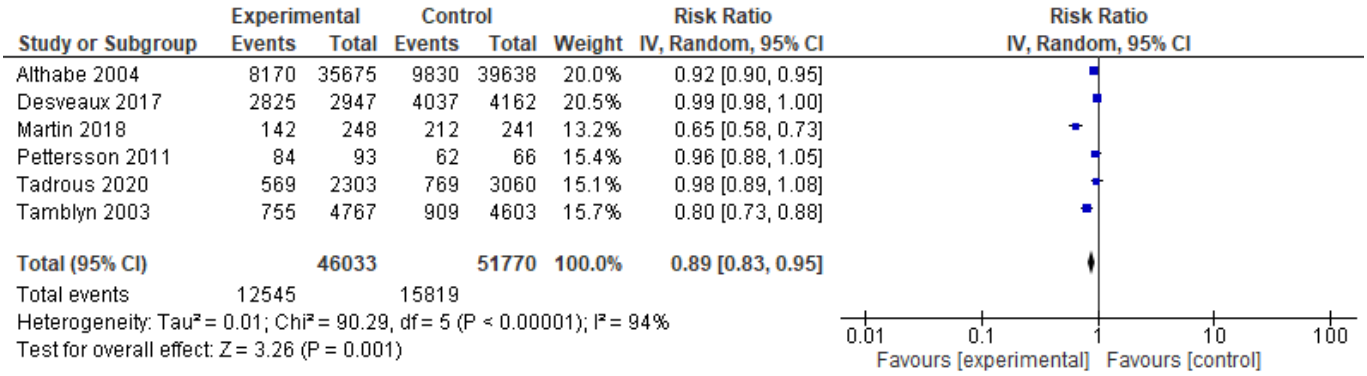
Author	Intervention independent of other changes	Shape of the intervention effect pre-specified	Intervention unlikely to affect data collection	Knowledge of the allocated interventions adequately prevented.	Incomplete outcome data adequately	Selective outcome reporting	Other risks of bias	Overall score
Tyson (2020)								High
Laan (2020)								Low
Keith (2013)								Medium

The three studies which used an interrupted-time series design varied in their risk of bias, with one study being assessed as ‘low’, ‘medium’, or ‘high’ risk respectively.

3.4.2 Meta-analysis

Six studies were included in the meta-analysis. Three controlled studies could not be included due to missing data (Giles et al, 2020; Jefferson & King, 2018; Pimlott et al, 2003). Overall, the meta-analysis indicated that there was evidence of a significant effect of the interventions on the measured outcomes. The relative risk ratio was 0.89 (95% CI 0.83, 0.95; I^2 = 94%) across the studies. Pooling data indicated that the included interventions produced a significant effect on the patient safety measures, although the reduction (11%) was relatively modest in magnitude.

Figure 3.2 Random-effects meta-analysis examining the effect of de-implementation interventions on patient safety measures. A forest plot of the studies included in the meta-analysis.



3.5 Discussion

This systematic review and meta-analysis aimed to understand what types of interventions have been used in the past to de-implement low-value healthcare practices and what their effects have been on patient safety. As mentioned in the introduction to this chapter, it was hoped that learning from this study could be applied later on in this PhD research, to inform the development of an intervention that aims to de-implement a target low-value PSP. It is understood that no previous systematic review has tried to

understand which types of interventions are most effective at achieving de-implementation and how this can impact patient safety. The meta-analysis indicated that, overall, the de-implementation interventions reported produced a small but significant effect on patient safety measured outcomes. The majority of all included studies were carried out in the U.S.A, focused on the de-implementation of inappropriate prescribing of medicines, used multicomponent interventions that targeted doctors and were delivered face-to-face. All articles included in this review focused on only one form of de-implementation action: reduction, whereby interventions aimed to reduce the frequency with which a low-value practice is carried out. This finding highlights the absence of de-implementation research that has tried to completely remove, restrict or replace low-value healthcare practices (Norton et al, 2020).

The majority of uncontrolled studies that produced a significant effect used interventions that targeted the de-implementation of inappropriate prescribing of medicines such as opioids, proton pump inhibitors and non-steroidal anti-inflammatory drugs (NSAIDs). Some of the interventions also aimed to reduce: the use of indwelling urinary catheters, the number of blood cell transfusions and the frequency of *C.difficile* tests. Most of these interventions were multi-component, targeted doctors, took place in secondary healthcare settings and were delivered by either electronic methods only or face-to-face methods only. The BCTs ‘credible source’, ‘social comparison’ and ‘monitoring of behaviour by others without feedback’ were included as part of the interventions by several uncontrolled studies that produced a significant effect, but were not included as part of the interventions that did not produce a significant effect. Due to the small

numbers of included studies and their low quality, no clear conclusions can be drawn on which BCTs were most effective at facilitating the de-implementation of low-value healthcare practices.

Amongst the three controlled studies that produced a significant effect, the interventions aimed to reduce non-emergency caesarean sections and reduce inappropriate prescribing of medicines. These multi-component interventions were carried out in primary and community settings and were delivered using either face-to-face methods, a mixture of face-to-face and paper-based methods or electronically. The BCT ‘information on health consequences’ was included in two of the interventions that produced a significant result and not by those that produced a non-significant result. Due to the small number of controlled studies included in this review, it is not possible to draw conclusions on whether including the BCT ‘information on health consequences’ is more likely to facilitate de-implementation than other BCTs. Further studies are therefore needed to understand the impact of this BCT on de-implementing low-value practices. A meta-regression could then be conducted to establish whether this BCT increases the likelihood of an intervention effectively achieving de-implementation. This inconclusive finding is consistent with the systematic review conducted by Rietbergen et al (2020) who was also unable to decipher which strategy was the most effective for reducing low-value nursing care practices due to the variation in outcome reporting.

The finding that the majority of de-implementation interventions included in the present review targeted doctors aligns with the systematic review carried out by Colla et al (2015) who reported that there is limited knowledge of de-implementation interventions directed at non-physician

staff. This is also consistent with the observation that most de-implementation initiatives, for example, the ‘Choosing Wisely’ campaign, produce recommendations for avoiding or eliminating low-value practices that are carried out by doctors (Levinson et al, 2018). A possible explanation for this greater emphasis on doctors may be due to the focus in research on de-implementing inappropriate medicines (Ingvarsson et al, 2022), the majority of which are prescribed by doctors.

Additionally, the finding that all of the controlled studies that produced a positive, significant effect used a multicomponent intervention supports previous literature that has found that multicomponent interventions are more effective in supporting de-implementation than single-component interventions (Colla et al, 2017; Orelio et al, 2021; Rietbergen et al, 2020). However, six (n=6/9, 67%) multicomponent interventions tested by the controlled studies included within this review did not produce significant results, indicating that the efficacy of a de-implementation intervention requires more than just a multifaceted approach.

Of the controlled studies included in the meta-analysis, only three out of nine (33%) significantly improved outcome measures relating to patient safety, each of which targeted doctors’ decision making and included an educational component i.e. included instruction on how to perform the behaviour or information on health consequences. However, these three studies differed in how they delivered the intervention i.e. electronically or face-to-face and in how they were combined with other BCTs. When considering the key components of interventions that have previously aimed to de-implement low-value practices, it is important to note that none of the included studies in the present review used theory to inform their design

(Eskes et al, 2019; Norton et al, 2020; van Bodegom-Vos et al, 2017). The majority of studies used previous evidence to inform the design of their intervention but did not consult any theories, models or frameworks.

All the included studies focused on the de-implementation of clinical practices, i.e. tests, treatments or surgeries. This highlights a lack of previous research that has explored the impact of de-implementation interventions on non-clinical practices (e.g. risk assessments or safety checklists) that could have an influence on patient safety. The most frequently targeted behaviour across all included studies was 'inappropriate prescribing of medicines'. Previous literature has highlighted that de-implementation research has largely focused on de-implementing the inappropriate use of medication (Scott et al, 2015; Sypes et al, 2020a). For example, Ingvarsson et al (2022) conducted a systematic review that aimed to identify strategies for the de-implementation of low-value care and reported that the most frequently identified target behaviour was de-implementing potentially inappropriate medicines for the elderly. Additionally, Colla et al (2017) reported that de-implementation interventions targeting medication use were the most common, followed by scans, procedures and laboratory tests. Ingvarsson et al (2022) suggest that this focus is because it is easier to determine that a medication is low-value because its effectiveness can be tested in randomised controlled trials that produce unequivocal evidence. This finding suggests that more research is needed to test the efficacy of interventions that aim to reduce healthcare practices other than inappropriate prescribing of medicines.

The final review question aimed to understand how the effects of de-implementation interventions on patient safety have been measured. The

majority of the uncontrolled studies measured process outcomes such as the change in the rate of the low-value practice before and after the intervention had been implemented, with authors claiming or demonstrating that these process measures were associated with safety outcomes. For example, the number of potentially inappropriate medications prescribed before and after intervention implementation (Bundeff & Zaiken, 2013; Illic, 2015; Jain et al, 2013; Keith et al, 2013). Some patient safety outcomes were also measured by the uncontrolled studies, for example, reduction in the rate of urinary tract infections (UTIs) as a result of reducing the use of indwelling urinary catheters (Lenz et al, 2021; Thakker et al, 2018; Tyson et al, 2020).

The majority of the controlled studies compared the rate of the low-value practice carried out in the experimental vs control group by measuring process outcomes (Althabe et al, 2004; Desveaux et al, 2017; Pettersson et al, 2011; Pimlott et al, 2003; Tadrous et al, 2020). For example, the reduction in quinolone prescription for patients with a UTI in control vs experimental hospitals following the implementation of an intervention (Pettersson et al, 2011). Again, some patient safety outcomes were measured such as adverse events (Jefferson and King, 2018) and rates of non-emergency caesarean sections (Althabe et al, 2004). These findings, however, indicate a great deal of variation in the outcome measures relating to patient safety addressed by studies included in this review, which adds to the difficulty in comparing the effectiveness of the interventions.

3.5.1 Strengths and limitations

A strength of this review is that it identified research articles from a variety of clinical contexts to understand how the process of de-implementation can affect outcome measures related to patient safety across different healthcare

settings. The majority of previous systematic reviews have explored the effectiveness of de-implementation interventions in specific areas of clinical practice which limits the extent to which their findings can be applied to different areas of healthcare (Rietbergen et al, 2020; Sypes et al, 2020a; Tabriz et al, 2022).

A limitation of this review is that, despite applying robust search strategies, it is possible that some relevant articles were not identified because a relevant key word was inadvertently omitted, though this risk was mitigated by using previous literature to inform the identified key words and search terms. Additionally, it is possible that relevant articles were excluded during the screening process because the author did not make an explicit link between the measured outcome and patient safety. For example, although there is a body of previous knowledge evidencing the link between the rate of indwelling catheters and urinary tract infections (a patient safety outcome), if an article only measured the rate of catheter use before and after the de-implementation intervention, without providing evidence of the link between catheter use and infection, it was not included in this review. Although this ensured there was an evidence-based link between the target healthcare practices and patient safety, it might have resulted in the elimination of articles that may have been relevant. Future research could alternatively consider using an established definition to determine whether the outcome measured/ reported is related to patient safety.

A final limitation is that all the included uncontrolled studies were of poor quality which meant it was not possible to draw definite conclusions based on their findings and some of the controlled studies could not be included in the meta-analysis due to missing data.

3.5.2 Conclusions

The reviewed evidence suggests that most controlled and uncontrolled studies with a positive significant effect used a multi-component intervention to reduce the inappropriate prescribing of medicines, targeted doctors and did not use theory to inform their design. Due to a small sample size and poor quality studies, it is unclear which BCTs are most effective at de-implementing a low-value healthcare practice. Further research should use more robust research designs to produce more reliable evidence that can then be analysed using a meta-regression to identify which BCTs are most effective at de-implementation. Additionally, future research may benefit from drawing upon behaviour theory when developing and testing de-implementation interventions to increase the likelihood of effectively changing healthcare professional behaviour (Nilsen et al, 2020b; O'Cathain et al, 2019; Patey et al, 2018). This review thereby increased understanding of how low-value healthcare practices have been de-implemented in the past and what the impact of this has been on patient safety. The learning from this review will be applied to the intervention development process that will take place at a later stage in this PhD research.

Chapter 4: A consultation exercise using Delphi principles to identify priority low-value patient safety practices for further investigation

4.1 Chapter summary

In Chapter 2, patient safety practices (PSPs) that healthcare professionals from the UK and Australia frequently perceived to be low-value were reported and compiled into lists. According to multiple de-implementation frameworks, following the identification of potential areas of low-value, the next step is to identify priorities for de-implementation (Grimshaw et al, 2020; Norton et al, 2018; Ospina et al, 2021). The decision to reduce or stop a PSP cannot be based on healthcare professional perspectives alone because this does not necessarily take into account important objective factors such as the underlying evidence base (or economic cost), or the views of other key stakeholders e.g. patients, all of which may affect the success of de-implementation. Further exploration of these PSPs is therefore required to determine which are appropriate candidates for de-implementation. There is currently no consensus on how to identify a target candidate PSP for de-implementation from a list of PSPs perceived by healthcare professionals to be of low-value. This chapter therefore describes a process of developing a set of criteria based on previous de-implementation and implementation literature, to eliminate practices from the UK list described in Chapter 2 and thereby identify those that could be considered priorities for de-implementation. The findings from this chapter were used to inform an interview study (Chapter 5) and a series of de-implementation intervention co-design workshops (Chapter 6).

4.2 Background

Recent years have seen recognition of the problem of ‘safety clutter’ in healthcare i.e. the accumulation of safety procedures, roles and activities that are carried out to improve safety but do not contribute to the safety of healthcare delivery (Rae et al, 2018). Safety clutter drains time and resources that could be alternatively spent on providing more effective patient care. An example of a task that could be classified as safety clutter in a healthcare context is the repeated documentation of the same information on different forms of paperwork. To reduce system inefficiencies, prevent unnecessary spending and improve safety outcomes, it is important to develop processes that can effectively identify and remove low-value PSPs that contribute to safety clutter.

Previous research investigating the process of de-implementation has focused on the identification and removal of clinical practices i.e. medical tests and treatments (Grimshaw et al, 2020; Norton et al, 2018; Ospina et al, 2021; Sypes et al, 2020a), however, the extent to which these processes can be applied to PSPs that contribute to safety clutter is unknown. It is therefore important to develop methods for deciding which low-value PSPs should be made priorities for de-implementation.

Several potential forms of safety clutter were identified by healthcare staff in Chapter 2. However, not all the identified PSPs are appropriate for de-implementation. It is possible that some healthcare professionals identified certain PSPs as low-value because they did not like carrying them out or due to implementation issues specific to their organisational context. Therefore, before any PSP highlighted in Chapter 2 can be taken forward as a potential candidate for de-implementation, it is necessary that other

relevant factors are also taken into consideration, alongside the healthcare professional perspective, to ensure that removal would not be inappropriate or detrimental to patient safety.

4.2.1 De-implementing low-value clinical practices

In the absence of established processes to prioritise low-value PSPs for removal, it is necessary to draw upon previous research that has developed strategies to identify candidate low-value clinical practices for de-implementation. This chapter will therefore describe the process of developing and using pre-determined criteria to identify priority PSPs for further investigation to determine a target practice for potential de-implementation. Because the Australian survey data collection began 6 months after the completion of the UK data collection, only the list of PSPs identified by UK healthcare professionals was taken forward at this stage. Additionally, it would not have been appropriate to use the Australian data to inform the design of a de-implementation intervention for implementation in UK healthcare settings. Any reference to the list of PSPs from this point onwards refers to the UK list only.

Previous research has emphasised the need to assess a range of factors when deciding which low-value clinical practices to prioritise for de-implementation. For example, Niven et al (2015) conducted a scoping review of literature on de-adoption and reported that frequently proposed criteria that have been used to prioritise low-value clinical practices for de-implementation have included: the availability of evidence of a practice being ineffective or harmful, the safety of the low-value practice (harmful practices should be prioritised over those that are just ineffective), potential health and cost impact of de-implementation and availability of alternative options.

Niven et al (2015) incorporated these factors into a conceptual framework for de-implementation. A key part of this framework also included consultation with clinical stakeholders and monitoring for scientific evidence.

Similarly, Norton et al (2018) developed a framework of factors that should be considered when planning the de-implementation of ineffective cancer treatments, practices and interventions. The initial stages of the framework focus on identifying and prioritising practices for de-implementation. Stage 1 highlights the need to consider the strength of evidence underlying a practice when deciding which practices should be de-implemented. For example, a practice based on a weak evidence base comprising mainly of non-controlled pre-post or observational studies should be prioritised for de-implementation over practices that have been previously implemented based on a strong evidence base consisting of, for example, randomised controlled trials. Stage 2 of the framework prompts consideration of the magnitude of the problem, comprising of four subfactors: 1) harm (injuries that patients incur from the treatment or intervention, 2) prevalence (the extent to which the treatment is used and delivered to patients), 3) equity (the extent to which removing the practice would benefit the full demographic range of the population, and 4) resources (time and staff required to carry out the practice). The subsequent three stages focus on the way the practice could be removed and the need to create the change at different levels of the healthcare service. Although this framework is designed to de-implement low-value practices in cancer care settings specifically, it is possible to adapt and apply the same criteria to evaluate low-value PSPs for potential de-implementation.

Additionally, Prasad and Ioannidis (2014) developed a conceptual framework to guide the process of establishing priority low-value medical practices for further testing that can be drawn upon when developing the criteria for this study. Their framework included seven key considerations: 1) prior evidence base (priority for de-implementation is given to practices that have the weakest evidence base), 2) cost/ ubiquity (priority is given to practices with considerable net financial burden on health payers), 3) alternative options (priority is given to practices for which there are multiple alternative options), 4) documented harms (priority is given to practices that cause well-documented harms), 5) testing the intervention makes financial sense (priority should be given to test practices where the cost to test is much less than the ongoing expenses associated with the practice), 6) proponents are open-minded (practices should be prioritised if it is likely that negative results will gain traction), and 7) the value of information gained (priority should be based on the expected value of funding a study that may inform de-implementation).

Prasad and Ioannidis (2014)'s framework emphasises the need to consider several contextual factors, for example, associated cost as well as having an awareness of the evidence base underlying medical practices to make a decision about which practices to prioritise for further evaluation. They encourage the prioritisation of practices that have the weakest evidence and place the greatest burden on the healthcare system for further testing to determine their appropriateness for de-implementation. This framework is a useful prompt to guide thinking about how to prioritise practices for potential de-implementation, however, there is no indication of which factors should be given more weight. This deliberately flexible

approach to evaluating medical practices means that the principles of the framework are broadly applicable to all healthcare fields, thereby also including PSPs.

Further, Grimshaw et al (2020) developed a framework to identify priority practices for de-implementation based on 'Choosing Wisely' recommendations. Grimshaw et al (2020) note that, because it is not feasible to address all identified 'Choosing Wisely' recommendations simultaneously, organisations should identify local priorities for which 'Choosing Wisely' recommendations to implement i.e. which low-value practices to stop. According to Grimshaw et al (2020)'s 'Choosing Wisely De-implementation Framework' (CWDF), 'Phase 0' involves identification of potential areas of low-value healthcare and 'Phase 1' focuses on detection of local priorities for implementation of 'Choosing Wisely' recommendations. During Phase 1, the framework states that local priorities should be informed by: 1) empirical studies demonstrating overuse of low-value tests and/ or considerable variations in practice, evidenced by local administrative data, and 2) consensus processes involving key stakeholders. There is much overlap between the CWDF and Prasad and Ioannidis (2014)'s framework. For example, both highlight the importance of using evidence and economic value to prioritise practices for further testing or de-implementation.

4.2.2 De-implementing low-value patient safety practices

The majority of previous research that has used pre-determined criteria or a framework to identify priority practices for de-implementation has focused on clinical practices i.e. tests and treatments. However, it is also important to consider previous literature that has applied criteria to evaluate PSPs specifically. For example, following the publication of 'To err is human:

building a safer health system' report (Donaldson, Corrigan & Kohn, 2000), the Federal Government's Quality Interagency Coordination Task Force recommended that the National Quality Forum (NQF) identify a set of PSPs that were critical to prevent medical errors (National Quality Forum, 2004). Although the goal of this exercise was to identify priorities for adoption rather than for de-implementation, it nevertheless outlines a process that can be used to evaluate PSPs. The NQF evaluated 220 candidate PSPs and, using a criteria and consensus approach, produced a report that identified 30 priority PSPs that should be implemented in healthcare settings to reduce the risk of harm to patients (Kizer & Blum, 2005). Since 2004, this report has been updated several times to ensure that the most recent evidence can be used to determine priorities for implementation (National Quality Forum, 2006, 2009, 2010). To identify priority PSPs for implementation, a structured method of assessment was developed that evaluated practices using five criteria: 1) specificity (the PSP must be a clearly and precisely defined process. The essential aspects of the PSP must be clear enough that an auditor could review a healthcare professional's performance and decide whether the practice is being implemented correctly), 2) evidence of effectiveness (there must be clear evidence that the practice is effective in reducing the risk of harm resulting from care), 3) benefit (the PSP must have evidence of benefit but also evidence that there would be a benefit if the practice were more widely used, 4) generalisability (the PSP should be usable in multiple clinical care settings and for multiple different patient groups), 5) readiness (the technology that is required to carry out the PSP must be available and staff who will be carrying out the practice are appropriately skilled).

Similarly, Shekelle et al (2013) evaluated a list of PSPs to identify priorities for widespread adoption. Shekelle et al (2013) recruited a Technical Expert Panel (TEP) to evaluate a subset of PSPs using the following criteria: 1) scope of the problem i.e. the frequency of the safety problem and the severity of each average event, 2) strength of evidence for effectiveness, 3) evidence of potential for harmful unintended consequences, 4) estimate of costs, and 5) implementation issues. Using this criteria, Shekelle et al (2013) identified lists of PSPs that were “strongly encouraged for adoption” and “encouraged for adoption”. Although this study did not develop criteria to identify target practices for de-implementation, it provides an alternative set of criteria that can be used to evaluate PSPs.

4.3 Developing a criteria to identify target low-value PSPs for de-implementation

Previous research has therefore encouraged the consideration of multiple criteria when seeking to identify priority healthcare practices for both implementation and de-implementation. As part of this PhD, DH developed a prioritisation criteria (see Table 4.1) that could be used to specifically prioritise PSPs for potential de-implementation. Criteria were chosen, based on the evidence outlined above, that could be adequately assessed within the confines of this PhD and that appeared particularly relevant for de-implementation. Table 4.1 outlines each element of the criteria, the reason for its inclusion and how it was assessed in the present prioritisation exercise.

Table 4.1. PSP De-implementation Prioritisation Criteria

Criteria	Description	Explanation	How was the criterion assessed?
Specificity	The PSP must be clearly defined. There must be sufficient detail to know what the essential aspects of the practice are, e.g. What steps need to be followed to complete this practice? Specific PSPs should be prioritised over general practices.	This criterion was included in previous evidence evaluating PSPs (National Quality Forum, 2010). Previous literature has also emphasised the importance of describing the target behaviour as clearly as possible when implementing behaviour change interventions (Presseau et al, 2019).	Healthcare professionals provided feedback on the specificity of the practices during the piloting of survey 1. Input from the supervision team was also used to determine the specificity of the practices (see section 4.4.4).
Evidence base	If the effectiveness of a PSP is underpinned by a weak evidence base comprising of low-quality research, it should be prioritised for de-implementation over PSPs that have a strong evidence base demonstrating their effectiveness.	This criteria was included in all de-implementation frameworks and prioritisation exercises described above (Grimshaw et al, 2020; Norton et al, 2018; Niven et al, 2015; Prasad & Ioannidis, 2014; Shekelle et al, 2013).	DH reviewed the evidence base underlying the candidate practices (see section 4.9).

Economic value	PSPs that are associated with a large cost to the NHS (including staff time and resources) for minimal or no patient benefit should be prioritised over PSPs that do benefit patients and produce minimal costs.	The majority of de-implementation frameworks and prioritisation exercises described above include a criterion that relates to the associated cost of the low-value practice (Niven et al 2015; Prasad & Ioannidis, 2014; Shekelle et al, 2013).	Stakeholders were asked to indicate how much staff time and resources the practices require (Section 4.4.4.3). DH also consulted with a health economist to try to calculate an estimate of the economic value of the practices. DH also reviewed evidence relating to the economic value of the candidate practices (section 4.10).
Staff motivation	Low-value PSPs should be prioritised for de-implementation if the proponents are motivated to stop carrying out the practice. If staff do not support the idea of de-implementation, it is likely that the de-implementation process will be very challenging in practice.	The National Quality Forum (2010) includes 'the readiness of healthcare staff' in its criteria and Prasad & Ioannidis (2014) include 'proponents are open-minded' in their framework which both relate to staff motivation to engage in de-implementation. With a lack of previous research assessing healthcare professionals' motivation towards de-implementation, three questions were developed (guided by principles from the Theoretical Domains Framework and the COM-B model (Cane et al, 2012) in an	This criterion was assessed by asking stakeholders questions relating to different elements of 'staff motivation', 1) **Beliefs about consequences** for patient safety i.e. how important staff perceived the practice to be for maintaining patient safety. (see section 4.4.4.2) 2) **Beliefs about capabilities** i.e. how easy/ difficult they felt it would be to stop carrying out the practice (see section 4.7.1.1) 3) **Emotion** i.e. if healthcare professionals felt very anxious about stopping a low-value

		attempt to address different aspects of this criterion.	PSP, they would be less motivated to stop it (see section 4.7.1.2)
Risk of increased harm	PSPs should be prioritised if the likelihood of increasing the risk of harm to patients as a result of de-implementation is higher than for other PSPs.	Prasad & Ioannidis (2014) and Shekelle et al (2013) included 'risk of harm' as a criterion to determine priorities for implementation.	Stakeholders answered a question asking them to rate how harmful or beneficial it would be if the practice were to be stopped in healthcare settings (see section 4.7.1.3). It was believed that the question targeting emotion (section 4.7.1.2) also mapped onto this criterion because staff would be likely to feel anxious if they thought that removing a practice was going to increase the risk of causing harm to patients.

4.3.1 Operationalising the criteria to determine priority practices for de-implementation.

Previous research has highlighted the importance of involving healthcare professionals in the process of prioritising practices for removal, to increase the likelihood of successful de-implementation (Ospina et al, 2021; Prusaczyk, Swindle & Curran, 2020). The importance of this involvement in prioritisation is also supported by de-implementation frameworks (Grimshaw et al, 2020; Niven et al, 2015). It was therefore decided that healthcare professionals should be involved in applying the criteria outlined in Table 4.1 to determine priority practices for de-implementation. More objective indicators i.e. underlying evidence base and cost effectiveness were also considered to ensure decisions were not solely based on healthcare professional opinion.

There are no guidelines on how best to involve healthcare professionals in this process, however, previously, consensus has been reached on establishing priority PSPs for adoption using technical expert panels and steering group committees comprising patient safety leaders and evaluation methods experts (National Quality Forum, 2010; Shekelle et al, 2013).

A modified Delphi survey method was chosen as a way to facilitate stakeholder involvement and achieve group consensus on de-implementation priorities (Boulkedid et al, 2011; Hasson et al, 2000; Hernan et al, 2016; Khodyakov et al, 2020). This is an iterative and flexible multistage approach that has been applied extensively in healthcare research. The aim of consensus methods is to determine the extent to which experts agree on a particular topic (Jones & Hunter, 1995). Although flexible,

there are fundamental principles that need to be followed for a method to be defined as a 'Delphi survey method' (Jones & Hunter,1995). Table 4.2 sets out the core characteristics of the Delphi survey method.

Table 4.2 Delphi survey method process outline.

Delphi Process Stage	Description
1. Definition of the problem	Clearly outline the objective of the Delphi survey at the beginning of the process (Jones & Hunter, 1995).
2. Selection of experts	A group of heterogeneous experts are invited to take part in the Delphi process. This can include healthcare professionals, informal caregivers or patients (Boulkedid et al, 2011).
3. First round	Prior to survey completion, define consensus and criteria for stopping the Delphi procedure. Following the first round, feedback on the findings must be provided to all experts (Boulkedid et al, 2011).
4. Second round	Construct the next round based on the results from the first round. Share results or feedback with each participant (Hasson et al, 2000).
6. If consensus has been achieved, report findings. If not, repeat second round.	Once consensus has been reached, stop the Delphi and provide feedback to the experts (Jones & Hunter, 1995).

The Delphi method stipulates that decisions should be made based only on the findings produced by the panel following each round of questioning (Boulkedid et al, 2011). In order to identify potential practices for de-implementation, it was felt that additional sources of information should be considered to ensure that the more objective elements of the criteria could be adequately addressed such as 'evidence base' and 'economic value'. It was therefore decided that the principles of the Delphi method would be followed i.e. clearly defining the problem, using a group of heterogeneous

experts, using rounds to achieve a consensus, however, following the consultation process, the evidence base underlying the remaining practices and the associated estimated economic costs would be assessed so that the final decision could be based on criteria that fell outside the expertise of the healthcare professionals. It therefore felt more appropriate to refer to this study as a ‘consultation exercise based on Delphi principles’ rather than a study that employed the Delphi method. This consultation exercise aimed to answer the following research question:

1) Using pre-specified criteria, expert input and evidence, which PSP(s) from the pre-established list should be prioritised as candidates for potential de-implementation?

4.4 Round 1 Methods

4.4.1 Overview of methods

The Round 1 survey (see Appendix 4.1) asked a panel of healthcare professionals (each of whom had a specific interest in patient safety) a series of questions that aimed to address the ‘staff motivation’ and perceived ‘economic value’ elements of the criteria. After analysing the results and feeding back to the panel, the Round 2 survey was then developed and piloted (see Appendix 4.2) to address the ‘staff motivation’ and ‘risk of harm’ elements of the criteria. An overview of the literature underpinning each of the remaining PSPs was then carried out to determine which PSPs had the weakest evidence base. The cost effectiveness of the remaining PSPs was then considered to identify the target practice for de-implementation.

4.4.2 Ethical approval

Ethical approval was not required for this consultation exercise because it was not classified as 'research' according to the Health Research Authority's decision making tool (http://www.hra-decisiontools.org.uk/research/). This tool supports researchers in deciding whether or not their study is research as defined by the UK Policy Framework for Health and Social Care Research.

4.4.3 Participants and setting

Purposive sampling was used to recruit healthcare professionals who were part of a 'Workforce Engagement and Wellbeing' (WEW) patient safety research group based at the Yorkshire and Humber Patient Safety Translational Research Centre (YHPSTRC). This group was targeted because they were a known group of healthcare professionals who had an interest in patient safety and were willing to participate in research. DH presented findings from Study 1 and outlined plans for the consultation exercise during a WEW group meeting. DH asked if any members would be willing to participate and several verbally expressed interest. DH asked those who expressed interest if they could forward on the email addresses of any clinicians they knew who might also be willing to take part. DH then emailed 22 potential healthcare professional participants (including nurses, doctors, midwives and pharmacists), inviting them to take part in the consultation exercise. The email contained a link to the first survey.

4.4.4 Included PSPs

The ten most frequently identified categories of PSPs were taken forward from the list produced by Study 1 into this consultation exercise (see Table 4.3). It was necessary to limit the number of included categories to ensure

that the survey only focused on the most frequently mentioned PSPs and to ensure that it did not take up excessive amounts of healthcare professionals' time. The most frequently identified PSP within each category was also provided as an example to help panel members understand what the different categories were. For some of the larger categories, for example, 'paperwork' and 'duplication', the second most frequently mentioned practice was also used as an example to ensure that the examples represented the variety of frequently identified practices in the group. This resulted in the inclusion of 12 individual practices in total. The ten categories of practices (and their most frequently mentioned example) were:

Table 4.3 The ten most frequently identified categories of PSPs produced by study 1.

Category	Most frequently mentioned example in Study 1
1a) Paperwork (assessments)	Performing risk assessments e.g. for Venous Thromboembolism (VTE). Healthcare staff are required to regularly conduct risk assessments on all patients to evaluate the likelihood of a patient developing a VTE (a blood clot).
1b) Paperwork (assessments)	Conducting falls risk assessments on non-risk patients in hospital settings: Healthcare staff are required to regularly conduct risk assessments on all patients to evaluate the likelihood of a negative health event e.g. a fall.
2) Paperwork (**Duplication)**:	Repeated transcribing of information on different pieces of paper/ objects.
3) Paperwork (general):	Completing excessive amounts of documentation.

4) Checking skin/ pressure areas for mobile patients in hospital settings.	Healthcare staff are required to regularly check the skin of patients for pressure damage even on mobile patients who are less likely to develop pressure damage.
5) Intentional rounding	Carrying out intentional rounding i.e. conducting regular checks on patients at set times to assess and manage their fundamental care needs.
6a) Duplication	Some paper documentation is repeated on Electronic Patient Record (EPR).
6b) Duplication	Routinely double-checking classified patient medication with a fellow member of healthcare staff, prior to administration.
7) Incident reporting	Reporting all safety incidents.
8) Some Mandatory Training	Doing mandatory e-learning that is not relevant to one's own practice.
9) Some Infection control measures associated with dress/ uniform:	Wearing masks and aprons or being 'bare below the elbows' in non-intervention settings.
10) Using medication compliance aids e.g. 'Dosette boxes' to dispense patient medication:	A multi-compartment compliance aid stores scheduled doses of medications and prompts patients to take medication at specific times throughout the day.

4.4.5 Round 1: Survey design

The online survey was developed using 'Qualtrics' (www.Qualtrics.com), a website that can be used to create data collection tools. 'Qualtrics' was chosen as the platform for this survey because it enables users to be compliant with several key privacy laws. The Round 1 survey (Appendix 4.1) began with some background information explaining the purpose of the survey, followed by three demographic questions that asked panel members to state their: age group, gender and current job. The survey then asked participants three questions relating to: 1) if they knew enough about the practice to answer further questions about it, 2) their motivation to stop the practice (relating to the 'staff motivation' element of the criteria and 3) the extent to which the practice consumes staff time and resources (relating to the 'economic value' element of the criteria).

Principles from the Theoretical Domains Framework (TDF) and COM-B model (Cane et al, 2012) were drawn upon to develop questions relating to the 'staff motivation' element of the criteria. These theories have been extensively used to explain implementation behaviour change amongst healthcare professionals (Atkins et al, 2017; Dyson & Cowdell, 2021; Francis et al, 2012; French et al, 2012). Additionally, recent literature has found that the TDF has been used to explain the de-implementation of low-value healthcare practices at the healthcare professional level (Nilsen et al, 2020b). Table 4.4 displays the TDF domains that are likely to be important in changing behaviour through targeting healthcare professional motivation.

Table 4.4 Mapping the COM-B framework onto the TDF Domains (Cane et al, 2012).

COM-B component		TDF Domain
Capability	Psychological	Knowledge
		Skills
		Memory, Attention and Decision Processes
		Behavioural Regulation
	Physical	Skills
Opportunity	Social	Social influences
	Physical	Environmental Context and Resources
Motivation	Reflective	Social/ Professional Role & Identity
		Beliefs about capabilities
		Optimism
		Beliefs about consequences
		Intentions
		Goals
	Automatic	Social/ professional role and identity
		Optimism
		Reinforcement
		Emotion

Three healthcare professionals (a nurse, a GP and a hospital consultant) were invited to take part in piloting Round 1 of the survey. They were emailed a link to the survey alongside a feedback form that asked questions relating to: the length of time it took to complete the survey, the readability of the questions and any feedback in general regarding the clarity of the questions or descriptions used in the survey. Based on this feedback, changes were made to the phrasing of some of the ten practices in an attempt to improve the clarity of the questions before it was shared with participants. For example, prior to piloting the survey, Category 1 used two examples (falls and VTEs) to describe the category of 'Paperwork (assessments): Performing risk assessments e.g. for falls or Venous Thromboembolism (VTE). Healthcare staff are required to regularly conduct risk assessments on all patients to evaluate the likelihood of a negative health event e.g. a fall or a VTE (a blood clot)'. However, feedback from the pilot survey highlighted that the two forms of assessments would be rated very differently in relation to the criteria of 'staff motivation and 'economic value' and so the survey was adapted to include both examples as independent practices.

Additionally, some participants fed back that they were not familiar with some of the included practices and so did not feel knowledgeable enough to answer questions on them. It was therefore decided that it was first important to establish whether participants understood each of the twelve practices well enough from the descriptions provided to give meaningful answers on the different elements of the criteria.

Further, the feedback based on the pilot survey noted that several of the included practices were 'very general'. For example, in relation to the

practice of “some mandatory training: Doing mandatory e-learning that is not relevant to one's own practice”, pilot feedback indicated that this could refer to a great variety of practices that could differ greatly depending on the healthcare profession and healthcare context. Healthcare professionals also commented on a lack of specificity relating to the additional three practices:

- **Paperwork** (**Duplication)**: Repeated transcribing of information on different pieces of paper/ objects.
- **Paperwork (general)**: Completing excessive amounts of documentation.
- **Duplication**: Some paper documentation is repeated on Electronic Patient Record (EPR).

As ‘specificity’ was an element of the pre-determined criteria used to eliminate PSPs that should not be considered for de-implementation, DH and the supervision team reviewed the specificity of the twelve individual practices in relation to the pilot feedback. Following extensive discussion, a consensus was reached between DH and the supervision team that the following four practices should be eliminated prior to the dissemination of the Round 1 survey due to a lack of specificity: 1. ‘Some mandatory training’, 2. ‘Paperwork’ (duplication), 3. ‘Paperwork’ (general), 4. ‘Duplication’ (paper documentation repeated on EPR). Future research should investigate these four categories further to identify the exact form of the practice that should be targeted for de-implementation.

4.4.5.1 Question 1

The first question asked panel members: “I know enough about this practice to answer questions about it” (yes/no). If a panel member answered

‘no’ to this first question in relation to one of the practices, meaning it was not possible for them to answer subsequent questions relating to that practice, the survey would automatically move onto the next practice. If a participant answered ‘yes’ to this question in relation to a specific practice, they were then taken to the second question that addressed a different element of the criteria. Practices that received 25% or more ‘no’ responses and for which subsequent questions were not answered were deemed to have received insufficient consensus to be confident that elimination was appropriate and were therefore retained. This question therefore did not address any specific criterion but was used to ensure that participants could provide meaningful responses for subsequent questions.

4.4.5.2 Question 2

The second question aimed to address the criterion of ‘staff motivation’ by asking a question relating to the healthcare professional’s beliefs about consequences (see Table 4.4). The question asked panel members to rate the extent to which they agreed that each practice is important for maintaining patient safety using a Likert scale (0: strongly disagree – 10: strongly agree). It was assumed that if a participant agreed very strongly that a practice is important for maintaining patient safety, they would anticipate that negative consequences would occur for patient safety if that practice was de-implemented. In line with Delphi principles (see Table 4.2) prior to survey completion, it was agreed that a mean score of 7.5 or more was required to eliminate a practice at this stage because this score would indicate that participants consider the practice to be highly important for maintaining patient safety and therefore removal would be inappropriate.

4.4.5.3 Question 3

Participants were then asked to rate each of the practices on the extent to which they agreed that 'complying with the practice consumes staff time and resources' using a Likert scale (0: strongly disagree – 10: strongly agree) . This item aimed to gather staff perspectives relating to the criteria of 'economic value'. It was pre-determined that only practices that generated a mean score of 7.5 or more could be considered to be taken forward to Round 2 because this would indicate high resource use, potentially making it an appropriate candidate for de-implementation. Appendix 4.1 contains the exact wording of the Round 1 survey.

4.4.6 Procedure

Healthcare professionals received an email containing a link to the Qualtrics survey that provided access to the first round of the consultation exercise. One month after completing the Round 1 survey, participants were emailed again with a link inviting them to take part in the Round 2 survey (Appendix 4.2). The first page of the Round 2 survey contained links to background information (Appendix 4.3) and a summary of the findings from Round 1 (see Appendix 4.4). Participants could access the summary without completing the second round of the survey if they wished. Following completion of the Round 2 survey, participants received feedback via email of the results once the data had been analysed. DH encouraged panel members to get in touch via email if they had any questions or feedback.

4.4.7 Data analysis

DH downloaded the survey response data from the 'Qualtrics' website and imported the data into an Excel spreadsheet for analysis. Using Excel functions, the following descriptive statistics were calculated for each of the

twelve practices: the percentage of the panel who answered ‘yes’ to knowing enough about a practice to answer subsequent questions (Question 1), the mean, median, range and standard deviation of the Question 2 scores and the Question 3 scores.

4.5 Results: Round 1

4.5.1 Participants

Sixteen healthcare professionals completed the survey. A quarter of the panel were doctors (n= 4, 25%) and female (n =11, 69%) and in the age range of 35-44 (n = 8, 50%) (see Table 4.5). Table 4.6 contains descriptive statistics for the three measures assessed during Round 1.

Table 4.5. Demographic Characteristics of Panel

Demographic Characteristic		N	%
Gender	Female	11	69
	Male	4	25
	No response	1	6
	Other	0	0
Age range	25-34	4	25
	35-44	8	50
	45-54	2	12
	55-64	1	6
	No response	1	6
Current occupation	Allied Healthcare Practitioner	1	6
	Doctor	4	25
	Nurse	3	19
	No response	2	13
	Paramedic	1	6
	Pharmacist	3	19

Midwife	1	6
Operating Department Practitioner	1	6

4.5.2 Round 1 Survey Results

The Round 1 findings displayed in Table 4.6 indicate that 75% of the panel or more perceived ‘VTE assessments’, ‘infection control measures’ and ‘incident reporting’ to be very important for maintaining patient safety according to the predefined criteria. These practices were therefore eliminated because the panel reached a consensus that three of the practices were very important for maintaining patient safety. A consensus was not reached for any of the practices on the ‘economic value’ question, so no practices could be eliminated based on these findings.

For five out of the eight practices assessed by the first survey, less than 75% of the panel felt they knew the practices well enough to answer further questions relating to them. For example, only 31.5% of the panel knew enough about the category ‘Paperwork (assessments): falls risk’ to answer subsequent questions about it. It was therefore not possible to eliminate any of these five practices because the average rating did not represent the majority of the healthcare professionals on the panel. The remaining five practices were therefore taken forward to Round 2.

Table 4.6: Round 1 Survey Results

Practice	Sufficient understanding (%)	Mean 'staff motivation' score (SD)	Median	Range	Mean 'economic value' score (SD)	Median	Range
Paperwork (assessments): VTE assessments	75	8.50 (1.45)	8	4	4.92 (2.57)	5	7
Checking skin/ pressure areas for mobile patients	50	7.00 (3.74)	9	9	5.43 (3.64)	6	9
Intentional rounding	43	6.57 (4.31)	8	10	5.71 (2.62)	5	8
Duplication (double-checking medication)	62.5	6.70 (3.30)	6.5	9	6.40 (2.76)	6.5	9
Incident reporting	94	8.47 (2.42)	10	7	6.90 (2.60)	7	8
Some infection control measures	94	8.67 (1.68)	9	5	1.20 (1.15)	1	5
Medical compliance aids	37.5	3.50 (2.43)	3.5	5	6.50 (2.81)	7	8
Paperwork (assessments): Falls risk	31.5	7.40 (3.29)	8	8	5.80 (1.30)	5	3

4.6 Round 2: Methods

4.6.1 Participants and setting

The 22 healthcare professionals who were originally invited to take part in the Round 1 survey were again invited by email and asked if they would be willing to complete a follow-up survey.

4.6.2 Survey design

The Round 2 survey (Appendix 4.2) was developed using 'Qualtrics' and began with background information explaining the purpose of the first and second round of the consultation exercise. Embedded in the summary were two hyperlinks that panel members could click on to access 1) background information (Appendix 4.3) and 2) feedback on the first round (Appendix 4.4), including a justification explaining why three of the practices had been eliminated based on the Round 1 results. Participants were then asked to answer demographic questions regarding their age group, gender and current job role.

The next page of the survey stated 'below are the five practices that are candidates for potential de-implementation'. The remaining practices were then described:

1. Checking skin/ pressure areas of independent patients regularly: Healthcare staff are required to regularly check the skin of patients for pressure damage even on mobile patients who are less likely to develop pressure damage.

2. **Hourly nurse rounding checks:** Conducting regular checks on all patients every 1-2 hours to assess and manage their fundamental needs.

3. Routinely double-checking classified patient medication with a fellow member of healthcare staff, prior to administration.

4. Pharmacists dispensing medicines into dosage trays or boxes when preparing to discharge a patient: A multi-compartment compliance aid stores scheduled doses of medications and prompts patients to take medication at specific times throughout the day.

5. Conducting falls risk assessments on non-risk patients in hospital settings. Healthcare staff are required to conduct risk assessments on non-risk patients to evaluate the likelihood of a fall.

The survey was piloted by the same three healthcare professionals that piloted the Round 1 survey (a nurse, a GP and a hospital consultant). They were emailed: 1) an update of the practices that were eliminated following Round 1, 2) a link to the Round 2 survey and 3) a feedback form that asked questions relating to: the length of time it took to complete the survey, the readability of the questions and any feedback in general regarding the clarity of the questions or descriptions featured in the survey. Based on their feedback, changes were made to the phrasing of some of the six practices in an attempt to improve the clarity of the questions before the survey was shared with participants.

4.6.2.1 Question 1

The first question targeted a different element of the criterion ‘staff motivation’ by asking a question that related to participants’ beliefs about their capabilities. Question one asked participants to rate the five remaining practices using a Likert scale on how easy-difficult they thought it would be for them to stop performing the practice (0: extremely easy – 10: extremely

difficult). The rationale for this was that if a healthcare professional believed it would be extremely easy to stop performing a PSP, it may be a more appropriate PSP to de-implement than one that was perceived as very difficult to stop performing. It was decided that a practice that produced a mean rating of 7.5 or more for this question should not be taken forward as a potential practice for de-implementation because this would suggest that healthcare professionals would be less motivated to stop performing this behaviour.

4.6.2.2 Question 2

Participants were then asked to rate the practices on how 'relaxed-anxious' they felt from a patient safety perspective about these practices not being carried out in healthcare settings (0: extremely relaxed – 10: extremely anxious). This question aimed to address the criteria of 'risk of increased harm'. It was felt that staff would be likely to feel anxious if they thought removing a practice could increase the risk of causing harm to patients. Additionally, this question also targeted a different element of the criterion: 'staff motivation'. If staff felt anxious about stopping a PSP, it would be unlikely they would feel motivated to engage in de-implementation efforts. It was therefore decided in advance that practices that generated a score of 7.5 or more for this question should not be considered for de-implementation.

4.6.2.3 Question 3

The third question aimed to address the criterion 'risk of increased harm' by asking participants to rate how harmful or beneficial they thought it would be if a practice were to be stopped in healthcare settings (0: extremely harmful – 10: extremely beneficial). If removing a low-value PSP was perceived by

healthcare staff as being extremely beneficial, it should be considered for de-implementation over PSPs perceived to be extremely harmful. It was agreed that if a practice produced a mean rating of 7.5 or higher on this scale, it should be considered as a potential target practice for de-implementation. Appendix 4.2 contains the exact wording of the Round 2 survey.

4.6.3 Analysis

DH downloaded the survey response data from the 'Qualtrics' website and imported the data into an Excel spreadsheet for analysis. Using Excel functions, the mean, median, range and standard deviation were calculated for each of the five remaining practices for Questions 1-3.

4.7 Round 2 results

4.7.1 Participants

Sixteen healthcare professionals completed the Round 2 survey. The majority of the panel were female (n= 13, 81%), in the age range of 35-44 (n= 7, 44%) and were either doctors (n= 4, 25%) or nurses (n= 4, 25%). Nineteen percent of the participants did not state their occupation. Table 4.7 contains demographic details of the panel.

Table 4.7 Demographic characteristics of panel

Demographic Characteristics		N	%
Gender	Female	13	81
	Male	3	19
Age range	25-34	3	19
	35-44	7	44
	45-54	4	25
	55-64	2	13
Current occupation	Doctor	4	25
	Nurse	4	25
	Paramedic	1	6
	Pharmacist	2	13
	Midwife	1	6
	No response	3	19
	Physiotherapist	1	6

4.7.2 Round 2 Survey Results

Table 4.8 contains descriptive statistics for the measures assessed during Round 2. It was not possible to gain consensus across any of the questions relating to the ‘staff motivation’ and ‘risk of increased harm’ criteria for any of the remaining practices. This finding indicated that all five practices were possible candidates for de-implementation. However, as part of the consultation exercise, it was not possible to assess the underlying evidence base criterion or objectively evaluate the economic value criterion. It therefore felt appropriate to assess the remaining five practices on these two criteria as the focus for the next stage of this prioritisation exercise.

Table 4.8: Round 2 Survey Results

Practice	Easy (0) / Difficult (10)			Relaxed (0) / Anxious (10)			Harmful (0) / Beneficial (10)		
	Mean (SD)	Median	Range	Mean (SD)	Median	Range	Mean (SD)	Median	Range
Checking skin/ pressure ulcers	4.8 (3.3)	4	10	3.1 (3.3)	2	10	6.5 (2.7)	7	10
Intentional rounding	5.1 (2.7)	5	9	3.6 (2.6)	3	10	5.5 (2.8)	5	10
Duplication (double-checking medication)	4.8 (2.4)	4.5	9	4.1 (3.5)	3	10	5 (3.4)	4	10
Medical compliance aids	5.6 (3.3)	5	10	3.5 (3.4)	1.5	10	5.6 (3.4)	5	10
Paperwork (assessments): Falls risk	3.4 (1.8)	3.5	6	1.9 (1.6)	1.5	6	6.1 (2.9)	7	9

4.7.3 Evidence Base Criteria

DH conducted an overview of the literature underpinning the remaining five practices to address the 'evidence base' element of the criteria. This evaluation of the evidence underlying each of the practices was part of the prioritisation process because it was not possible to rely on the expert panels being aware of the evidence base underpinning healthcare practices.

4.7.3.1 Pharmacists dispensing medicines into dosage trays.

Medical compliance aids (MCAs), also known as 'dosette boxes' are devices that separate out medicines based on the day and time of day they should be taken to address unintentional non-adherence to medication, often used amongst elderly patients (Walters et al, 2021). There are many different forms of MCAs and there is a lot of variation in the way the devices are used. Although some previous research supports the use of MCAs in improving adherence to medication in specific patient groups such as people with cognitive impairment (Bhattacharya et al, 2016), Furmedge et al (2018) reports a lack of definitive evidence demonstrating clinical effectiveness and cost-effectiveness of the use of MCAs. Watson et al (2016) conducted a systematic review that supports this, reporting that there is limited evidence demonstrating the effects of MCAs and evidence that is available is susceptible to a high risk of bias.

The Royal Pharmaceutical Society reported that there is not enough evidence to say that medication compliance aids improve medication adherence or improve patient outcomes (Royal Pharmaceutical Society, 2019). Additionally, there is also mounting evidence that the use of MCAs may lead to medication-related harm, inappropriate prescribing and medication errors (Counter et al, 2017; Midlöv et al, 2012). Therefore, there

is a strong need for more research to be carried out in this area to understand the value of this practice.

Although the previous literature outlined above is not an extensive overview of the evidence underpinning the use of MCAs, it is understood that the evidence base for the use of MCAs is weak. There is a lack of a national approach to MCA provision and initiation which leads to significant variation in practice (Walters et al, 2021). Due to this variety, further research is required to determine the exact form of MCA and the healthcare context to target using a de-implementation intervention. It was therefore decided that, despite this practice's weak evidence base, this PSP should be eliminated from the list.

4.7.3.2 Checking skin pressure areas of independent patients

NICE guidelines recommend that, on admission to hospital, all adult patients are assessed to predict their risk of developing a pressure ulcer (NICE, 2023). The patient's level of risk can be determined using clinical judgement and/ or a validated risk assessment tool such as the 'Braden scale' or 'Waterlow tool' (Chou et al, 2013). 'Independent' patients are less likely to be at risk of developing a pressure ulcer because they are able to reposition themselves and do not have limited mobility.

There is a lack of evidence that has tested the effectiveness of risk assessing independent patients specifically to prevent the likelihood of developing skin ulcers in hospital. However, much previous research has questioned the effectiveness of using validated risk assessment tools compared to using clinical judgement alone to prevent the development of pressure ulcers (García-Fernández et al, 2014; Johansen et al, 2014;

Pancorbo-Hidalgo et al, 2006). For example, Webster et al (2011) conducted a systematic review comparing the effectiveness of two pressure-ulcer screening tools with clinical judgement in preventing hospital-acquired pressure ulcers amongst patients admitted to medicine or oncology wards in an Australian hospital. The review reported no evidence demonstrating that the tools were more effective in preventing pressure injury than using clinical judgement.

Despite the absence of evidence testing the effectiveness of risk assessing independent patients for pressure ulcers, Gaspar et al (2019) emphasised that risk-assessment tools can be useful in identifying some individual risk factors. Even if a patient is ‘independent’ and mobile, risk assessment tools might be useful in determining whether a patient has a significant loss of sensation, is malnourished or has a significant cognitive impairment, all of which can increase the risk of an ‘independent’ patient developing a pressure ulcer (NICE, 2023). More evidence is therefore required to determine if this practice is low-value among this specific patient group. Also, it is not clear from the phrasing of this practice ‘checking skin pressure areas’ if it is referring to the practice of using critical judgement, using a risk assessment (and if so which one) or both. Further research is therefore needed to determine exactly what form of risk assessment is identified by healthcare professionals to be low-value and what is meant by ‘independent patients’. Based on this lack of clarity, it was decided this practice should not be considered as a priority for de-implementation within the current PhD.

4.7.3.4 Conducting falls risk assessments on non-risk patients in hospital settings.

It has been reported that 30-40% of safety incidents in acute hospitals are falls (Randell et al, 2021). Reducing the incidence of falls in hospital is a highly complex issue that requires regular monitoring of patients and the hospital environment to minimise risks (Healey, 2010). It is recommended that patients receive a falls risk assessment as part of the admission process to identify key risk factors known to increase the risk of falling, for example, a history of falls, conditions that affect mobility or balance, polypharmacy, being over 65 years old or other health conditions such as visual impairment (NICE, 2023). On the basis of this assessment, a multifactorial intervention should be developed and tailored to address the patient's individual risk factors (Randell et al, 2021).

If, following initial assessment, a patient is deemed to be at low-risk of falling, they will thereafter receive a falls risk assessment once a week or if there is a significant deterioration or improvement in their condition. It is therefore common for patients who are initially identified as being at low-risk of falling to receive a falls risk assessment intermittently during their stay in hospital. The majority of evidence evaluating the use of falls risk assessments focuses on high-risk patient groups such as the elderly (Cunha et al, 2019; Cameron et al, 2010; Oliver et al, 1997).

There is a lack of evidence underpinning the practice of conducting falls risk assessments on non-risk patients specifically. However, previous research has observed statistically significant reductions in falls when tailored, multi-faceted interventions have been implemented. It is estimated that using these interventions can reduce the incidence of all patient falls by

20%-30% (Royal College of Physicians, 2017). Routine risk assessment carried out on all patients (including low-risk patients) is therefore an important component of preventing falls in hospital.

The value of carrying out falls risk assessments on non-risk patients specifically is unclear and further research is therefore required in this area. However, due to the evidence that multifactorial interventions based on the outcomes of falls risk assessments are effective in reducing the incidence of falls, it was decided that this practice should not be considered as a potential target for de-implementation.

4.7.3.4. Hourly nurse rounding check

Hourly nurse rounding, also known as 'intentional rounding' is a practice that involves nurses or healthcare assistants carrying out regular checks on patients, using a standardised protocol to ensure they are safe and comfortable (Harris et al, 2019a). The purpose of intentional rounding is to ensure that all patients' needs are met including pain assessment and control, personal comfort and environmental needs (Ryan et al, 2019). Intentional rounding was first introduced to the UK in 2006 but became more prevalent following the dissemination of the Francis report (2010) which prompted the British Prime Minister to support the campaign for intentional rounding (Bartley, 2011; Kendall-Raynor, 2012; Kirk & Kane, 2016). Subsequently, intentional rounding was widely implemented in the UK in an effort to address some of the care quality problems outlined in the Francis report (2010) relating to patient hygiene, pain relief and nourishment deficits in hospitals.

The evidence and rationale underpinning the use of intentional rounding has been questioned due to a range of methodological issues. For

example, Snelling (2013) argued that evidential claims made for intentional rounding in the UK rely heavily on a study by Meade et al (2006) which reported that carrying out intentional rounding reduced the number of falls and number of call bells activated in a hospital alongside causing an increase in patient satisfaction outcomes. Snelling (2013) criticised this study, however, for issues of selection bias, potential conflicts of interest, study design and data analysis.

Additionally, Harris et al (2019b) conducted a realist evaluation of intentional rounding and concluded that the evidence indicating its effectiveness was very weak. The evaluation included a realist synthesis of the evidence underlying the practice which reports ambiguity surrounding the purpose of intentional rounding alongside extensive variation in its implementation, resulting in a number of discrepancies between how intentional rounding is purported to work and how it operates in practice.

Due to the limited and methodologically-flawed evidence base underlying the practice of intentional rounding, it was decided that this practice could be taken forward for further investigation as a potential candidate practice for de-implementation.

4.7.3.5 Routinely double-checking classified patient medication with a fellow member of healthcare staff

Prior to administering a specifically classified drug, two registered nurses are required to independently check that the correct medicine is about to be given to the correct patient at the right time, via the correct route (O'Connell et al, 2013). The list of classified drugs that require this check can vary at both an organisational and a ward level. This practice uses additional nursing resource and increases the number of interruptions that

take place which can introduce other risks (Mcleod et al, 2015).

In recent years, there has been increasing recognition of the insufficient evidence base for the effectiveness of carrying out double-checking to prevent medication administration errors. For example, Koyama (2020) conducted a systematic review that identified 13 studies that evaluated the use and effectiveness of double checking on reducing medication administration errors in a hospital setting, 10 of which were observational studies. Of the three good quality randomised controlled trial studies, two reported a significant association between double-checking and a reduction in medication administration errors (MAEs), however, methodological concerns in each study limited the validity of the findings. The authors concluded there was not enough good quality evidence that double-checking medications is associated with a significant reduction in MAEs.

Similarly, Westbrook et al (2021) conducted a direct observational study of 298 nurses to measure the association between double-checking and the occurrence and potential severity of MAEs. The study found that, of 3563 observed administrations where double-checking was mandated, only 1% received independent double-checks, demonstrating that the practice was rarely carried out in accordance with hospital policy. The study also reported no significant association between double-checking and the occurrence of a MAE. Therefore, the evidence base underpinning double-checking is not sufficient to warrant its use, making it also an appropriate candidate PSP to consider for potential de-implementation.

4.8 Economic Cost

To ensure that the two candidate PSPs identified above were appropriate to consider for de-implementation according to the final element of the criteria, 'economic value', the possibility of calculating the economic cost of intentional rounding and double-checking medicines was explored with a health economist (CB). After further investigation, it was found that calculating the associated costs of these practices would have required extensive further research, for example carrying out a 'time-in-motion' study which would not have been possible as part of this PhD. As an alternative, DH identified previous evidence that produced estimated costs associated with the two PSPs:

- **Double-checking**: In Westbrook et al (2021)'s observational study, it was calculated that it took, on average, 6.4 minutes to double-check a medication and with around 1800 administrations taking place per day across the hospital, the process requires around 133 nursing hours per day, resulting in an estimated cost of around $A 2.7 million annually (£1.5 million).
- **Intentional rounding**: Harris et al (2019b) conducted a cost analysis of intentional rounding, using resource data collected in staff interviews, non-participant observation, shadowing and detailed information about the ward context. It was estimated that intentional rounding that took place every hour cost £8.27 per patient-day. If intentional rounding was carried out every 2 hours, the estimated cost dropped to £4.47 per patient-day. Harris et al (2019b) estimated the annual incremental costs of IR could exceed £100,000 per hospital

ward in the case of hourly intentional rounding (NHS costs are calculated on full absorption basis, which includes the allocation of all overhead costs).

Based on the evidence outlined above, it was decided that intentional rounding and double-checking met the final ‘economic cost’ element of the criteria because they are associated with a high annual financial cost, confirming that they are suitable to consider as priority PSPs for potential de-implementation. Table 4.9 provides an overview of the reasons why the original 12 PSPs were eliminated, based on the pre-determined criteria. Figure 4.1 outlines the prioritisation process.

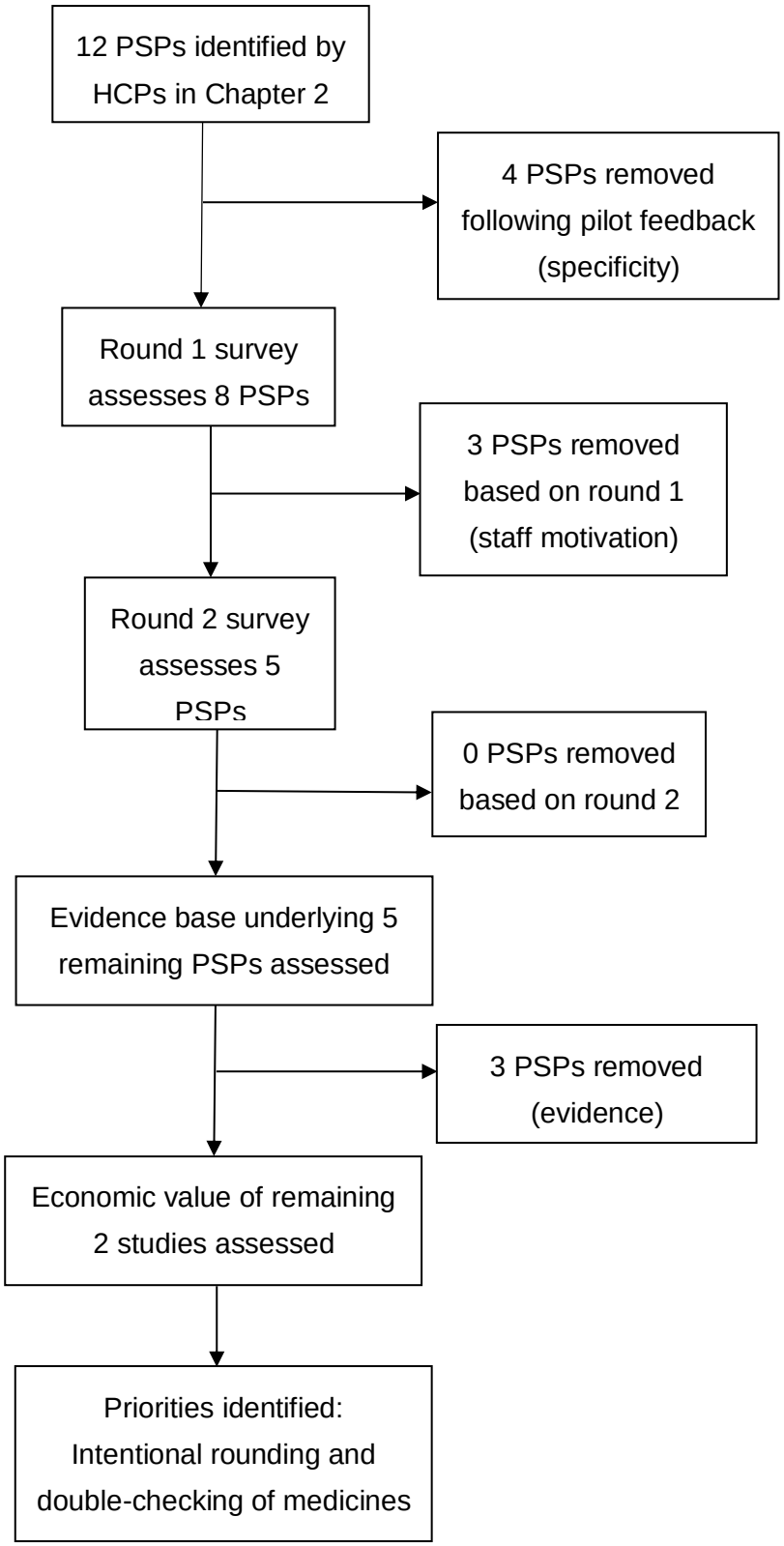


Figure 4.1. Flow diagram of prioritisation process

Table 4.9 Reasons for eliminating candidate PSPs to consider for potential de-implementation based on pre-determined criteria.

	Specificity	Staff Motivation			Risk of increased harm	Evidence base	Economic value
		Belief in Con	Belief in Cap	Emotion			
Paperwork (assessments) VTE		✓					
Paperwork (assessments) falls						✓	
Paperwork (duplication)	✓						
Paperwork (general)	✓						
Checking skin/ pressure areas						✓	
Intentional rounding							
Duplication: repeated paper documentation on EPR	✓						
Duplication: double-checking medicines							

Incident reporting		✓					
Some mandatory training	✓						
Some infection control measures		✓					
Using medication compliance aids						✓	

4.9 Discussion

This consultation exercise based on Delphi principles aimed to determine whether it is possible to apply a criterion-based approach deciding which PSP(s) (from a pre-established list) should be prioritised as potential targets for de-implementation. This process facilitated the elimination of several candidate low-value PSPs for de-implementation based on a criteria that incorporated expert opinion and evidence. Intentional rounding and double-checking of classified medicines were identified as potential priorities for de-implementation that require further investigation. Several of the PSPs eliminated by this process may be appropriate for de-implementation, however, extensive further research is required to determine the exact form and context within which they are perceived to be low-value, thereby making them inappropriate candidates to target within this PhD.

Based on feedback from the Round 1 pilot survey, four candidate PSPs were eliminated based on the ‘specificity’ criterion. Following the completion of the Round 1 survey, the majority of the panel reached a consensus on removing three further PSPs based on the ‘staff motivation’ criterion. The Round 2 survey did not reach a consensus on the removal of any further practices based on the ‘risk of harm’ or ‘staff motivation’ criteria and so, no further practices could be eliminated at this stage. After reviewing the literature that underpinned the remaining five practices, two PSPs were found to have the weakest evidence base, making them the most appropriate candidates to consider further for de-implementation. Previous evidence also highlighted that these two candidate PSPs were associated with high economic costs, thereby confirming the choice to make them priorities for potential de-implementation.

No previous research has used a criterion-based approach to establish priority PSPs for potential de-implementation. However, it may be useful to compare the present consultation exercise to previous efforts that have been used to establish priority PSPs for implementation. For example, Shekelle et al (2013) considered the strength of evidence of effectiveness underlying each practice, the associated costs and used expert opinion to identify 22 PSPs that should be encouraged for adoption. Although these elements are similar to those used in the present consultation exercise, Shekelle et al (2013) used different methods to identify priorities for implementation. For example, Shekelle et al (2013) included a ‘topic refinement’ stage where an initial group of 158 potential PSPs were assessed to identify a smaller number of PSPs that would be most appropriate to consider for implementation. This ensured that all PSPs were

suitable to be evaluated in more depth during the prioritisation process. Including a formal preliminary stage as part of the present consultation exercise might have been a more robust way of establishing which PSPs were not specific enough to consider for de-implementation, rather than basing this decision on the Round 1 pilot survey feedback and supervision team discussion. Future research might therefore benefit from including a preliminary topic refinement stage to ensure that all PSPs included in the prioritisation exercise are appropriate for consideration.

Additionally, Shekelle et al (2013) conducted a rigorous evidence review process whereby an evidence assessment framework was used to systematically assess the evidence regarding the outcomes of the PSPs and the contextual factors that influence the PSP's use and effectiveness. The quality of previous systematic reviews underlying the included PSPs was assessed and, if necessary, systematic reviews were updated to ensure the most recent evidence underlying each PSP was included. A criteria was also developed to establish the strength of evidence associated with each of the PSPs. Due to time restrictions, it was not possible in the present consultation exercise to conduct in-depth evidence reviews for all the included PSPs. This may have increased the likelihood of important evidence not being used to make decisions on which PSPs to prioritise for de-implementation. Future research may therefore benefit from carrying out more comprehensive literature reviews of the evidence underlying each PSP to inform the prioritisation process.

In addition, it is important to discuss the limitations of the findings of this consultation exercise. Firstly, the lack of guidance and established

processes in identifying priority PSPs for potential de-implementation resulted in the development of survey questions that could not be based on previous evidence. Although a consensus was reached on the elimination of some PSPs during Round 1 e.g. ‘VTE assessments’ and ‘incident investigations’, there was a lot of variation in the scores given by panel members across both surveys. This could possibly be due to the provision of insufficient context to the survey. For example, the practice ‘checking skin/ pressure areas for mobile patients in hospital settings: Healthcare staff are required to regularly check the skin of patients for pressure damage even on mobile patients who are less likely to develop pressure damage’ does not indicate the patient group, the member of healthcare staff conducting the assessment or the hospital setting. It is likely that the perceived importance of carrying out this practice in order to maintain patient safety will vary depending on several factors. This could partially explain the variety in panel members’ responses. The practices included in this consultation exercise were presented in a way that was consistent with how healthcare staff identified them during Study 1 (Chapter 2). However, future research might produce more reliable findings by working with healthcare professionals to develop more detailed descriptions of examples of PSPs that include more contextual information.

Another limitation of this consultation exercise is that the expert panel did not include a representative sample of nurses. The majority of the included PSPs are usually carried out by nurses, for example pressure ulcer assessments and intentional rounding (Halm, 2009; Moore & Patton, 2019). However, across both rounds, most of the participants who completed both rounds of surveys were doctors and a considerable proportion did not state

their occupation. Although doctors are likely to have an awareness of the included practices, nurses would have more tacit knowledge, thereby potentially making their answers relating to the ‘staff motivation’ and ‘economic value’ criteria more valid. Previous research has recognised the importance of involving those with tacit knowledge when making decisions on how to improve patient safety (Kothari et al, 2011; Taylor et al, 2013). Therefore, future consultation exercises may benefit from including a greater proportion of stakeholders with tacit knowledge of the included PSPs.

A final limitation of this consultation exercise is that during the Round 1 survey, some stakeholders highlighted that they did not have sufficient understanding of some of the practices to answer further questions on them, however, the second round of the survey contained questions that addressed the same practices, regardless of whether stakeholders had previously declared that they did not know enough about them to answer further questions. It was not possible to eliminate all the practices that received 25% or more ‘no’ responses (in response to the ‘do you know enough about this practice?’ question) because this would have resulted in no practices being taken forward to Round 2. Although none of the healthcare professionals highlighted any issues relating to the fact that the same practices were being taken forward to Round 2 in their feedback during piloting of the survey, it may have been better to either: 1) include a question at the beginning of Round 2 that asked stakeholders if they felt they knew enough about the practice to answer questions on it or 2) work with the stakeholders to understand how to describe the practices in more detail so that they felt they could answer questions on them.

Despite the limitations identified, this consultation exercise provides an example of how a criterion-based approach can be used to establish priority PSPs for potential de-implementation. Based on healthcare professional input and evidence reviews, ten PSPs were eliminated as candidates for de-implementation using this consultation exercise. Intentional rounding and double-checking of classified medicines were identified as target candidate practices to consider for potential de-implementation.

Future research should ensure there is a representative proportion of panel members with tacit knowledge of the PSPs in question. Further, more structured and in-depth evidence reviews should be conducted to ensure that key previous findings are considered when prioritising practices for potential de-implementation.

Intentional rounding and double-checking of classified medicines were taken forward at this point for further evaluation to better understand how these practices could be removed from practice and what the impact of de-implementation could be for healthcare professionals and patient safety.

Chapter 5: Exploring the perceived feasibility of de-implementing low-value safety practices. An interview study with NHS nurse managers

5.1 Chapter Summary

The previous chapter presented a description of the process by which two low-value patient safety practices (PSPs) (double-checking the administration of classified medicines; intentional rounding) were identified as the most appropriate candidates for potential de-implementation from a pre-determined list based on stakeholder consultation and evidence (Chapter 4). This chapter reports on Study 3, in which semi-structured interviews were used to explore nurse managers' perceptions of the two candidate practices in relation to: 1) their value, 2) the potential barriers and facilitators to de-implementing them, and 3) the possible impact of their removal on patients and healthcare staff. Data were analysed inductively, using thematic analysis (Braun & Clarke, 2006). The findings from this study were used to inform intervention development for one of the two candidate PSPs for de-implementation.

5.2 Background

Before it is possible to determine how double-checking the administration of classified medicines (hereafter referred to as 'double-checking') or intentional rounding could be de-implemented from practice, it is first necessary to consider the extent to which each practice could feasibly be stopped within the healthcare setting (Prusaczyk et al, 2020). Even if a practice is deemed acceptable and appropriate for de-implementation by healthcare providers, certain organisational and system factors such as

performance measures and policies may present substantial barriers to change (MacLean et al, 2018). For example, if a particular procedure is required for quality oversight purposes, it may call for regulators or commissioners to change their requirements to make de-implementation possible (Prusaczyk et al, 2020). An understanding of the determinants (barriers and facilitators) that could influence the de-implementation of low-value PSPs is therefore essential (Augustsson et al, 2021).

Determinants of implementation are well documented in previous literature, as described in the Theoretical Domains Framework (TDF) (Cane et al, 2012) and the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al, 2009). The extent to which it is possible to apply such implementation frameworks to categorise determinants of de-implementation is largely unknown (Upvall & Bourgault, 2018; van Bodegom-Vos et al, 2017). However, recent evidence has begun to explore the possible determinants of de-implementation of low-value care. For example, a recent scoping review by Augustsson et al (2021) identified a range of barriers and facilitators to de-implementing low-value care practices at different levels of the healthcare system (patient level, healthcare practitioner level, socio-political level and healthcare environment level). At the healthcare provider level, resistance to change, fear of malpractice, lack of interest in saving money and fear of litigation were the most commonly identified barriers to de-implementation. Augustsson et al (2021) concluded that the identified determinants that influence the de-implementation of low-value care broadly overlap with existing implementation frameworks. However, because some determinants e.g. professionals' fear of malpractice and patient expectations may be more prominent for de-implementation than

implementation, these existing frameworks must be adapted to be appropriate for de-implementation (Augustsson et al, 2021).

Similarly, Leigh et al (2022) synthesised evidence to produce a list of the determinants of the de-implementation of low-value care. Conducting a systematic review and an interview study, Leigh et al (2022) worked with healthcare professionals based in critical care settings to understand whether barriers and facilitators to de-implementation found in the published literature overlap with those experienced in critical care practice. Content analysis was used to identify lists of 29 distinct barriers and 24 distinct facilitators to de-implementation from 172 included articles. The stakeholder interviews identified 23 of the 29 barriers and 20 of the 24 facilitators as being relevant to the process of de-implementation in critical care settings. Table 5.1 shows a selection of the most frequently cited determinants of de-implementation from the systematic review, mapped onto different levels of the healthcare system.

Table 5.1. Most frequently cited determinants of de-implementation. Adapted from Leigh et al (2022)

Stakeholders	Frequently Cited Barriers	Frequently Cited Facilitators
Patients	Patient demands and preferences	Stakeholder involvement
	Difficulties with stakeholder support	Shared decision-making
Healthcare professionals	Lack of credible evidence	Availability of credible evidence
	Fear of malpractice	Audit and feedback
	Clinicians' resistance to change	Interactive clinician education

	Entrenched norms	Clinician decision support
Policy-makers	Lack of credible evidence	Cost-saving opportunity
	Lack of resources for de-adoption initiatives	Established and credible assessment criteria to identify low-value care
	Lack of criteria for identifying low-value practices	Availability of credible evidence

Leigh et al (2022) support previous evidence that has explored the determinants of de-implementation of low-value care in different healthcare contexts. For example, Barnes et al (2017) interviewed nurses and pharmacists to identify the barriers and facilitators they experienced during the implementation of an intervention designed to reduce unnecessary routine blood tests among patients with stable warfarin management. Several facilitators to de-implementation were identified including personalised nurse and pharmacist feedback on their use of less frequent testing which resonates with the 'audit and feedback' facilitator identified at the healthcare professional level in Table 5.1. Barnes et al (2017) also identified the facilitators of 'staff education' and 'clinician decision support' as potential strategies that could improve utilisation of the de-implementation intervention to reduce routine blood testing. It is also important to note that Barnes et al (2017) identified barriers that were not recognised by Leigh et al (2022)'s study, for example, a policy that made it difficult to access patient medical records prevented healthcare professionals from being able to reduce the frequency of testing in some situations. This highlights the importance of understanding the specific nature of the target practice and

the barriers and facilitators that are potentially unique to its removal, prior to any de-implementation efforts.

The process of identifying the determinants of de-implementing low-value care practices is also included in several de-implementation frameworks. For example, Grimshaw et al (2020)'s 'Choosing Wisely De-implementation Framework', emphasises the importance of working with stakeholders to understand context-specific barriers and develop interventions that can address these barriers following identification of a priority practice for de-implementation. Additionally, Norton et al (2018) produced a de-implementation framework that includes a 'barriers/facilitators' stage, prompting consideration of the potential challenges at the patient, provider and societal levels of the healthcare system and ways of overcoming these. Niven et al (2015) also include assessing barriers and facilitators to de-adoption as a key stage in their 'Synthesis Model' for the process of de-adoption.

Previous research has identified potential barriers to the implementation of the two target practices identified for potential de-implementation in this study. For example, high workload, burdensome rounding logs, lack of staff buy-in and lack of staff education were all identified as barriers to the implementation of intentional rounding (Harris et al, 2019b; Toole et al, 2016). Additionally, Westbrook et al (2021) reported that a lack of time and ability to locate nurses during busy periods were likely barriers to compliance with double-checking policy. No previous evidence has tried to identify barriers or facilitators to de-implementing either candidate practice.

Previous literature has explored the possible determinants of the de-

implementation of low-value clinical practices (Barnes et al, 2017; Leigh et al, 2022). However, there is a lack of research that has tried to identify the potential barriers and facilitators associated with de-implementing low-value PSPs specifically. To address this gap, this study conducted semi-structured interviews to understand nurse managers' perspectives on the de-implementation of double-checking and intentional rounding. This study (Study 3) aimed to explore:

Research questions:

1) What are the attitudes of NHS nurse managers towards the candidate practices?

2) What potential barriers do NHS nurse managers think could arise when trying to de-implement the candidate practices?

3) What are the potential ways to overcome barriers to de-implementing the candidate practices according to NHS nurse managers?

4) How do NHS nurse managers think the de-implementation of the candidate practices could impact patient care?

5.3 Methodology and methods

5.3.1 Epistemology and methodological approach

As outlined in Chapter 1, the epistemological foundation for research in this thesis is pragmatism, a philosophy that posits using the methodological approach that addresses the research question most effectively (Biesta, 2010; Greene, 2008; Murphy et al, 1998; Tashakkori & Taddlie, 2010). Qualitative methods are useful when trying to understand stakeholder perspectives and experiences in healthcare services research (Hoff & Witt,

2000; Pope & Mays, 1995). Previous research studies exploring healthcare professionals' perspectives of de-implementation have employed semi-structured interviews to capture detailed information (Barnes et al, 2017; Leigh et al, 2022; Parker et al, 2022a). This study therefore used semi-structured interviews using open-ended questions to prompt participants to draw on their own experience and share their perceptions. Due to the limited evidence in understanding the determinants of de-implementation in relation to safety practices, it was decided that using an inductive approach would be most appropriate to ensure that findings were not based on pre-conceived ideas or frameworks. It is important to note that, following the identification of cross-cutting themes in Chapter 2, and an awareness of the literature underlying de-implementation following the systematic review reported in Chapter 3, DH was aware of sensitising concepts that may have informed the approach to conducting the interviews and analysing the data. Sensitising concepts are interpretive devices that are viewed as a starting point for qualitative research (Bowen, 2005; Glaser, 1978; Padgett, 2004). DH was therefore aware of sensitising concepts such as anxiety and regulation acting as potential barriers to de-implementation which may have informed the way the research was carried out.

5.3.2 Ethical approval

Ethical approval for this study was granted by the University of Leeds Faculty Research Ethics committee (Reference: PSYC-219). Efforts were made to address all potential ethical issues such as informed consent and anonymity and information on this was included in the participant information sheet (Appendix 5.1) which was sent to all participants prior to participation. All healthcare staff gave recorded verbal consent to take part in the study at

the beginning of their interview and were reminded that they could withdraw from the study at any time without giving reason. All participants received a debrief sheet (Appendix 5.2) via email following the interview.

5.3.3 Setting

This study was conducted online using the video conferencing platform 'Zoom' (www.zoom.us). Participants were not given the option to be interviewed in person due to the Covid-19 pandemic restrictions in place at the time of data collection which stipulated that everyone should work from home if possible. Conducting the interviews online meant that they could be carried out in any location, at a time that best suited the participant, thereby enhancing chances of recruiting healthcare professionals who work shift patterns. Face-to-face interviews would have been preferable to online interviews because they avoid technical disruptions and facilitate the creation of a safe and comfortable atmosphere (Saarijarvi & Bratt, 2021). To ensure that it was still possible to create a safe and comfortable atmosphere, DH checked the WiFi connection was strong before each interview to prevent the problem of technical disruptions, asked the participant how they were feeling at the beginning of the interview and used positive body language e.g. smiling and not folding arms.

5.3.4 Participants and recruitment

DH consulted with three research nurses based at the YH PSTRC to find out which healthcare professional groups would be best to target to better understand the potential barriers and facilitators to de-implementing the two candidate practices. The research nurses recommended targeting the following groups: matrons, heads of nursing, clinical governance leads, ward managers and any other NHS managers who were involved in overseeing

intentional rounding and double-checking. The research nurses felt that managers would have more awareness of the potential organisational-level barriers that might influence de-implementation compared to frontline healthcare professionals. Purposive and snowball sampling was used to recruit healthcare professionals in these groups from the 09/03/21 – 14/04/21. Potential participants were excluded from taking part if they were either: 1) not currently working as an NHS manager or 2) working in a setting other than an acute hospital. DH posted recruitment posters online (Appendix 5.3) via Twitter on a weekly basis, asking potential participants to take part in a 40 minute audio-recorded interview exploring the barriers and facilitators to de-implementing intentional rounding and double-checking. Each tweet tagged relevant and influential people and organisations, for example, the Royal College of Nursing in tweets to generate greater interest in the study. This method of recruitment was chosen because it is a recognised way of recruiting study participants who are not known to the researcher in healthcare services research (Leighton et al, 2021; Marcus et al, 2017; Reagan et al, 2019). Following each interview, participants were emailed a £20 Amazon Voucher as a token of appreciation for taking part.

5.3.5 Data collection tool

A semi-structured interview schedule was developed iteratively with feedback from supervisors (see Appendix 5.4). The schedule permitted the interviews to remain focused whilst giving the investigator the autonomy to explore any interesting ideas that arose during the course of the interview (Adeoye-Olatunde & Olenik, 2021). The interview schedule contained mostly open-ended questions and prompted participants to describe the context in which the two target practices are usually carried out and discuss the

potential barriers and facilitators associated with their removal from routine practice. The interview schedule was piloted during an audio-recorded Zoom meeting with one NHS matron who provided feedback relating to improving the clarity of some of the questions. For example, the matron suggested changing the question ‘in your organisation, what are the rules around e.g. intentional rounding and what are the processes associated with this practice?’ to ‘ in your organisation, what are the rules around e.g. intentional rounding and how does this work in practice?’ Additionally, RL listened to the recording of the pilot interview and provided feedback on how to make the style of interviewing more conversational by using simple and clear language. Previous evidence encourages the process of piloting the interview schedule to develop the investigator’s interviewing skills (Malmqvist et al, 2019). Examples of some of the questions featured on the final version of the interview schedule included ‘what do you think the impact would be on safety if healthcare staff stopped carrying out double-checking patient medication?’ and ‘what implications does intentional rounding have for staff time and resource use?’ Appendix 5.4 contains a full copy of the interview schedule.

5.3.6 Procedure

NHS managers who were willing to take part in the study were asked to email DH directly using the email address provided on the poster. DH then liaised with the potential participant to ensure their current job role involved responsibility for ensuring compliance with both intentional rounding and double-checking. Once participant eligibility to take part in the study had been confirmed, the participant was emailed the participant information sheet outlining, for example, the purpose and nature of the study, what the

study would involve and how they could withdraw from the study (Appendix 5.1). A mutually convenient date and time for the interview to take place was agreed with the participant via email. At this point, participants were assigned a randomly generated code so that personal information (names, email addresses and occupations) could be stored in a password secured file separately from the transcribed interviews.

At the beginning of the interview, DH introduced herself, briefly outlined some background information and what topics the interview was going to cover. To try and encourage the participant to speak openly about not doing practices that were a requirement, DH emphasised that anything they said during the interview would be completely confidential. The participant was then given the opportunity to ask questions and if they were happy for the interview recording to begin. Once the participant confirmed they wanted to begin the interview, DH began recording and read each of the 6 consent form statements aloud one by one (Appendix 5.5), waiting for the participant to verbally agree or disagree with each statement. If the participant consented to all 6 statements, DH then began asking the interview questions. Following the interview, DH emailed the participant thanking them for their contribution and attached a £20 voucher and debrief sheet that thanked participants, reiterated the purpose of the study and provided DH's email address so that participants could ask any follow-up questions (Appendix 5.2). Interviews were then transcribed verbatim by DH in Microsoft Word and all names and personal details were removed from all transcriptions. Recruitment stopped when DH decided that data saturation had been reached i.e. when new interview participants were expressing new insights, thereby leading to information redundancy (Braun & Clarke, 2021;

Saunders et al, 2018). DH listened to audio recordings of interviews in order to determine when informational redundancy had been reached. Data collection took place from 16/03/21 – 21/05/21.

5.3.7 Analysis

5.3.7.1 Theoretical and epistemological approach

Reflexive thematic analysis (Braun & Clarke, 2006; Braun & Clarke, 2019) was used to analyse the interview data. This method was chosen because it offers a flexible approach for analysis and it has been used by much previous research to provide rich and compelling insights into the real world experiences of healthcare professionals (Bourgault & Upvall, 2019; Braun & Clarke, 2014; Joo & Liu, 2021; Karavadra et al; 2020). An inductive approach was used to ensure that the identification of codes and themes was directed by the interview data alone, rather than a pre-determined theoretical framework based on existing ideas and preconceptions (Braun & Clarke, 2006; Frith & Gleeson, 2004; Hayes, 2021; Patton, 1990). This approach was chosen, in line with the pragmatist epistemology of this thesis, due to the lack of previous research that has specifically focused on identifying barriers and enablers to the de-implementation of PSPs, meaning that it would not have been possible to code data into themes based on previous research findings.

Themes were generated at the semantic level, within the surface meanings of the interview data. This approach was chosen because the research questions sought to understand participants' perspectives and attitudes rather than any underlying assumptions, conceptualisations and ideologies at the latent level that may have informed the content of the data (Boyatzis, 1998; Braun & Clarke, 2006).

5.3.7.2 Analytical process

DH became familiar with the interview data by transcribing each interview verbatim and carefully reading the transcripts several times. During this process, DH wrote lists of ideas about what was in the data and what was interesting about it in relation to each of the candidate behaviours.

At this point, DH began systematically identifying initial codes (meaningful units of text) across all transcripts that could later form potential themes. Supervisors RL and GJ each independently coded one transcript that DH had already coded. The codes identified across the double-coded transcripts were compared and discussed as a team and changes were made to the codes based on these conversations.

Once all the data had been coded, DH began sorting the different codes into potential themes and collating the relevant coded data extracts within the identified themes. Braun & Clarke (2014) describe a theme as a 'coherent, consistent and meaningful pattern in the data which is relevant to the research question'. Draft themes for the two candidate practices were developed and organised separately because it was understood that the barriers and facilitators associated with de-implementing the practices would differ because the practices are carried out in different contexts. DH created tables using Microsoft Excel to collate groups of codes into draft themes and added representative extracts of the data into the table to illustrate each theme. DH considered the relationships between codes and between themes at this stage to inform the development of draft main themes and associated sub-themes with some being collapsed into each other or renamed as part of the final draft theme structure. This phase ended with a list of draft themes, together with their associated sub-themes and extracts

of data that demonstrated each one.

The next stage of analysis involved reviewing and finalising the draft themes. All themes were discussed at length with the supervisory team. Some were merged into one theme and some theme labels were changed to better encapsulate the meaning of the theme. DH then worked on defining and refining the themes by going back to the collated data extracts and ensuring that the final themes and sub-themes accurately represented the overall message portrayed by the dataset.

DH considered each theme individually and in relation to others and clearly defined what the themes were as well as what they were not. The theme names were discussed and refined again with the supervisory team until agreement was reached on the final theme names.

5.3.7.3 Reflexivity

It is important to discuss the role of reflexivity in this research to understand how the researcher (DH)'s feelings and values might have influenced the interpretation of the interview study findings. Reflexivity is fundamental in enabling researchers to question their approach to research (Pillow, 2003). At the beginning of each interview, DH introduced herself as a PhD student and made it clear that she was not a healthcare professional and had no experience of carrying out PSPs in hospital settings. By framing herself in this way, DH hoped that participants would understand that she was independent to the healthcare service and therefore be more likely to open up when discussing potentially sensitive subject matter. It is also possible that this 'outsider' positionality made DH more likely to ask participants to

clarify specific clinical processes and terminology during the interviews. This might have prompted participants to provide additional detail in their answers that they wouldn't have mentioned if DH had been a clinician. Conversely, DH's lack of clinical experience and understanding may have resulted in a lack of confidence in asking follow-up questions when the participant had mentioned some medical terminology that DH was unfamiliar with. However, conducting a pilot interview with a nurse manager helped to develop DH's interviewing skills and build confidence to ask for clarification if needed. It is also important to recognise that, prior to conducting the interviews, DH had carried out Study 1 (Chapter 2) and the consultation exercise (Chapter 4), during which DH had reviewed the evidence bases underlying each of the target PSPs and had several conversations with healthcare professionals about their negative views of both PSPs. This prior knowledge may have unconsciously influenced DH's opinion on the level of difficulty associated with removing either target practice. To avoid this prior knowledge influencing DH's interviewing style or analysis, DH made notes on reflexivity and discussed them with the supervision team at regular intervals during the research process.

5.4 Findings

5.4.1 Participants

Sixteen NHS nurse managers were interviewed. The majority of the sample were female (n= 12, 75%) and were either senior nurses or matrons. The average interview lasted 50 minutes 52 seconds. Table 5.2 contains information about each participant and the duration of their interview. The

patient safety managers were interviewed together because they worked together and requested to have a joint interview.

Table 5.2 Participant Characteristics

Participant number	Gender	Role	Duration of interview (minutes: seconds)
1	Male	Head of Nursing	36:14
2	Female	Ward Manager	40:22
3	Female	Matron	48:55
4	Male	Patient Safety Manager	54:32
5	Female	Patient Safety Manager	54:32
6	Female	Head of Nursing	40:57
7	Female	Deputy Associate Director of Nursing	51:30
8	Female	Sister	61:58
9	Female	Patient Safety Improvement Lead/ Lead Nurse	58:52
10	Female	Matron	39:40
11	Female	Deputy Theatre Matron	50:30
12	Male	Clinical and Quality Education Manager	47:57
13	Female	Matron	32:39
14	Female	Quality Governance Lead Nurse	50:17
15	Male	Lead Nurse	37:56

16	Female	Lead Nurse	44:34

5.4.2 Thematic Analysis

The following themes were identified within the analysis. The themes developed based on the data relating to double-checking are presented first, followed by those identified in the intentional rounding data.

- **Double-checking theme 1: realities of double-checking in practice**

Participants discussed issues relating to the translation of policy into practice and inconsistency in how double-checking is carried out. Several obstacles to carrying out double-checking were highlighted by participants alongside their opinion on why double-checking is low-value for safety.

Sub-theme 1: Impractical policy

Participants criticised the lack of detail and clarity in the double-checking policy that makes it difficult for nurses to know exactly how to carry out an independent check. Participants highlighted that the policy often describes the types of medicines that require a double-check and instructs that staff check the ‘5 ‘R’s (right patient, right route, right time, right drug, right dose), however, more information is required for the practice to be carried out consistently and thoroughly. Participants explained that this absence of clear guidance on exactly how to carry out double-checking often results in variation in how the practice is carried out, with it being commonplace for double-checking to not be conducted independently. Instead, participants discussed that, often in practice, one nurse will share information with another nurse and thereby influence the objectivity of the second nurse’s checking process.

“we found that the policy didn't actually state how you do the check…you know…so the five 'Rs' but actually our policy didn't describe that and that was one of the recommendations...so they do happen but they don't happen independently...you work through them together" (14)

“The policy…doesn't specify how you should go about double checking and our training practices actually when we looked also weren't particularly clear, it was just a ‘you should double check’ with no additional guidance” (5)

Sub-theme 2: Workarounds

Participants also described that external factors such as increased demand on healthcare staff and lack of resources can make it difficult to adhere to the double-checking policy. It was common for participants to comment on the extensive amount of time it takes to double-check the administration of medicines and that it is often not carried out in accordance with policy i.e. not independently or steps are missed out, in order to save time to carry out higher-priority tasks.

"I see nurses cutting corners because there aren't enough nurses on the ward so I see the practice not working quite as well as it should do really... so it calls into question the value of it." (3)

"the art of nursing is balancing your risk and what that translates to in your day to day is that you save time by eyeballing a bottle of flush rather than second checking it" (6)

Additionally, participants described that, in practice, sometimes nurses intentionally do not follow the double-checking policy strictly because they do

not perceive it to be a valuable task (for example, for drugs that are perceived to be lower-risk to patient safety) and so will miss out steps or not complete a totally independent check so that they can allocate time to higher-value tasks. Therefore, the greater the perceived risk of harm to the patient, the higher the likelihood of the nurse carrying out an independent check.

"I think people check antibiotics as an independent checker but I don't believe they will go check the patient...I think blood (transfusions)... they would be very cautious doing because I suppose of the high (risk) of causing harm" (7)

- **Double-checking theme 2: perceived control**

Sub-theme 1: Double-checking dilutes responsibility

Some participants felt that double-checking makes the verification process less thorough because the shared responsibility creates potential for nurses to pay less attention to the task because they may rely on the other nurse to detect errors. Some participants made the argument that if they were only required to single check a drug prior to administration, it would make their checking more focused and thorough because they would be solely responsible for any errors made.

"if you're administering a medication and you think you're the only person checking it, you will look in more detail because it's you who's personally responsible for it." (1)

"there's a danger there that it is less safe to have two people checking but neither of them are taking that fully you know understanding the gravity of that because they're relying on the other person to do so." (4)

Within this sub-theme, participants also discussed that a power imbalance in the double-checking process can also dilute responsibility. Participants referred to scenarios in which they had been carrying out a double-check with a more senior member of staff and felt reluctant to question the accuracy of the second nurse's check because they were less experienced. In this situation, the more junior nurse may feel as though they have less responsibility in the double-checking procedure which may increase the likelihood of a medication error not being detected.

"There can be a little bit of a power struggle and I think some people are still a bit worried about challenging people." (5)

"I think often when I've seen it go wrong there's often a power imbalance between the two people and you've got a more senior staff asking a junior staff " (4)

Sub-theme 2: Double-checking provides false reassurance

Some participants explained that the act of double-checking gave them a false sense of reassurance due to the assumption that the more people involved in the checking process, the less likely it is for a medication error to occur. However, participants highlighted that this feeling of reassurance could result in less attention being given to the task, thereby potentially increasing the likelihood of a medication error taking place.

"…instead of providing additional safety you're actually leading yourself down the path where everybody's reassured because you've done this double checking that you should have done, but you're actually in a much riskier position." (5)

This sub-theme also related to sub-theme 1 because some participants discussed the influence of power imbalances creating a false sense of reassurance during double-checking. Participants discussed that a less experienced nurse may be reluctant to question a more senior nurse's judgement during double-checking because they assume that the more senior nurse is less likely to make a mistake and so is reassured by their judgement. This assumption thereby makes it challenging to conduct an objective independent check of the medicine.

"It's not being done properly, it's like me saying to you, can you have a look at that? Are you happy? Yeah? I'll put your name down then. "You often trust the one before you…especially if they're more senior than you" (8)

- **Double-checking theme 3: barriers to stopping double-checking**

Sub-theme 1: fear of removing safety blanket

Despite the majority of participants perceiving double-checking to be of low-value, many described feeling apprehensive at the prospect of stopping this practice because it would remove the feeling of security that often accompanies shared decision-making. Participants explained that, if an error was to occur following the administration of a double-checked medicine, both nurses would share the feeling of blame because they would both feel partially responsible. If double-checking were to be stopped, the nurse who administers the drug on their own would be solely accountable for the error, which participants felt was a more daunting prospect.

"I think there's a reliance on that protection if that makes sense, people still feel however much you try and live in a no blame culture, so I think people

are very apprehensive about the blame that will come to someone if something went wrong." (7)

Additionally, participants described feeling uneasy at the thought of stopping a familiar practice that has been embedded in their organisational culture for many years to the point where it feels habitual. Participants mentioned that the NHS, as an organisation, is slow to enact change because there is a culture of doing things 'because they've always been done that way' and a resistance to change the status quo, especially if there is not a strong evidence base underpinning the need to change something.

"where is…where is the evidence, why do you want to change this without any real evidence? We'll just keep doing what we're doing" (5)

"I think you'd get a lot of nervous staff because that's the way they are used to doing things" (2)

Additionally, cognitive dissonance was described by participants who perceived double-checking to be low-value for preventing medication errors, however, if it were to be stopped, they would be afraid of causing serious harm or death to a patient.

"there would be a fear of... if there was a severe harm, or death that came from some from something where they realized that there wasn't that second check." (10)

Sub-theme 2: resistance from senior members of staff

Participants anticipated that more senior members of nursing staff would oppose the de-implementation of double-checking because they have responsibility for preventing patient harm at a ward-level, and so removing

systems that were originally implemented to enhance safety is likely to be challenging from an assurance perspective.

“the resistance to change, I think probably even from really senior levels, you know… most of our chief execs now right at that level have always been nurses and I think you know, trying to get nurse buy-in from when ‘this is how I always did it in my day’” (16)

This sub-theme relates to the ‘fear of removing the safety blanket’ sub-theme because the resistance felt by senior members of staff may be underpinned by fear caused by removing a perceived safety-net.

“the NHS thrives on the word assurance… we love the idea of assurance and safety netting and doing everything we can to prevent harm to patients and you know the good manager…will have thought and forecast at all their site and will have all these systems in place. If you remove one of those systems there's going to be a level of anxiety, so you might get some resistance from the likes of the pharmacy teams or from senior managers. ”

Participants also highlighted that, if senior members of nursing staff opposed the de-implementation of double-checking, this might influence more junior nurses to also not engage with de-implementation which could be very challenging. Participants emphasised the importance of role-modelling in nursing and discussed the powerful influence that more senior nurses have on junior nurses.

"If you get areas where there are senior respected nurses who don't think it's a good idea, you perhaps won’t get confidence from more junior members of their team who will also oppose it and that could be a barrier" (9)

- **Double-checking theme 4: perceived consequences of removing double-checking**

Sub-theme 1: Enhanced quality of care

The majority of participants anticipated that removing double-checking from healthcare settings would positively impact the quality of care by saving time that could be allocated to carrying out more effective care. Most participants did not think that stopping double-checking would result in a greater number of medication errors taking place.

"patients getting their medications more promptly" (15)

"I think it would be safer…and I think it would save time" (16)

"I would probably put my neck on the line and say there wouldn't be much (impact) I don't think…in my experience, if you have an error if the wrong medicine's given to the wrong patient, invariably it can be a medicine that has already been double checked and both nurses have seen it" (6)

Some participants described their experience of changing from double-checking to single-checking certain drugs during the Covid-19 pandemic, and highlighted that this change resulted in them being able to spend more time with patients which they believed enhanced the quality of care they delivered.

"as soon as people got used to the change it became embraced…people started to see that they could spend more time with a patient and less time in the treatment room, so people were able to get to know their patients more (11)".

However, a few participants who had carried out double-checking for decades felt that removing the practice would be detrimental for patient safety. The participants who did not support the de-implementation of double-checking referred to previously being involved in a medication error which could have led to patient harm.

"I just think it's highly dangerous because I mean I've been a nurse for 30 years and I couldn't ever imagine not second checking with somebody else … I think medication errors would increase …I just know because I investigate before I did this job…we did have some areas where people didn't do that didn't do it properly, and it resulted in the patient receiving the wrong dose of drug or the wrong route" (10)

- **Double-checking theme 5: overcoming barriers**

Sub-theme 1: listen and give choice

Participants discussed that a possible way of addressing emotional barriers to de-implementing double-checking at the healthcare professional-level could be achieved by altering the policy to create a more flexible approach to double-checking medicines. Instead of completely stopping double-checking in practice, a more flexible approach could be adopted by nurses whereby it could be optional to carry out a double-check if the nurse feels anxious about making an error without getting a second opinion. Some participants felt that giving nurses the choice to perform double-checking could be empowering.

"If you are a person who values second checking…still go and do that… there's no shame in continuing to ask for that second check. It's

not...mandatory... but it's encouraged if you feel it will be helpful beneficial to you and you know, which I think is could be a really positive message" (13)

Sub-theme 2: Communicate patient benefit

Participants felt that, in order for nurses to support the de-implementation of double-checking and stop performing the practice, it was crucial that the benefits for patients specifically were communicated effectively so that staff didn't assume that the removal of double-checking was put in place to save resources as a cost-cutting exercise, that could put patients at risk. Participants identified efficient communication of patient benefits as a key facilitator to de-implementing double-checking.

"The message would need to come from…it would need to be a patient safety message rather than a staff shortage message" (11)

"explains really clearly, the benefits in terms of patient care they're much more likely to be engaged with and seeing the benefits of that... I think, nurses will respond to that quite well." (8)

- **Intentional rounding Theme 1: Why intentional rounding is perceived to be low-value**

Sub-theme 1: Insufficient resources to carry out IR

Participants felt that the frequency with which intentional rounding should be carried out according to policy (every 1-2 hours) is unrealistic, as it could take a member of staff a full hour to check on all patients and address their needs, at which point, it would be time to begin the process again, leaving no time to complete additional (and often more urgent) care tasks. Participants felt that there were not enough nurses and healthcare assistants to carry out intentional rounding in accordance with the policy.

“(According to policy) if your patient is at risk, you must intentionally round them once an hour every hour without fail. In practice, I don't know that we've ever achieved that if I’m honest I don't even know if on a fully staffed day if you went down and looked down the board, if you would see every at risk patient had been visited once an hour with the paperwork completely filled in and ready to go… it just it just doesn't happen… it can't basically” (8)

"if I... went down to one of the elderly wards... at midday when things are busy when they’re doing washes, I can guarantee you there will be no intentional rounding filled in and the staff nurse even that morning won’t have allocated how often they should be completed and that largely is because they are so poor in staffing and they are so poor at completing tasks at that time of day that the paperwork is not prioritized and arguably rightly so" (2).

Participants highlighted that there are already practices in place that ensure nurses regularly check on patients, for example, ward rounds, meal rounds and medicine rounds. Due to the lack of time and resources available to carry out intentional rounding in addition to these pre-existing rounds, nurses mentioned that sometimes they document that they have carried out an intentional round at a time when they were actually performing a different type of round or task on a patient.

"They just go through the whole day and write, not necessarily reflecting what they've done, but if they feel they've been in the room, say, you know 15 times during shift they'll document 15 intentional roundings at the end of the day but it might not necessarily accurately reflect what happened." (6)

Additionally, participants emphasised that the lack of resources means that nurses and healthcare assistants are often unable to document the intentional rounding process in real-time, as is stipulated in the policy. Instead, it is common for staff to have to stay late to retrospectively complete their intentional rounding paperwork.

“I don't know if it necessarily in reality takes too much time, other than the time of filling out the paperwork so oftentimes you know, in areas where they fill out the intentional rounding at the end of the shift that can mean people staying late” (1)

Sub-theme 2: Completed IR documentation doesn’t reflect the reality of care

Participants repeatedly discussed that they didn’t trust the accuracy of the information included in the intentional rounding documentation because there is an awareness that nurses often complete the documentation to indicate care done even though nurses are rarely able to complete the intentional rounding practice as often as is stipulated in policy. Participants described the pressure often placed on nurses to provide evidence of patient care that can be used to protect the NHS if an investigation or complaint is issued.

"it's a mandated tick box exercise in case it goes to the court to a court in... for a legal case or an inquest...we need to be seen to be seeing our patients" (8)

Despite this pressure, however, some participants who had been involved in incident investigations said that they would not rely on intentional rounding documentation to evidence the care a patient had received because it was

unreliable and often did not reflect the truth. Instead, participants said they would prefer evidence of good staffing levels to provide assurance during an investigation. Other participants referred to relying on the ‘evaluation’ written for patients at the end of each day which is a written ‘running commentary’ of all the care they received on a particular day.

“I can't rely on the care rounding and therefore it's not it's not worthwhile to me… and because you just rely on the evaluation of the shift at the end of the end of the day” (13)

Further, participants discussed that intentional rounding documents do not accurately reflect the reality of care because they are often completed as a ‘tick-box’ exercise that must be completed regardless of whether the nurse or HCA was able to carry out the intentional rounding. Participants highlighted that the inflexibility of this practice exacerbates its ‘tick-box’ nature because there is no opportunity to adapt the practice to the patient’s individual needs.

"if I’m being totally honest doesn't matter if it's filled it or not and a lot of the time because…some people will, at the end, they just go and tick the boxes" (1)

Sub-theme 3: Detracts from patient-centred care

The notion that intentional rounding doesn’t facilitate the delivery of patient-centred care was repeatedly mentioned by participants. Rather than treating each patient as an individual, participants emphasised that intentional rounding encourages nurses and HCAs to standardise care so that patients are checked on in a way that suits healthcare staff rather than patients. It was often mentioned that some patients don’t want to be checked on so

frequently and be reminded about the pain they are feeling. However, participants also highlighted that intentional rounding could be effective if it was only carried out on patients who actively wanted to be checked on frequently. The need to listen to the patient and tailor care to their preferences was highlighted as a way of making intentional rounding more patient-centred.

"It just takes away some of that human connection that patients would value… you know, HCAs pop in to answer something and then now they've got to get their clip board out and write it down it just doesn't feel very…very person centred I suppose" (9)

This sub-theme also related to the sub-theme 'completed IR documentation doesn't reflect the reality of care' because data in this theme referred to the notion that intentional rounding is performed more in the interest of the healthcare organisation rather than in the interest of patients, thereby making it less patient-centred.

" the strap line for our hospital is 'exceptional health care personally delivered' and you think about intentional rounding it really isn't personally delivered care is it? It is absolutely not about 'hi I'm here, what do you want from me and how often do you want it?' It is a 'I am coming around every hour to ask you, these set questions'…that is not 'patient-centred healthcare' that is us doing something to make ourselves feel better." (5)

Sub-theme 4: Removes opportunity for professional judgement

Participants described intentional rounding as a practice that disempowers nurses because it removes the need for them to use their critical judgement

to care for the patient. The rigidity of intentional rounding was also criticised by participants in the way that it creates a ‘robotic’ style of nursing that removes the opportunity for staff to think and adapt to challenges. Participants also highlighted that tools such as intentional rounding do not encourage staff to behave in a critical manner which can be detrimental to their general approach to providing care, especially when unexpected situations arise.

"that's the thing isn't it intentional rounding is this routine thing to stop you from thinking" (3)

"with all of these things where…the process takes away from the judgment of the individual, it contributes to a culture of kind of automatic nursing almost robotic culture, you know you only do things because the paperwork tells you. The more and more that culture comes into place and the more policy and protocols and standard operating procedures we put into place, the less nurses behave in a critically critical manner, the less critical thought there is less critical thought goes into the care of a patient which is not good." (9)

- **Intentional rounding theme 2: Considerations for de-implementation**

Sub-theme 1: Loss of evidence of care

Participants highlighted one key potential barrier to de-implementing intentional rounding as the loss of evidence of care. If an investigation is launched following an adverse event that takes place in hospital, intentional rounding documentation is a legitimate form of evidence that can be used to prove that healthcare staff did all they could to prevent an adverse event from happening. Participants also described that, from a family perspective,

it can be comforting to have evidence (in the form of intentional rounding documentation) that your family member was regularly checked on by healthcare staff.

"from a senior manager perspective obviously… there's less of that sort of paper assurance that patients have been regularly seen is quite nice to have so, for example when responding to incidents if you've got documentation that shows that patients been checked on every one to two hours that can help you showcase that we did what we did what we do and it's a good way of showing, on paper at least that regular care has been provided...regular touch points have occurred which from an insurance perspective and from an incident or complaints response perspective is quite useful" (6)

"not having that evidence to share with family, it will be it may be slightly distressing to them that we can't demonstrate what we have done for their loved one" (6)

Participants therefore highlighted that a likely barrier to de-implementing intentional rounding would be the loss of potential evidence that could be used in complaints or investigations to demonstrate that a patient received good quality care.

Sub-theme 2: Alternative ways to achieve the same goal

Participants discussed the desire to keep the ethos of intentional rounding i.e. ensuring regular patient contact but reducing the bureaucracy and 'tick-box' nature associated with the practice. Participants emphasised the importance of regularly checking on patients who are not able to use their call bell or ask for help by using a more person-centred approach whereby

the patient is checked as regularly as is deemed appropriate by healthcare staff.

"really carefully managed so that it's not just pulling out the one check that we do...we have to ensure that we replace it with a person-centred model of encouraging patients to ask for help, encouraging nurses to maintain intentional rounding where they feel that adds value to that patient" (9).

Participants also highlighted potential ways of encouraging low-risk patients to take some control of their care by using their call bell whenever they need help. By empowering patients to ask for help, this could remove the need for additional routine checking for patients who often don't benefit from intentional rounding.

"I think the impact would be extremely minimal and so long as it was swapped with something in it for something, such as nurses giving out a leaflet that says, you know you must ask for help, as and when you need it, or you know something like that something that make sure that patients understand that they can ask for help, they can ring that bell and somebody will respond to them." (3)

- **Intentional rounding theme 3: Perceived impact of removal**

Sub-theme 1: Minimal impact on patient safety

Participants felt that de-implementing intentional rounding would have a minimal impact on safety as long as other roundings, checks and efforts still remained to ensure that patients would still receive regular contact from healthcare staff. Some participants discussed the lack of association

between patient safety and intentional rounding, emphasising that removing this practice would not noticeably affect patient safety

"*I don't think it has anything to do with patient safety. I've never found an incident or another thing where we'd have genuinely hand on heart said 'God if we've just done some intentional rounding things would have been so much different'. I don't think it would have any impact whatsoever actually at all.*" (5)

It is important to highlight that, although the majority of participants agreed that stopping intentional rounding would have a minimal impact on patient safety, this was based on the assumption that patients would still be checked on frequently during other practices such as medicine rounds and meal rounds. For example, one participant referred to the potential problems that could arise if intentional rounding was stopped without ensuring that a patient knew how to use their call bell,

"*patients will get forgotten if they're sitting by quietly without using their bell*" (6)

Therefore, healthcare staff perceived that there would be minimal impact on patient safety if intentional rounding was de-implemented, providing that other efforts to maintain regular patient contact were still carried out.

Sub-theme 2: Releasing nurse time

Participants anticipated that removing intentional rounding from nursing workload could free up time that could be alternatively allocated to carrying out more effective healthcare practices. Participants discussed that spending more time delivering more effective healthcare practices could improve the quality of care provided and make it more person-centred,

"instead of…spending your few minutes documenting everything's all right, you have a few extra minutes to mobilise a patient or to allow them to sit in their chair, or to go and make them a cup of tea'. If you release time from the bureaucracy, then you're releasing time to care". (1)

"*I think it'd be good… it would free up time to give enhanced level of care" (16)*

"more time to give actual personalized care if anything" (8).

Therefore, in general, participants thought that removing intentional rounding would positively impact patients because it would free up time to carry out more effective practices without compromising on safety.

Sub-theme 3: Improved patient care experience

Amongst participants, it was felt that stopping intentional rounding would improve patients' experience of care in several ways. For example, some participants discussed that it would be beneficial for low-risk patients who are experiencing pain to not have to be reminded of that pain every hour during intentional rounding and that reducing the regular checks might help patients to relax in a hospital setting.

"patients not being reminded how much pain they are in so often would be another massive benefit" (2)

Additionally, participants highlighted that reducing or removing intentional rounding and encouraging patients (where possible) to use their call bell more could empower patients to take more control of their care and in this way potentially improve their transition from hospital to home.

"I think there'd be an impact on kind of this 'pyjama paralysis' notion that we see so often...patients becoming dependent as they're in hospital and less independent and there'd be a positive impact on restoring dependence formations if they were encouraged to ask for help when they need it more." (9)

Therefore, participants highlighted the potential benefits of increased autonomy and more time to rest following the de-implementation of intentional rounding that could occur if regular patient contact was still ensured.

5.4.3 Common themes across double-checking and intentional rounding

To gain a better understanding of the wider process of de-implementation, it is useful to highlight some of the themes that were identified across both candidate practices.

Firstly, participants provided similar reasons explaining why they perceived both candidate practices to be of low-value. The nurse managers expressed that both practices are ineffective because, often, it's not possible to carry them out in reality as originally intended, relating to the 'work as imagined' vs 'work as done' paradigm (Braithwaite, Wears & Hollnagel, 2016). For example, participants considered double-checking of medicines to be low-value due to an awareness of the great variability with which it is carried out, potentially as a result of its underpinning vague policy. Similarly, the findings highlighted that, often, it is not possible to carry out intentional rounding in accordance with the policy due to the lack of time and resources available on the ward which can result in nurses documenting that the practice has been completed when, in reality, it wasn't possible to carry it

out. Therefore, participants in general held negative attitudes towards the candidate practices because, often, it is not possible to carry them out according to policy due to unclear processes or a lack of resources.

Secondly, participants discussed that each of the candidate practices were low-value because performing them removed some of their professional autonomy which can negatively impact patient care. For example, some nurse managers highlighted that intentional rounding can disempower nurses because the 'tick-box' nature of the practice removes the option for them to use their critical judgement to care for the patient. Similarly, participants emphasised that the act of double-checking can dilute the feeling of responsibility and thereby remove some professional autonomy as nurses rely on each other to a certain extent to make sure that the medicine has been thoroughly checked prior to administration.

Interestingly, when asked to suggest how the candidate practices could be de-implemented, many participants made suggestions that would increase the amount of professional autonomy associated with carrying out each practice. For example, the sub-theme 'listen and give choice' describes the option of a nurse choosing whether they want to carry out a second check or not. Similarly, the theme 'alternative ways to achieve the same goal' encompassed the idea of removing the paper-based tool of intentional rounding and trusting nurses to maintain the ethos of intentional rounding i.e. providing a sufficient level of patient contact.

Additionally, another similarity between both candidate practices relates to participants' perceptions of the possible consequences of de-implementation. Nurse managers believed that stopping double-checking would result in patients receiving their medications more promptly and more

time being available to provide more patient-centred care practices. Similarly, participants thought that stopping intentional rounding would improve the care experience for patients by giving them more time to rest and giving them more control over their own care and thereby increasing their independence.

5.5 Discussion

This study aimed to explore the potential barriers and facilitators associated with de-implementing two low-value PSPs: double-checking and intentional rounding. Previous evidence has identified the potential determinants for the de-implementation of low-value care in a variety of healthcare contexts (Augustsson et al, 2021; Barnes et al, 2017; Leigh et al, 2022), however, it is believed that this is the first interview study that has investigated healthcare professionals' perspectives on de-implementation in relation to these two specific PSPs. In this study, healthcare professionals discussed why they perceived the two PSPs to be low-value, potential barriers to their removal from practice, ways to overcome the barriers and the possible implications for patients and staff following their de-implementation.

Several of the present findings align with previous evidence that has evaluated the two candidate practices. For example, existing literature has reported that double-checking is rarely carried out in accordance with the policy (Alsulami et al, 2014; Schutijser et al, 2019; Westbrook et al, 2021). Additionally, Chua et al (2019) conducted a survey exploring registered nurses' attitudes towards single-checking and double-checking medicines and reported that participants would be scared of replacing double-checking with single-checking medication because they thought it would increase the

rate of medication errors. This survey study also found that nurses perceived having greater accountability for medication administration using single-checking compared to when using double-checking. However, a different survey conducted in Switzerland to explore oncology nurses' beliefs towards double-checking found that participants largely believed that double-checking enhanced patient safety (Schwappach et al, 2018). Further research is needed to understand how perceptions of the value of double-checking vary depending on the clinical context in which it is carried out.

Similarly, Harris et al (2019b) produced a realist evaluation of intentional rounding carried out in acute NHS trusts that supported the present findings. Using surveys, interviews, observations and routinely collected ward outcome data, Harris et al (2019b) found that fidelity to the original intentional rounding intervention by nurses was generally low due to the lack of time available to carry it out. This is consistent with the reasons participants gave in the present study to explain why they perceived intentional rounding to be low-value. Harris et al (2019b) also reported that the practice prioritises accountability and risk management above person-centred care, a finding that aligns with the barrier 'loss of evidence of care' identified in the present study. Additionally, the present finding that intentional rounding removes opportunity for professional judgement is consistent with previous evidence that box-ticking exercises can diminish nurses' sense of professional autonomy (Candadas-De LA Fuente et al, 2015; Swensen, Shanafelt & Mohta, 2016).

Participants identified mostly emotion-based barriers to de-implementing double-checking, experienced at the healthcare professional level of the healthcare system. For example, 'fear of causing harm' and

‘resistance from senior members of staff’ to change an entrenched practice. These findings align with Augustsson et al (2021) and Leigh et al (2022) who reported that ‘fear of malpractice’ and ‘clinician resistance to change’ were key barriers to de-implementation. Augustsson et al (2021) also identified ‘lack of interest in saving money’ as a barrier to de-implementation. Although this wasn’t identified in the present study as a key barrier to de-implementation, nurse managers did emphasise the importance of communicating the possible benefits for patients rather than the potential financial savings as a facilitator of de-implementation. Leigh et al (2022) also identified other barriers to de-implementation that were not identified by the present study, for example, ‘disconnect between training and evidence’ referring to the delay in incorporating de-implementation evidence into clinical training. This discrepancy may be due to the fact that Leigh et al (2022) explored barriers to the de-implementation of a variety of practices whereas the present study only examined the barriers to de-implementing two specific PSPs. This emphasises the potential for variation in barriers to de-implementation, depending on the context of the target practice.

Participants identified ‘loss of evidence of care’ as an important barrier to de-implementing intentional rounding. Unlike the emotion-based barriers identified in relation to de-implementing double-checking, this barrier relates more to issues regarding removing a form of evidence that can be used to reassure families and governance boards that adequate care has been provided. However, participants also said that intentional rounding does not ‘reflect the reality of care’. Therefore, although participants had an awareness that the evidence provided by intentional rounding is often not accurate, they were still hesitant to remove it. This finding highlights some of

the system-level barriers that would need to be addressed before it would be possible to change healthcare professional behaviour. For example, it would be necessary to firstly ensure that either evidence of care would no longer be required or it could be provided through alternative methods before de-implementation of intentional rounding could take practice.

Effectively communicating the possible benefits of de-implementation for patients specifically was identified as a way of overcoming barriers to removing double-checking. Participants highlighted that they would not be motivated to stop double-checking unless they knew that it would be advantageous for patients. Nurse managers believed that if nurses on the ward perceived that the de-implementation efforts were driven by a top-down initiative to cut costs, they would be less likely to engage in the initiative. Leigh et al (2022) reported that framing de-implementation efforts as an opportunity for ‘cost-saving’ or ‘reallocation of resources’ was identified as a facilitator whereas framing it as ‘cost-cutting’ was identified as a barrier. The present study therefore supports previous literature that has emphasised the importance of effectively framing de-implementation initiatives to motivate healthcare professionals to engage in efforts to remove low-value practices.

The majority of participants supported the de-implementation of intentional rounding and conveyed that, as long as patients were regularly checked on, it would improve patients’ care experience whilst also reducing the administrative burden placed on nurses. Participants felt that de-implementing double-checking of medicines would free up a lot of time for nurses, increase the likelihood of patients receiving their medications on time and would not have a detrimental impact on safety. However, unlike

with intentional rounding, participants expressed that they would only be willing to de-implement certain forms of double-checking that were perceived as ‘lower-risk’. Further research is therefore needed to understand exactly which forms of double-checking nurse managers would be willing to de-implement and how this could be done in practice.

A strength of this study was the variety of job roles within the sample of nurse managers. For example, some participants were senior nurses with years of clinical experience whereas others’ worked in a role that was more focused on quality governance and patient safety. This variety of job roles included in the sample provided a richer insight into nurse manager attitudes towards de-implementation as a whole, rather than focusing on only one clinical perspective. Another strength is that this study contributed to understanding the variation in how intentional rounding and double-checking are carried out in practice depending on Trust.

A potential limitation of this study is that the recruitment method excluded nurse managers who did not use social media which restricts the potential pool of participants. Future research should therefore consider the use of additional methods of recruitment such as placing information sheets in clinical settings to make involvement more accessible to those who do not use social media.

5.6 Conclusions

The findings presented here demonstrate that there are a number of emotional, practical and bureaucratic barriers that can arise when considering the de-implementation of low-value PSPs that vary depending on the context in which the practice is carried out. Healthcare professionals

suggested a number of ways of overcoming barriers to de-implementation that could result in reducing staff workload and increasing the quality of care delivered to patients. Many of the present findings align with previous literature that has explored potential determinants to the de-implementation of low-value clinical practices. However, to more fully investigate the potential barriers and facilitators associated with the removal of low-value PSPs, it is necessary to be more precise in how the candidate practice is defined. For example, the barriers associated with double-checking will be determined by the patient group, the type of drug being administered and the healthcare context in which it is carried out. Due to the greater amount of recent evidence questioning the value of double-checking of medicines (Koyama, 2020; Westbrook et al, 2021), DH decided to take this candidate practice forward for further evaluation in Chapter 6 to develop an intervention to target the de-implementation of a low-value PSP.

Chapter 6

Co-producing an intervention using the Theoretical Domains Framework to support healthcare professionals with de-implementing a target low-value safety practice.

6.1 Chapter summary

This chapter reports the process of co-producing an intervention designed to de-implement a specific form of double-checking medicines. This process aimed to address the research question: how feasible is it to co-design a behaviour change intervention with patients and healthcare staff that aims to stop healthcare staff carrying out a low-value PSP. Stakeholders (patients and healthcare professionals) reached a consensus on the target medicine group, format and context of double-checking medicines (hereafter referred to as 'double-checking') that the intervention would aim to de-implement before identifying context-specific barriers and facilitators to stopping this behaviour. Behaviour change theory was then applied to the barriers and facilitators to identify relevant behaviour change techniques (BCTs) that could be used to overcome challenges to de-implementation. Healthcare professionals (HCPs) then discussed how these BCTs could be operationalised into strategies used in practice to facilitate the de-implementation of the target double-checking practice.

6.2 Background

6.2.1 Determining the target behaviour

As described at the end of chapter 5, based on the findings of the interview study, it was decided that double-checking would be the most appropriate

target practice to be taken forward as the focus for developing a de-implementation intervention. As emphasised in previous chapters of this thesis, increasing awareness of low-value practices alone is not enough to facilitate the removal of low-value care (Kastner et al, 2022; Rosenberg et al, 2015). Previous research has recommended the use of additional interventions to support HCPs in stopping low-value care practices (Colla et al, 2017; Kerr et al, 2017; Levinson et al, 2018). Therefore, this chapter will explore the process of developing an intervention to support de-implementation of (remove, replace, restrict or reduce) double-checking.

Double-checking is conducted on a variety of drugs, across different patient groups and in many different healthcare settings (Hewitt et al, 2016). The findings from the interview study (Study 3) presented in Chapter 5 shed some light on the possible challenges associated with de-implementing the general practice of double-checking. However, when designing interventions that aim to change the behaviour of HCPs, it is important that the target behaviour is specific enough to ensure that the intervention components influence the measured outcomes (Ince et al, 2015; Kastner et al, 2015; Michie & Johnston, 2004). If a target behaviour is too general, it can be challenging to know which healthcare professional needs to do what differently and to identify the barriers and facilitators that can enable change. It was therefore necessary to investigate a more specific form of the practice to better understand how to develop a context-specific de-implementation intervention. Presseau et al (2019) encourage clarification of the following aspects of the target behaviour prior to intervention development: action, actor, context, target and time (AACTT). Therefore, it was decided that the first step of the intervention development process should involve determining

the exact form of double-checking that the intervention would aim to de-implement.

6.2.2 Using theory to develop a de-implementation intervention

Several de-implementation frameworks have encouraged the development of evidence-based, context-specific strategies to effectively change healthcare professional behaviour to stop them carrying out target low-value practices (Grimshaw et al, 2020; Niven et al, 2015; Norton et al, 2020). Strategies for de-implementation can target specific barriers to de-implementation and incorporate facilitators that support the implementation of the intervention (Niven et al, 2015). Although there is no established method for developing de-implementation strategies, previous research has highlighted the value of applying behaviour change theory to design such strategies, to develop a more complete understanding of the factors that influence de-implementation (Davidoff et al, 2015; Nilsen et al, 2015; Parker et al, 2022b; Walsh-Bailey et al, 2021).

Parker et al (2022b) conducted a scoping review of published studies that used theoretical approaches to understand and explain the factors that influence efforts to reduce low-value care. The review identified 48 studies that used a range of theories including: classic theories such as the ‘Theory of Planned behaviour’, (Ajzen, 1991) implementation theories, for example, the ‘Normalisation Process Theory’ (May & Finch, 2009) and determinant theories such as the ‘Consolidated Framework for Implementation Research’ (CFIR) (Damschroder et al, 2020). The Theoretical Domains Framework (TDF) (Cane et al, 2012) was found to be the most commonly used framework (n=22) to explain the factors that influence efforts to reduce low-value care. The TDF is a behavioural framework that was originally

developed to simplify and integrate a variety of BCTs to make theory more accessible to other disciplines (Cane et al, 2012). The framework is based on 33 psychological theories and 128 key theoretical constructs relating to behaviour change. It comprises of constructs ('a concept specially devised to be part of a theory', for example, 'fear' and domains ('a group of related theoretical constructs'), for example, 'emotion'. (Michie et al, 2005, p.33; Cane et al, 2012). The TDF has been used extensively in the past to inform implementation interventions and identify barriers and facilitators to implementing guidelines and interventions in healthcare settings (Atkins et al, 2017; Dyson et al, 2013; Presseau et al, 2017). In recent years, research has begun to apply the TDF to better understand the process of de-implementation (Cullinan et al, 2014; Curran et al, 2013). For example, Voorn et al (2014) conducted a survey study with orthopaedic surgeons and anaesthesiologists to identify barriers associated with the intention to stop low-value blood management techniques (BMTs) such as perioperative blood salvage (where blood lost during an operation is simultaneously transfused back into the patient). The barriers identified by HCPs in the survey were then mapped onto relevant TDF domains by the research team. For example, the barrier 'lack of alternatives for perioperative blood salvage' was mapped onto the domain 'knowledge'. Voorn et al (2018) then developed a multifaceted strategy that aimed to address the barriers within the TDF domains, using BCTs. BCTs are the active ingredients of a behaviour change intervention and can include techniques such as feedback, reinforcement and goal-setting (Smith et al, 2022). Michie et al (2013) developed a taxonomy of 93 BCTs which can be used to inform the development of more effective interventions.

To overcome the identified barriers within the TDF domain of ‘knowledge’, Voorn et al (2014) included the BCT of ‘information provision’ via written letter or email to educate HCPs about more effective, alternative blood management techniques. This strategy was tested as part of a randomised controlled trial (RCT) and although there was a reduction in the use of blood salvage techniques following the intervention, there was no significant difference between the experimental and control group. Voorn et al (2018) emphasised the need for future research to identify more effective strategies to de-implement the use of low-value practices to improve the quality of care.

The TDF has also been used to identify barriers and facilitators to de-implementing other low-value clinical practices such as chemical castration to treat localised prostate cancer (Skolarus et al, 2021), low-value breast cancer surgical procedures (Smith et al, 2020) and the use of computed tomography in adults with minor head injury (Curran et al, 2013). Additionally, Taylor et al (2013) used the TDF in combination with implementation principles to design an intervention that aimed to support HCPs across three different NHS Trusts with replacing a low-value practice (checking the position of a nasogastric tube using an X-ray) with a more effective practice (checking the position of the tube by obtaining the pH of the aspirate from the stomach). HCPs were asked to identify barriers to the target behaviour using a questionnaire. Following this, focus groups were held, during which different staff groups were asked to reach a consensus on which of the 11 identified barriers were most influential and discuss intervention strategies that could be used to address the four most prominent barriers to achieve the target behaviour. The research team then

matched strategies to specific barriers and mapped them onto BCTs. Table 6.1 contains an example of one of the strategies included as part of the intervention.

Table 6.1. An example of a strategy included in an intervention developed by Taylor et al (2013).

Strategy	**Barrier**	**BCT**
Screen saver containing key messages that targeted emotion.	Emotion	Anticipated regret, salience of consequences, framing and re-framing.

Following the implementation of the intervention over a period of 9 months, there was an increase in the target behaviour from 11% to 60% and a decrease in the use of X-ray to check the nasogastric tube position from 60% to 37%. Although Taylor et al (2013) used a combination of the TDF and implementation principles taken from process theories, these findings nonetheless demonstrate the utility of the TDF in developing a theoretically informed method of overcoming barriers to replace a low-value practice with a more effective target behaviour. This study also highlights the importance of understanding local context because some of the barriers identified by staff differed depending on the Trust they worked in which resulted in the intervention being tailored to meet the specific barriers at each site.

The systematic review (Study 2) presented in Chapter 3 of this thesis established that the TDF has not previously been used to develop an intervention specifically designed to stop a low-value PSP. To address this gap, the TDF was used to guide the intervention development process outlined in this chapter, to ensure that the de-implementation strategies

developed to stop HCPs carrying out double-checking were evidence-based and relevant to context-specific barriers and facilitators.

It was hoped that using the TDF to guide the development of this intervention would enhance understanding of some of the common themes associated with de-implementation that may differ from the implementation process. Previous research has identified 'absence of evidence of effectiveness' and 'fear of patient harm' as barriers to the general process of de-implementation (Elshaug et al, 2008; Haines et al, 2014; Haines et al, 2017). Similarly, the interview study reported in Chapter 5 of this thesis identified 'fear of removing the safety blanket' and 'resistance from senior members of staff' as key barriers that may be particular to the process of de-implementing PSPs.

6.2.3 Involving stakeholders in intervention development

Recent years have seen increasing recognition of the importance of involving key stakeholders at each stage of the research process to increase the likelihood of the intervention creating meaningful benefits for end-users (O'Cathain et al, 2019; Slattery et al, 2020). This focus on stakeholder engagement is a core element of the intervention development process according to the Framework for Developing and Evaluating Complex Interventions (Skivington et al, 2021) and is included in several de-implementation frameworks (Grimshaw et al, 2020; Niven et al, 2015; Norton et al, 2020). The term 'stakeholders' is used in this chapter to refer to nurses, senior nurses, pharmacists, patient safety managers and patients because all parties would be affected by an intervention targeting the de-implementation of double-checking medicines. These specific groups were

targeted in an attempt to capture understanding of the potential challenges to de-implementation that could arise at ward-level.

One possible way of incorporating tacit knowledge and local expertise into intervention development is through the method of co-production (Pronovost et al, 2008). This is a collaborative and egalitarian way of working, whereby everyone works together to create something or make a decision that works for all stakeholders (Hickey et al, 2018). There is great variation in how co-production can be conducted, depending on what is being co-produced and the purpose of the research (Filipe et al, 2017; Williams et al, 2020). To improve clarity regarding the process of co-production, the UK National Institute for Health Research (NIHR) produced a list of key guiding principles (see Table 6.2) .

Table 6.2 Key principles and definitions from INVOLVE (NIHR)

Key Principles	Definition
Sharing of power	People work together to achieve a joint understanding.
Including all perspectives and skills	The research team should involve all people who can contribute to discussions.
Respecting and valuing the knowledge of all those working together on the research	All people involved are of equal importance.
Reciprocity	Everyone benefits from working together
Building and maintaining relationships	Developing rapport is an important aspect of sharing power. It is important that there is clarity of roles and responsibilities.

According to Hickey et al (2018), there is no set method of carrying out co-production in research because it is a principles-driven process. However, it

is essential that power is shared by all those involved when making key decisions.

There is a lack of previous research that has used co-production to develop de-implementation interventions underpinned by theory. However, it is possible to apply learning from previous studies that have used co-production to develop complex interventions in healthcare settings. For example, the aforementioned Taylor et al (2013) used co-design (a form of co-production) to produce a theoretically-underpinned intervention that successfully changed healthcare professional behaviour to replace a low-value practice with a more effective intervention. In-person focus groups were held, during which stakeholders discussed their views on carrying out the target behaviour, completed exercises that rated barriers and generated intervention strategies. The research team then matched stakeholder's suggested intervention strategies onto the most prominent barriers and mapped them against relevant BCTs to develop the intervention.

Similarly, Smith et al (2022) held online workshops with HCPs to develop 'track-and-trigger' tools to support healthcare practitioners with recognising patient deterioration. The research team used previous literature to map TDF domains representing barriers and facilitators onto appropriate BCTs, followed by consensus approaches to prioritise the most relevant BCTs. Shortlisted BCTs were then presented to stakeholders during online focus groups where they discussed practical ways in which the BCTs could be implemented in practice. Stakeholders were asked to rank the five BCTs/ applications that they considered to be most acceptable. The research team then designed an intervention based on stakeholders' ideas.

Previous evidence and research reported in this thesis has informed the rationale for this intervention development process. As highlighted in the systematic review (Study 2) described in Chapter 3, the majority of previous evidence testing de-implementation interventions has focused on clinical practices such as the deprescribing of inappropriate medicines. There is therefore a need to explore how best to design interventions that can target the de-implementation of low-value PSPs to try and address the problem of safety clutter in healthcare practices. Unfortunately, it was not clear from this systematic review which BCTs are most effective at de-implementation and should therefore be included in the present intervention. However, the review findings support previous evidence that has suggested a multi-component intervention would be the most effective approach for de-implementation (Colla et al, 2017; Hahn et al, 2016; Rietbergen et al, 2020; Tabriz et al, 2022) and so the present intervention will also be multi-component. Additionally, the barriers and facilitators identified in the interview study reported in Chapter 5 were used to inform the intervention development process outlined in this chapter. However, it is not possible to develop an intervention using the findings from Chapter 5 alone because this study explored perceptions relating to the general process of double-checking medicines, i.e. it did not explore an exact form of double-checking or specific type of drug, the action, the context in which the practice is carried out in etc. Further exploration is therefore needed to understand the potential barriers and facilitators that are specific to an exact form of double-checking to increase the chances of an intervention being effective in practice.

This chapter will therefore build on these previous findings by reporting the process of using online workshops to co-produce an intervention, underpinned by the TDF, with HCPs and patients that aims to stop a specific, target form of double-checking. The aims of this process were to:

1) Achieve a consensus on the exact form of double-checking (using the AACTT framework) for the de-implementation intervention to target.

2) Identify barriers and facilitators that are specific to stopping the target form of double-checking.

3) Apply the TDF to the identified barriers and facilitators and map evidence-based BCTs onto the most relevant ones.

4) Understand what context-specific strategies HCPs believe could overcome barriers to stopping the target behaviour.

5) Explore the feasibility of co-producing a theory-based behaviour change de-implementation intervention with stakeholders.

6.3 Methods

6.3.1 Ethical approval

Ethical approval was not required for the workshops because it was not classified as 'research' according to the Health Research Authority's decision making tool (http://www.hra-decisiontools.org.uk/research/). This tool supports researchers in deciding whether or not their study is research as defined by the UK Policy Framework for Health and Social Care Research.

6.3.2 Overview of methods

Five workshops were conducted with patients and HCPs in accordance with the INVOLVE principles of co-production (Table 6.2) to develop a de-implementation intervention targeting double-checking. Due to the Covid-19 restrictions in place at the time of planning the workshops (December 2021), it was decided that it would be most appropriate to host the workshops online. The groups of people taking part in each workshop varied i.e. just patients, just HCPs or both, depending on the particular workshop focus. This decision was made to align with the principle of 'respecting and valuing the knowledge of all those working together on the project'. Only involving certain groups when their specific experience or knowledge was relevant to the particular stage of intervention development ensured that participation was meaningful rather than tokenistic. Each workshop was recorded for the sole purpose of providing an accurate summary of the discussions that took place. Once the summary had been written, the recording was deleted and participants were made aware of this prior to attending.

6.3.3 Participants and setting

DH consulted the Y&H PSTRC patient and public panel for advice on how best to recruit stakeholders to participate in the online workshops. Based on the panel's feedback, snowball sampling was used to recruit: 1) patients and unpaid carers who had experience of taking medication whilst in hospital or caring for someone who had taken medication whilst in hospital, and 2) HCPs (nurses, senior nurses, pharmacists and patient safety managers). These specific staff groups were targeted via social media in an attempt to capture the perspectives of a variety of HCPs whose everyday professional role could be directly impacted as a result of de-implementing double-

checking or their behaviour would need to change for de-implementation to be successful. Separate recruitment posters were posted regularly on Twitter to recruit the patients/ carers and HCPs (Appendix 6.1- 6.2). The posters encouraged those interested in taking part to email DH. In an effort to recruit a representative and diverse sample of stakeholders, a variety of lay and professional community groups were tagged in tweets. Additionally, DH worked with the public patient involvement and engagement lead (FQ) based at the YH PSTRC to target members of the 'Safety in Numbers' group (a network of patients who had previously consented to receive information from the Y&H PSTRC about research involvement opportunities) by sending them the recruitment poster directly by email. The next section of this chapter will describe the process and findings of each workshop.

6.3.4 Procedure

Each workshop took place online using Microsoft Teams for a maximum of 90 minutes. DH used input from a lay leader (HT) to produce an accessible information sheet (Appendix 6.3) outlining background information and the objectives of the upcoming workshop for all stakeholders. The information sheets were emailed to stakeholders one week in advance of each workshop. A summary of the activities and discussions that took place during each workshop is described in section 6.4 Following each workshop, DH circulated a concise summary of the discussions that took place to all stakeholders who took part. To meet the INVOLVE guideline of 'reciprocity', all participants were emailed a £30 voucher as a token of appreciation following their attendance at each workshop.

6.4 Findings

6.4.1 Participants

In total, 20 stakeholders took part across all 5 workshops (6 patients/ unpaid carers and 14 HCPs). Healthcare professional stakeholders were recruited from the following NHS hospitals: North Bristol Trust, Northern Lincolnshire and Goole NHS Foundation Trust, Royal National Orthopaedic Hospital, University Hospitals Birmingham, Bradford Teaching Hospitals NHS Foundation Trust, Oxford University Hospitals, Northumbria Healthcare NHS Foundation Trust. Table 6.3 displays the number of patients and HCPs who attended each workshop and the different healthcare professional groups that were represented.

Table 6.4 Number of patients and HCPs who attended each workshop.

Workshop	No. patients	No. HCPs	HCP group represented
1	6	0	
2	5	7	Medicines Management Nurse (3), Clinical Nurse Educator (1), Lead Medicines Safety Pharmacist (1), Patient Safety Manager (1), Senior Sister for Quality and Clinical Standards (1)
3	6	7	Medicines Management Nurse (3), Clinical Nurse Educator (1), Lead Medicines Safety Pharmacist (1), Patient Safety Manager (1), Senior Sister for Quality and Clinical Standards (1)
4	5	7	Medicines Management Nurse (2), Clinical Nurse Educator (1), Lead Medicines Safety Pharmacist (1), Patient Safety Manager (1),

			Senior Sister for Quality, Clinical Standards (1) Chief Matron (1)
5	0	8	Research nurse (5), Patient Safety Manager (1), Chief Matron (1), Clinical Nurse Educator (1)

A description of each workshop will now be provided alongside the key findings.

6.4.2 Workshops

6.4.2.1 Workshop 1 description and findings

Based on feedback from the public and patient panel, it was understood that patients would be unlikely to have prior knowledge of key concepts that the workshops would focus on i.e. double-checking and de-implementation. Therefore, in line with the INVOLVE (2019) principle of 'sharing power,' the first workshop aimed to inform patients about the key concepts that would be discussed throughout the intervention development process, to enable them to fully contribute to decision-making in subsequent workshops alongside HCPs. Therefore, only patients and unpaid carers were invited to take part in the first workshop. Additionally, it was thought that patients/ unpaid carers would be more comfortable with asking questions about the key concepts without the presence of HCPs, therefore the first workshop also served this purpose.

Once a patient or unpaid carer had emailed DH expressing an interest in taking part, they were emailed an information sheet that provided more detail about what the first workshop would involve (Appendix 6.3). At the beginning of Workshop 1, patients and unpaid carers were asked to

introduce themselves and describe what they were hoping to achieve from the workshop. DH encouraged discussion between stakeholders and asked if they had any questions throughout the workshop. DH also delivered a brief PowerPoint presentation that defined the following key concepts: double-checking, de-implementation and the principles of co-production.

Participants expressed that, in general, they believed patients and unpaid carers would be unaware of what double-checking is and why it is carried out in hospital. The benefits of co-design were discussed, for example, using input from different perspectives makes it more likely that the intervention will be beneficial to those who are affected by it. The group questioned if there was a way that technology could be used to check the administration of medicines instead of an independent double check. Stakeholders also asked if the patient (who was about to be administered the medicine) could carry out the second check themselves or if a pharmacist could perform the second check instead of a second independent nurse. The group also discussed how feasible such alternatives would be and whether they would be classified as de-implementation.

Participants questioned the need to inform patients that double-checking was being stopped for a specific medicine. Some people felt this could cause unnecessary stress to patients who would otherwise be unaware of double-checking whilst others thought that giving patients a leaflet to explain why their medication was not being double-checked would be a good idea. Additionally, participants expressed that if a de-implementation intervention was to be introduced, it would be important to educate staff and patients that the purpose of de-implementation is not to save money but it is about keeping patients safe.

Following Workshop 1, participants were emailed a summary of the discussions that took place (Appendix 6.4) and were encouraged to provide feedback via email. Maintaining contact between workshops was an important step in establishing rapport with the stakeholders and following the INVOLVE principle of 'building and maintaining relationships'. The email also contained a link to a poll that enabled patients and unpaid carers to vote for the date and time of the subsequent three workshops that would take place with HCPs. This was an important step in giving patients and unpaid carers control over important decisions and to 'share power' in line with the INVOLVE principle. It was decided that Workshops 2, 3 and 4 would take place on the three dates that received the greatest number of votes. Patients and unpaid carers were then sent online invitations to the three subsequent workshops. At this point, the recruitment poster for HCPs was circulated on Twitter with the specified dates and times as determined by patients and unpaid carers (Appendix 6.2).

6.4.2.2 Workshop 2 description and findings

Following circulation of the recruitment poster on Twitter, over 30 HCPs expressed interest in taking part in one or more of the three planned workshops. DH selected 8 HCPs who were able to attend more than one workshop (or ideally all 3) to ease the process of re-visiting and further developing ideas discussed by the group in the previous workshop. DH also tried to ensure that HCPs recruited onto the workshops equally represented the four staff groups (nurses, senior nurses, pharmacists and patient safety managers). No more than 8 HCPs were recruited so that there were roughly equal numbers of patients and HCPs in an attempt to share power equally.

In advance of Workshop 2, patients and HCPs were emailed an

information sheet containing a summary of the discussions from Workshop 1 and the aims of Workshop 2 (Appendix 6.5). The email also encouraged stakeholders to provide feedback and ask questions in advance of the next workshop. The aim of Workshop 2 was for patients and HCPs to reach an agreement on the specific type of double-checking that the intervention would focus on according to the AACTT framework.

DH, GJ and FQ facilitated the workshop which began with all participants introducing themselves and saying what they were hoping to achieve from it. DH then delivered a brief PowerPoint presentation that included a timeline of the intervention development process, a recap from Workshop 1 and outline of the plan for Workshop 2.

The first activity involved placing groups of HCPs and patients (pre-determined to ensure equal representation of each staff group) into breakout rooms with a facilitator to answer the question “what form of double-checking would you most want to stop?” Breakout rooms were used to ease stakeholders into sharing their ideas with people they had not met before. Following 20 minutes of discussion in small groups, all attendees returned to the full group discussion where one volunteer from each breakout room fed back a summary of their discussion and highlighted some potential target practices to the group. DH noted the main points on a virtual whiteboard that all stakeholders could view.

Some participants identified certain groups of medicines that should not be considered for de-implementing double-checking. For example, medicines that require weight calculations and high-risk drugs used in oncology and paediatrics. Stakeholders were also reluctant to remove double-checking of drugs they perceived to be high-risk due to the fear of

incorrect administration causing serious harm to a patient. Stakeholders were more open to the idea of stopping the double-checking of medicines that are administered using pre-filled syringes that do not require mathematical calculations because they were perceived to be less risky.

Attendees also discussed that patients are experts in administering their own medication at home (without double-checking) and yet when they come into hospital, their medication is taken off them and administered by someone else (after double-checking it). It was therefore questioned during discussion, whether a medicine that is not double-checked when the patient administers it at home but is double-checked in hospital could be a possible focus for this intervention, for example, certain forms of insulin.

Additionally, participants considered using medicines that are single-checked in some Trusts but double-checked in others as a target for de-implementation of double-checking. This option was discussed as a way of identifying a target medicine that could be perceived as posing less of a risk to patient safety and may be therefore more acceptable to healthcare staff in some circumstances.

The possibility of choosing a target drug that can be purchased over the counter but requires a double-check when administered in hospital was also explored. For example, it is possible to buy oral paracetamol over-the-counter but before intravenous paracetamol is administered, it must be double-checked. This prompted discussion relating to the different risks associated with delivering paracetamol through different routes. The group also discussed that only a very small number of medicines that can be bought over-the-counter are double-checked in hospitals.

Stopping the double-checking of certain medicines that are

administered during an emergency was also suggested because the process of double-checking in these situations can potentially cause more harm due to the delay in their administration e.g. IV antibiotics in the case of sepsis. There was also more discussion of enabling the patient to double-check the administration of medicine themselves instead of a second nurse. This topic raised the issue of accountability: if a medication error occurs following the administration of a drug after the patient has double-checked it, is the patient responsible? Participants discussed whether this could lead to the addition of more checks to ensure the patient has the capacity to carry out the second check, which could in itself contribute to safety clutter. The group agreed that this option would be very difficult to implement. There was a discussion around the feasibility of using a barcode system to negate the need for a second nurse to check the administration but stakeholders were very unsure if this could be feasible in practice.

After discussing several possible target practices, healthcare staff asked how the impact of removing the double-check on patient safety would be measured. Participants made some suggestions including: measuring the time saved as a result of stopping double-checking, which could free up staff time for other patient-facing work, or comparing the number of medication errors in wards where double-checking had been de-implemented compared to those where it had not. It was highlighted that measuring the impact of the intervention on patient safety was an important factor to consider when designing this intervention. At this point in the workshop, the whole group discussed together which of the potential target behaviours identified by each breakout room should be chosen as the intervention target.

The group were unable to reach a consensus on the specific form of double-checking to target during the allotted time for the workshop. However, they agreed to take forward three categories of medicines that had been repeatedly discussed as potential target forms of double-checking to Workshop 3 to continue discussion and reach a consensus. These categories were: 1) medicines that patients self-administer at home but are double-checked in hospital e.g. insulin, 2) medicines which can be bought over the counter but are double-checked in hospital e.g. paracetamol and 3) medicines that are double-checked in some hospitals but not in others e.g. certain antibiotics.

One week after Workshop 2, DH emailed a summary of the discussions that had taken place to all attendees (Appendix 6.6) and asked them to provide feedback on Workshop 2.

6.4.3.3 Workshop 3 description and findings

In advance of Workshop 3, patients and HCPs were emailed an information sheet containing a summary of the discussions from Workshop 2 and the aims of Workshop 3 (Appendix 6.7). Workshop 3 aimed to reach a consensus on the target form of double-checking that the intervention would focus on stopping. DH, RL, and FQ facilitated the workshop which began with introductions and questions and then DH recapped the previous discussions that had taken place during Workshop 2. At the beginning of Workshop 3, patients and HCPs were allocated to pre-determined groups (that differed to groups in Workshop 2 to encourage new conversations between stakeholders but were a mix of patients/carers and HCPs) to discuss the three groups of medicines previously identified in Workshop 2 in more depth and decide their preferred medicine as the target of the

intervention.

After 20 minutes of small group discussion, participants re-joined the full group discussion. A volunteer from each group fed back to all attendees and DH made notes on a virtual whiteboard that was visible to all attendees. Participants initially discussed the need to think about why double-checking was originally put in place: was it because some medicines look similar to others in their packaging? Was it in case a HCP made a mistake during a complex calculation? Several HCPs commented that the majority of medicines in categories 1 and 2 would not usually be double-checked, meaning that there would be limited options to choose from for a target medicine in these categories. HCPs also spoke about the considerable variation in drugs that are double-checked depending on the healthcare context (there is variation in double-checking policy between Trusts, hospitals and sometimes even between wards). Insulin was mentioned as a possible target drug because this medicine is not double-checked in the community and so is perceived to be less risky for patient safety than other medicines. Some stakeholders supported this, expressing a preference to target drugs that are self-administered by patients when at home but not in hospital.

DH then prompted the full group to try and reach a consensus on which target medicine to choose as the focus for the intervention from the options they had identified as listed on the virtual whiteboard. The focus of the discussion then moved from identifying target medicines to stop double-checking to identifying medicines that patients should be allowed to self-administer when in hospital. A HCP wrote in the chat function that it was important not to get double-checking of medicines being administered by

health care staff confused with medicines that could be suitable for self-administration because that was not the focus of this intervention. This interjection helped the group become focused on the task again.

Several stakeholders supported the idea of targeting certain fluids or medications that are administered intravenously because they are generally perceived to be 'low-risk' for safety and double-checking them requires a great deal of time for nurses so could also represent a good opportunity to reduce pressure on staff and improve the safety of care.

After around twenty minutes of discussion, DH asked all stakeholders to vote (using the chat function on Teams) on which medicine they wanted to make the target of this de-implementation intervention. Stakeholders then voted as follows (number of votes in brackets):

- Mild analgesia e.g. paracetamol (1),
- IV fluids/medications (3),
- medicines that can be bought over the counter but are double-checked in hospital settings (2),
- insulin (not from a vial and for diabetes) (6),
- Parkinson's medication (1).

DH counted the votes in real time and confirmed that insulin would be the target behaviour because it received the greatest number of votes.

Further discussion then took place regarding whether the patient should carry out the second check of the insulin instead of an independent nurse. The group agreed that this would not be de-implementing the practice and so the focus of the intervention should be removing the second check rather than changing the second checker. It was therefore agreed as a group that

insulin that was not self-administered would be taken forward as the target medicine i.e. insulin that is administered to the patient by a HCP. There was some more discussion to confirm the exact contextual details of the target behaviour according to the AACTT framework. Attendees agreed on the following details of the target medicine: A nurse (actor) not double-checking (action) insulin that is administered sub-cutaneously using a pen device (context) to a patient who has stable diabetes (target) at a time when the patient usually receives insulin in hospital (time).

DH then briefly summarised the discussions that had taken place during Workshop 3 and outlined the objectives for Workshop 4. Stakeholders were emailed a summary of the Workshop 3 discussions which confirmed the target medicine that had been agreed (Appendix 6.8). This summary also encouraged all attendees to email DH if they had any feedback or questions.

6.4.3.4 Workshop 4 description and findings

In advance of Workshop 4, patients and HCPs were emailed an information sheet containing a summary of the discussions from Workshop 3 and the aims of Workshop 4 (Appendix 6.9). DH began the workshop by summarising the discussions that had taken place in the previous workshop and gave stakeholders the opportunity to discuss the target medicine/behaviour agreed upon in Workshop 3 in more depth. DH then split pre-determined groups (different groups to those used in Workshop 3 but still a mix of patients/carers and HCPs) of stakeholders into breakout rooms with a facilitator (DH, GJ or FQ) where the activity was to answer the question, ‘what are the barriers and facilitators to stopping double-checking of the target medicine? Please choose 3 barriers and 3 facilitators to feedback to the group’. Following 20 minutes of discussion, participants

returned to a full-group discussion where one volunteer from each group summarised their discussion and shared their three barriers and three facilitators. DH wrote down the main points from the summaries using a virtual whiteboard that was visible to all attendees.

The following barriers to de-implementing double-checking of the target behaviour were identified:

1) Staff confidence in their own ability to administer the target drug without making a medication error.

2) Senior leaders may be reluctant to stop the target practice due to vicarious liability.

3) Fear of harming the patient if double-checking was stopped and how this could impact nurse registration.

4) Electronic prescribing systems are set up to require two nurse signatures/codes before it is possible to administer medication. Removing these structures in some parts of the hospital but not others could be challenging.

5) Nurses assuming that de-implementing this practice is a ‘cost-cutting exercise’ i.e. reducing spending rather than in the interests of improving patient safety.

The following facilitators to de-implementing double-checking of the target medicine were identified:

1) Key stakeholders supporting the transition from double-checking to single-checking the target drug e.g. diabetes nurse specialists and diabetologists, managers/senior leaders.

2) Ensuring that the message communicated to healthcare staff is simple and clear to avoid confusion and further resistance. Ensure that the change is defined at the medicine-level to avoid confusion in practice.

3) Using evidence of either: a) the potential patient safety benefits associated with stopping double-checking of the practice or b) the absence of an increase in medication errors arising from stopping double-checking.

4) Reassuring nurses that they would be protected if they were to make a medication error when not carrying out double-checking of the target medicine. Discussion took place around the need to embed the change in a Just Culture (organisations that investigate how the system led to sub-optimal behaviours following an incident rather than placing blame solely on the HCP).

5) Emphasising the intervention's potential to improve patient care by supporting the timely administration of insulin. Administering insulin at the correct time i.e. just before a patient's mealtime is very important. Delays to meal time (caused by double-checking) can reduce the patient's quality of care.

6) Highlighting the intervention's potential to empower staff and support professional autonomy by trusting them to administer medication on their own could be motivational.

Following the identification of barriers and facilitators, some HCPs questioned whether it would be necessary to specify that double-checking of the target drug should only be carried out on patients who have an established insulin regime (not recently diagnosed with diabetes). After discussion, it was agreed that the target behaviour should be at the

medicine-level rather than the patient-level because in practice it would be very difficult to expect staff to remember both.

DH then prompted the stakeholders to have a group discussion to answer the question: ‘how, in practice, could we stop nurses carrying out the target form of double-checking?’ DH wrote down ideas discussed by the group on the virtual whiteboard. Stakeholders again spoke about whether it would be necessary to tell patients about stopping this specific form of double-checking. If patients are largely unaware of this practice taking place in the first place, there is potential to cause distress if patients are informed that a safety practice is not being carried out. It was agreed that patients should not be informed of this practice being stopped. Some stakeholders commented on the importance of asking healthcare professionals how they would suggest stopping the target form of double-checking but there was not enough time left in the workshop to discuss this question in more depth. DH thanked all participants and outlined the next steps of the intervention development process. DH sent all attendees a summary of the discussion via email (Appendix 6.10) and again encouraged people to ask questions or provide feedback.

6.4.3 Applying the TDF to workshop findings

DH created a spreadsheet containing the 5 barriers and 6 facilitators that were repeatedly discussed by stakeholders during Workshop 4 and reviewed the barriers and facilitators that were identified during the interview study (Study 3, Chapter 5) in relation to the more general practice of double-checking. Several of the barriers and facilitators identified in the interview study overlapped with the barriers and facilitators identified during Workshop 4. Any barriers or facilitators that were identified in the interviews but not

during the workshop were added to the spreadsheet, then DH matched relevant TDF domains and constructs to each item. The spreadsheet was discussed on several occasions with the supervisory team (including two behavioural scientists who are experts in the TDF and an experienced researcher who is a Registered Nurse) and iterations were made until agreement was reached. Table 6.3 contains examples of some of the barriers/ facilitators included in the spreadsheet.

Table 6.3. Barriers/ facilitators identified through interviews (Chapter 5) and/ or workshops to de-implementing the target behaviour and the TDF domains and constructs mapped onto them.

Barrier/ Facilitator	Domains: constructs
Barrier: Resistance from senior members of staff (workshops and interviews)	1) **Social influences**: Power, group conformity, social pressure , intergroup conflict. 2) **Social/ Professional Role and Identity:** Leadership, identity.
Barrier: Fear of harming patient and becoming liable (workshops)	1) **Emotion**: Fear, stress. 2) **Beliefs about consequences**: Outcome expectancies, beliefs, anticipated regret 3) **Social/ professional role and identity**: Professional confidence 4) **Beliefs about capabilities:** Professional confidence, perceived competence, perceived behavioural control, self-confidence 5) **Skills:** Skills development
Barrier: Preference for shared accountability (workshops)	1) **Beliefs about capabilities:** Professional confidence, perceived competence, perceived behavioural control, self-confidence.

Barrier: Electronic prescribing systems design that requires two signatures (workshops)	1) **Environmental context and resources:** Resources/ material resources, barriers and facilitators 2) **Behavioural regulation**: breaking habit
Barrier: Lack of evidence of benefits of stopping DC (workshops)	1) **Beliefs about consequences**: Outcome expectancies, beliefs 2) **Beliefs about capabilities**: Perceived behavioural control, professional confidence
Facilitator: Clear communication of potential benefit to patients and staff. (workshops and interviews)	1) **Beliefs about consequences**: Characteristics of outcome expectancies 2) **Goals:** Goal priority
Facilitator: The change must be underpinned by a just culture (workshops)	**1) Environmental context and resources:** Organisational culture/ climate **2) Beliefs about capabilities:** Empowerment, professional confidence, perceived behavioural control 3) **Beliefs about consequences**: Outcome expectancies.
Facilitator: Support from senior leaders/	1) **Social influences**: Social support, power, modelling

senior medical team (workshops)

At this point, DH used the ‘Taxonomy of BCTs’ to map BCTs onto the identified barriers and facilitators (Michie et al, 2013). This taxonomy contains 93 consensually agreed, distinct BCTs that can be used to specify, evaluate and implement behaviour change interventions. DH used the taxonomy to identify a list of 92 BCTs that could be used to address the barriers and facilitators. For example, DH mapped the BCT ‘reduce negative emotions’ onto the barrier ‘fear of harming patient and becoming liable’. In instances where there were no appropriate BCTs in the taxonomy that could be mapped onto a particular domain, DH referred to previous literature that had effectively mapped BCTs onto TDF domains to prompt behaviour change. To reduce the list of 92 BCTs and narrow down the scope of the intervention, DH used the online ‘Theory and Techniques Tool’ (https://theoryandtechniquetool.humanbehaviourchange.org/) (an interactive ‘heat map’ that displays the strength of evidence between 74 BCTs and 26 mechanisms-of-action) (Johnston et al, 2021). DH used the tool to eliminate any BCTs that did not have an evidence-based link to a mechanism-of-action (a process through which behaviour change can take place) (Carey et al, 2019). This reduced the list of BCTs included in the spreadsheet to 32 BCTs (see Appendix 6.11). At this point in the intervention development process, it was necessary to involve HCPs to understand how these BCTs could be operationalised in practice to achieve the target behaviour.

6.4.4 Workshop 5 description and findings

DH emailed the HCPs who had taken part in the previous workshops, inviting them to a final, one-hour long workshop. The invitation was also sent to research nurses based within the YH PSTRC to ensure that a representative sample of different healthcare professional groups would be able to attend. Patients were not invited to this workshop because the focus of the workshop was to understand how the BCTs could be operationalised in practice by staff so tacit knowledge of working in healthcare settings was required. DH consulted the supervision team and HT about this decision and it was agreed that inviting patients at this point could be seen as tokenistic because it was unlikely that patients would be able to contribute meaningfully to discussion relating to the practical implementation of BCTs by HCPs. However, it was decided that patients should be informed of the decisions made during the workshop and have the opportunity to input into the final intervention design. DH circulated an information sheet to participants in advance of the workshop that provided a brief summary of Workshops 1- 4 and outlined the objectives of Workshop 5 (Appendix 6.12). GJ, who has experience of working as a Registered Nurse, provided feedback on the information sheet to ensure it would be acceptable for the HCPs.

During the workshop, all attendees introduced themselves and DH delivered a brief presentation that summarised the intervention development process up until that point. Then, DH explained that the purpose of Workshop 5 was to discuss how previously identified BCTs could be operationalised to address key barriers and facilitators. A sub-selection of 3 barriers and 3 facilitators that were discussed by stakeholders most

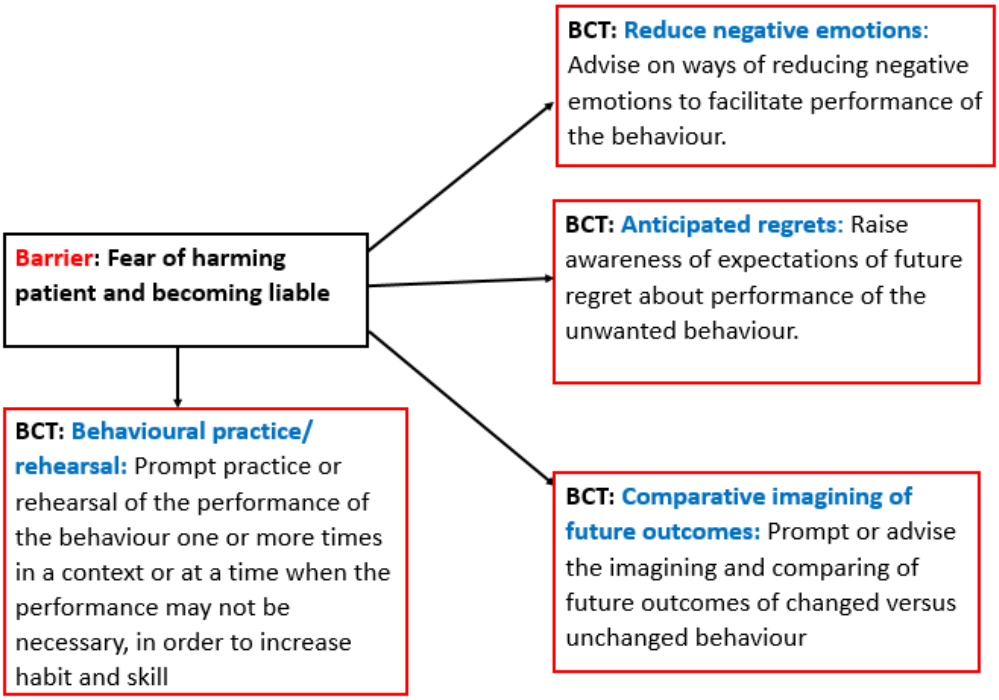


Figure 6.1 Example diagram used to demonstrate links between barriers/ facilitators and BCTs.

frequently during workshop 4 were chosen to ensure that in-depth discussion could take place in the time available. DH displayed six diagrams (see Figure 6.1 for one example) that contained either a barrier or a facilitator with arrows demonstrating evidence-based links to multiple BCTs for workshop 5 attendees. At this point, DH prompted participants to discuss (as a full group) how best to implement the BCTs associated with each barrier and facilitator.

Following Workshop 5, DH listened to the recording and made notes of participants' suggestions relating to how to operationalise the BCTs to achieve the target behaviour. DH then created a table containing the barriers and facilitators alongside their corresponding BCTs and suggested strategies (Table 6.5).

DH emailed the table of strategies to all stakeholders (including patients) who took part in the workshops (Appendix 6.13) asking them to provide feedback or ask questions on any aspect of the table or intervention development process. Changes were made to the document based on stakeholder feedback. The supervision team then provided feedback on the table before the final version was agreed upon (Table 6.5).

Table 6.5 contains the findings from Workshop 5. Strategies (suggested by HCPs) that could be used to operationalise the BCTs have been mapped onto their corresponding barriers/ facilitators. Some boxes are left blank because healthcare professionals were unable to identify strategies that could be used to operationalise certain BCTs. Healthcare professionals also suggested some strategies that could not be mapped onto the BCTs so these are described below the table.

Table 6.5. Intervention strategies suggested by HCPs during Workshop 5.

Barrier/ Facilitator	BCTs	Intervention Strategies	Contextual Information
Barrier: Resistance from senior members of staff	**1) Social comparison**	• Share learning from different areas of healthcare that have already stopped double-checking/ have never carried out double-checking. Informing healthcare staff of real-world examples where stopping double-checking hasn't caused patient harm could provide reassurance that that this form of de-implementation would not lead to an increased risk of medication errors.	• Double-checking policy can vary greatly depending on healthcare context. For example, within the same Trust, some acute settings conduct double-checking of the target medicine whilst it is not double-checked in community settings. Comparisons of low target medication error rates in community settings could be shared with other healthcare settings to demonstrate that stopping double-checking does not increase risk to patient safety.
	2) Provide information about others' approval	• Senior managers need to visibly and consistently promote the de-implementation of the target behaviour to motivate nurses on the wards to change their behaviour.	• Nurses need to feel supported by their more senior colleagues in stopping this form of double-checking.
	3) Social support (practical)	N/A	

Barrier: Fear of harming patient and becoming liable.	**1) Reduce negative emotions**	N/A	
	2) Anticipated regret	• When raising awareness of expectations of future regret about performing double-checking, it will be important to describe them from a patient safety perspective rather than in terms of potential financial benefit for the Trust.	• Nurses' fear of harming a patient is unlikely to be overcome by encouraging anticipated regret relating to cutting costs for the Trust. Nurses' fear is more likely to be overcome by anticipated regret relating to patient safety/ quality of care specifically. For example, anticipated regret of delaying medication administration caused by double-checking is more likely to address this barrier.
	3) Comparative imagining of future outcomes	N/A	
	4) Behavioural practice/ rehearsal	N/A	

Barrier: Lack of evidence of benefits of stopping DC	**1) Information about the social and environmental consequences**	• Provide evidence of the impact of stopping double-checking by carrying out an internal mini-audit of double-checking the target form of insulin and measure the number of medication errors that still take place. Sharing this information with staff could give them the confidence to stop carrying out double-checking because it doesn't provide benefits for safety. • Printed information leaflets, verbal presentations, screen saver campaigns, ward meetings and staff meetings could be effective ways of disseminating information relating to the potential patient safety benefits associated with stopping double-checking of the target behaviour.	• For example, a small plan-do-study-act cycle could be conducted where the effect of carrying out double-checking the target behaviour on medication errors could be measured on one ward. If medication errors still took place on the ward even when the target behaviour was double-checked, this would demonstrate that the practice was not effective in preventing medication errors. • Alternatively, a small scale study could be conducted that could measure the impact of stopping double-checking on preventing patient medication delays which could provide evidence of the possible positive health consequences for patients.
	2) Information about health consequences		• Providing information about social/ environmental and health consequences of de-implementing the target practice during staff meetings would give staff the opportunity to ask questions and give suggestions for how to implement the change.

			• A screensaver campaign could also act as a reminder for staff to stop double-checking.
Facilitator: Support from senior leaders/ senior medical team	**1) Prompts/ cues**	• Some electronic prescribing systems are programmed to prompt nurses to obtain two independent nurse signatures (via double-checking) before it is possible to administer the drug. Removing this prompt/default barrier would enable nurses to stop double-checking.	
	2) Social support (practical)	• 'Schwartz rounds' style informal meetings could be conducted where nurses meet regularly with senior nurses in a supportive environment to discuss their experience of stopping double-checking.	• Providing a non-judgmental support mechanism for staff at all levels to be honest and share how they are finding the process of de-implementation demonstrates that senior leaders in the Trust approve of this change.
Facilitator: The change must be underpinned by a Just Culture	**1) Verbal persuasion about capability**	N/A	• The successful implementation of this intervention depends on a pre-existing Just Culture being in place. For example, it would only be possible to measure the effect of de-implementing double-checking (and generate evidence) if staff are comfortable with reporting that they have made a medication error. This change needs to take place at the

			organisational level and be embedded in training.

Additional findings from Workshop 5

- HCPs also mentioned that a variety of stakeholders would need to be involved at every stage of developing and testing this intervention in practice to ensure that it would be acceptable to HCPs in real-world settings.
- Additionally, depending on the Trust at which this intervention was implemented, a change in medications safety policy would be required to ensure that adhering to the de-implementation intervention would not be breaking Trust policy.

6.5 Discussion

This chapter describes a series of five workshops that involved stakeholders in the co-production of a theory-based intervention, designed to de-implement a specific form of double-checking. During the workshops, HCPs and patients reached a consensus on the target form of double-checking that became the focus of the intervention. Stakeholders then identified context-specific barriers that could prevent HCPs from de-implementing the practice, alongside facilitators that could support the de-implementation intervention. DH used the TDF to map relevant BCTs onto the barriers and facilitators identified by stakeholders. HCPs then suggested strategies that could be used to operationalise the BCTs in practice.

To date, there has been no previous attempt to work with stakeholders to co-produce a theory-based intervention designed to de-implement a low-value PSP. The findings produced by this series of workshops highlight that it is possible to co-design a theory-based de-implementation intervention with key stakeholders. They also emphasise the importance of considering local context when identifying potential challenges to de-implementation and the need to enable change at different levels of the healthcare system to facilitate de-implementation. Additionally, the findings indicate that, when developing a de-implementation intervention, additional strategies may be required that cannot be mapped onto the TDF in its current iteration. For example, the suggested strategy of changing medications safety policy could not be mapped onto the TDF, suggesting that the use of additional frameworks is necessary.

During the workshops, stakeholders identified barriers and facilitators at: 1) the individual level (the nurse who is stopping double-checking), for example, ‘fear of harming a patient and becoming liable’ , 2) the healthcare delivery setting level (acute in-patient setting), for example ‘de-implementation must be underpinned by a just culture framework’ and 3) the policy/system level (regulations and health policy), for example, ‘electronic prescribing systems design that requires two signatures’. This is consistent with existing de-implementation theory that encourages targeting change at multiple levels of the healthcare system to facilitate de-implementation (Grimshaw et al, 2020; Leigh et al, 2022; Nilsen et al, 2020a; Norton et al, 2018). Previous research has mainly used the TDF to identify BCTs that target behaviour change at the individual and the healthcare delivery setting level (Atkins et al, 2017; Dyson et al, 2013; Presseau et al, 2017). It is therefore beyond the remit of the TDF to use individual or group BCTs to target behaviour change that affects culture and policy. Therefore, additional frameworks may be needed to develop strategies that target this level of the healthcare system.

According to the Norton et al (2018) framework, patient-level attributes, such as awareness, beliefs or trust can strongly influence de-implementation efforts. For example, a patient may express their unwillingness to stop receiving a low-value treatment which may make a doctor reluctant to stop prescribing a low-value medication. In this co-production process, however, no barriers or facilitators were identified at the patient-level. In fact, during Workshop 1, stakeholders acknowledged that most patients would largely be unaware of what double-checking is and why it is carried out, and therefore targeting change at this level was not

appropriate for this target behaviour. This may be a feature of a range of PSPs, some of which may be largely invisible to patients.

The present findings align with previous research that has explored barriers to de-implementing low-value practices. For example, a recent scoping review reported that ‘fear of malpractice’, ‘fear of litigation’ and ‘lack of interest in saving money’ have been previously identified as barriers to de-implementation (Augustsson et al, 2021). In the present workshops, patients and HCPs identified ‘fear of harming patient and becoming liable’ as a key barrier to the de-implementation of double-checking. Also, stakeholders repeatedly emphasised that successful de-implementation of the target behaviour would be less likely if HCPs perceived the change to be a cost-cutting exercise rather than an initiative to specifically improve patient safety. This is also supported by the aforementioned Voorn et al (2014) who identified ‘lack of interest in saving money’ as a significant barrier to HCPs intending to de-implement blood saving measures.

Additionally, there are similarities between the present findings and evidence produced by Leigh et al (2022) who carried out a systematic review and interview study to develop a list of the determinants of the de-implementation of low-value care based on published literature. Leigh et al (2022) produced a table of the most frequently identified determinants of de-implementation which included barriers such as ‘lack of credible evidence’ and ‘fear of malpractice’; both of which were identified by stakeholders in the present workshop series. Additionally, their table contained facilitators such as ‘stakeholder involvement’ and ‘availability of credible evidence’, both of which were discussed repeatedly by the stakeholders in the co-design process reported here as being necessary for de-implementing double-

checking.

One of the most pertinent barriers to de-implementation identified by our workshop participants was ‘lack of evidence’ i.e. stakeholders expressed that they would feel reluctant to de-implement double-checking due to the lack of evidence demonstrating that this would not cause harm to patients. During the introduction to each workshop, stakeholders were reminded of the reasons why double-checking medicines was the focus of the de-implementation intervention, one of which was the lack of evidence demonstrating the practice’s effectiveness in preventing medication errors. Therefore, despite being aware that double-checking is underpinned by an insufficient body of evidence, stakeholders still expressed a need for evidence that stopping double-checking would not increase the risk of harm to patients. This finding aligns with prior research highlighting the importance of the availability of credible evidence to underpin de-implementation (Howard & Gross, 2015; Prasad & Ioannidis, 2014; van Dulmen et al, 2020). Also, this reluctance to de-implement double-checking despite an awareness that it lacks sufficient evidence of effectiveness could also provide support for psychological biases that have been previously identified as potential barriers to de-implementation. For example, van Bodegom-Vos et al (2017) reported that confirmation bias, which is a tendency for HCPs to favour information that validates prior beliefs, can hinder de-implementation efforts.

It is also important to explore why the present workshop series did not identify certain barriers and facilitators to de-implementation that have been reported in previous literature. For example, Leigh et al (2022) identified ‘disconnect between training and evidence’ as a key barrier to de-

implementation where healthcare professionals perceive stopping a practice to be difficult because they've never received the training to know how to do this. Participants in the present workshop series focused more on the emotional barriers to stopping double-checking and the need for evidence of the impact of de-implementation. It is possible that participants didn't identify 'disconnect between training and evidence' as a barrier to de-implementation because they were aware that their involvement in the workshops was contributing to the development of an intervention that would support healthcare professionals in making this change. However, further research is required to understand this discrepancy. Additionally, 'shared decision making' and 'clinical decision support' have been previously identified as facilitators to de-implementation in previous literature; neither of which were identified during the present workshops (Specchia et al, 2018). This variation in determinant identification could be due to the nature of double-checking. When trying to remove the need for a second nurse to independently check medication that is about to be administered, it may seem counterintuitive to use 'shared decision making' to facilitate this change. Additionally, this variation could be due to the fact that previous literature that has identified determinants to de-implementation has focused on clinical practices whereas the present intervention development process focuses on PSPs specifically which may account for some variation. Additionally, in the present workshops, barriers and facilitators were identified by a relatively small number of stakeholders who were from a limited number of HCP groups. Further research is therefore needed to better understand why there is variation in determinants to de-implementation.

The table of strategies co-produced by stakeholders recommends implementation of a multi-faceted intervention that uses a combination of strategies to address: social support, information distribution, prompts/ cues and anticipated regret to change the healthcare professional behaviour required to stop double-checking of the target medicine. As reported by the systematic review presented earlier in Chapter 3, previous research has also encouraged the use of multi-faceted interventions to address barriers to de-implementation (Colla et al, 2017; Hahn et al, 2016; Rietbergen et al, 2020; Tabriz et al, 2022). However, HCPs also suggested strategies for overcoming barriers to de-implementation that could not be mapped onto the TDF because they were outside the domains of this framework. For example, the need to have a 'Just Culture' framework in place, the need to change Trust policy and the need to involve stakeholders throughout the implementation process. Therefore, although the TDF was useful in identifying relevant BCTs that could be used to target healthcare professional behaviour, additional theoretical frameworks are likely to be needed to guide the most effective development of strategies that target de-implementation processes at all levels of the healthcare system. Hasson et al (2018) emphasise the need for research to explore the determinants of de-implementation at a system level because decisions made by individual HCPs will largely depend on the culture of their organisational group that is influenced by factors such as organisational norms, values, work processes alongside financial and professional interests. Therefore, to develop a more complete understanding of the process of de-implementation, further research is needed to explore how to address barriers at the organisational and societal levels of the healthcare system.

Several challenges arose throughout the intervention development process that are important to highlight when considering the feasibility of using a co-production process to support de-implementation efforts. Firstly, reaching a consensus on the target form of double-checking took longer than anticipated. HCPs discussed their contrasting opinions on the value of double-checking as a general practice during Workshop 2 until the research team prompted them to focus on identifying a target form of medicine for the intervention to focus on. Patients and unpaid carers had the opportunity for wider discussion on the value of double-checking during Workshop 1, however, HCPs did not attend this initial orientation session because it was assumed they did not need to be informed of what double-checking is and why it is carried out. It might also have been beneficial to hold a pre-workshop session with HCPs, however, to give them the opportunity to discuss their perceptions of the value of double-checking before trying to identify the specific focus for the intervention. Alternatively, stakeholders could have been given a more interactive task to complete during the breakout sessions such as a worksheet that guided their discussion to ensure they stayed focused on the workshop objective. Future workshops may therefore benefit from allocating some time at the beginning for HCPs to discuss their opinions on de-implementing double-checking before trying to identify a target form of double-checking. Similarly, using a more structured and interactive task during the breakout section of the workshops may encourage stakeholders to stay focused on the task of identifying a target form of medicine.

Secondly, Workshop 5 took place in August 2022, a time when many HCPs take annual leave. This resulted in several HCPs who took part in

Workshops 2-4 being unable to take part in Workshop 5 and so several research nurses who had not taken part in the previous workshops were recruited to take part in Workshop 5. Despite sharing an information sheet with all HCPs prior to Workshop 5 and briefing them on the intervention development process to date at the beginning of the session, there was some confusion when the HCPs were asked to think about how they could operationalise the BCTs in practice. This could be due to the fact that HCPs were likely to have been unfamiliar with BCTs, a more in-depth explanation of how BCTs have been used in previous research to develop intervention strategies in hospital settings might have better prepared the HCPs for this task.

It is also important to highlight some strengths of the present co-design process. Firstly, the recruitment strategy used was successful in involving HCPs from several different healthcare professional groups from across different NHS regions. This was useful in understanding the differences in how double-checking of medicines is carried out and perceived across the UK, however, future intervention development processes might benefit from involving policy makers and those in strategic governance roles to gain a deeper understanding of the potential barriers at the organisational and system-level of healthcare when trying to de-implement double-checking.

Additionally, a strength of this intervention development exercise is that stakeholders were involved at every stage of the process. This ensured that tacit knowledge was used to inform decisions about which strategies to

include as part of the intervention, thereby increasing the likelihood of the intervention being feasible and effective in practice (Burton et al, 2021).

6.6 Conclusions

The findings from this intervention development process contribute to understanding of how a low-value PSP could be de-implemented from a healthcare organisation. HCPs and patients were able to contribute ideas at every stage of the intervention development process to co-produce a table of strategies, underpinned by the TDF, that could be used to de-implement a target form of double-checking.

It is feasible to conduct a series of online workshops to co-produce a behaviour change intervention, however, future research may benefit from using more interactive tools to guide discussion during the workshops to help stakeholders stay focused on the specific objective of each workshop which could enable more effective use of the time available. Additionally, a more in-depth explanation of how to operationalise BCTs in healthcare settings may help HCPs identify a greater number of potential strategies to address de-implementation barriers. Importantly, the strategies identified by stakeholders are not specific to the target form of double-checking, therefore future research could adapt the strategies identified here when developing an intervention to de-implement a different target form of double-checking.

Chapter 7
General discussion: thesis summary, reflections, critique and directions for future research

7.1 Chapter summary

This final chapter provides an overview of the thesis research questions and a description of the studies carried out to address them. The key findings from each chapter are summarised and integrated in relation to each of the research questions posed by this thesis and the wider literature. Following this, consideration is given to the limitations of this thesis and potential directions for future research. Lastly, the implications of this thesis for theory, policy, practice and research are discussed.

7.2 Thesis aims and overview

As outlined earlier in this thesis, there is a large body of research that has evidenced the problem of low-value healthcare and its associated negative consequences such as: increased staff workload, preventable harm to patients and wasted finite resources (Berwick & Hackbarth, 2012; Carter et al, 2015; Glasziou et al, 2013; Godlee, 2012; Hall et al, 2019; Moynihan et al, 2012). A number of initiatives such as the ‘Choosing Wisely’ campaign have used top-down strategies to produce recommendations of low-value clinical practices that healthcare staff should avoid, however, evidence has indicated limited effectiveness of this approach (Pearson & Littlejohns, 2007; Rooshenas et al, 2015; Rosenberg et al, 2015; Welk et al, 2018). Less attention has been given to the identification and de-implementation of non-

clinical practices such as patient safety practices (PSPs), some of which contribute to the problem of 'safety clutter,' where practices are performed in the name of safety, but do not contribute to the safety of operations (Rae et al, 2018; Shekelle et al, 2013). Research carried out as part of this thesis therefore used an alternative approach, by working with healthcare staff to identify low-value PSPs and develop possible ways of de-implementing them. Specifically, this thesis addressed the following research questions:

1. Which PSPs are most commonly identified as being of low-value by healthcare staff?

2. Why are the identified low-value PSPs perceived to be of low-value?

3. What types of interventions have been previously used to de-implement low-value healthcare practices and what have their effects been on patient safety?

4. What are the main perceived barriers and facilitators to de-implementing low-value PSPs in healthcare?

5. How feasible is it to co-design a behaviour change intervention with stakeholders that aims to stop healthcare staff carrying out a low-value PSP?

To address the research questions above, two empirical studies were conducted, alongside a systematic review, a consultation exercise and a series of co-design workshops involving healthcare professionals and patients. In Study 1 (Chapter 2), a paper-based and online survey was disseminated to healthcare staff, asking them to identify everyday practices that they felt do not contribute towards patient safety and the underlying reasons for their choice were explored. A consultation exercise based on

Delphi principles (Chapter 4) was then conducted, in which a panel of healthcare professionals identified two target low-value PSPs that were considered appropriate candidates to explore for potential de-implementation (intentional rounding and double-checking of medicines). A systematic review and meta-analysis (Chapter 3, Study 2) was also carried out to explore what types of interventions have been previously used to de-implement low-value practices and what their effects have been on patient safety. An interview study (Chapter 5, Study 3) was then conducted with NHS nurse managers which explored the potential barriers that could arise when trying to de-implement the two target low-value PSPs, alongside what facilitators might enable the process. Finally, five co-design workshops (Chapter 6) were carried out with patients and healthcare staff to develop an evidence-based intervention that aimed to support nurses in de-implementing a specific form of double-checking medicines.

7.3 Summary of key findings

7.3.1. Which safety practices are most commonly identified as being of low-value by healthcare staff?

This research question was addressed by the survey study (Study 1) reported in Chapter 2. There is limited previous research that has involved healthcare staff in the identification of low-value healthcare practices and that which is available has used a combination of top-down and bottom-up methods to identify potential clinical targets for de-implementation (Elshaug et al, 2012). Study 1 (Chapter 2) used an alternative approach by asking healthcare staff themselves to identify practices they perceived to be low-value for safety. It is understood that no previous research has worked with healthcare staff to identify candidate PSPs for removal. Key reflections on

the findings of this survey will now be discussed.

Healthcare staff were keen to identify practices which they perceived to be of low-value, as is reflected in the high number of survey responses, however, the substantial proportion of responses that did not answer the research questions indicates that healthcare staff may not have understood what terms such as ‘low-value’ and ‘safety practice’ meant. Previous evidence has highlighted that the terminology used to describe de-implementation varies widely (Niven et al, 2015; Orelio et al, 2021) and that healthcare staff are generally unfamiliar with discussing the process of de-implementation (Davidoff, 2015). This offers a possible explanation for why many responses did not address the research question. To improve the clarity of the survey, future research could include a definition of what a low-value safety practice is and provide some examples. Alternatively, educational materials developed with stakeholders could be shared with healthcare staff prior to survey completion.

It is useful to consider the extent to which the types of low-value care identified by healthcare staff throughout this thesis align with previous research findings. Verkerk et al (2018) developed a typology of three types of low-value care: inefficient care (effective care that becomes low-value due to inefficient provision or inappropriate intensity e.g. prolonged catheterisation), ineffective care (low-value from a medical perspective where the harms of the practice outweigh the benefits e.g. using antibiotics in children with upper respiratory tract infections) and unwanted care (a practice that does not solve the individual patient’s problem e.g. chemotherapy for a patient who prefers palliative care). Several of the low-value PSPs identified by healthcare staff throughout the research conducted

within this thesis could be categorised into the ‘inefficient care’ category. For example, healthcare staff discussed how intentional rounding can be a useful practice when carried out on the appropriate patient group at an appropriate frequency, however, when it is conducted too frequently across all patients, it becomes less effective. However, it is more difficult to categorise the PSPs identified by the present research into the ‘ineffective care’ category because they are non-clinical and so there is a lack of evidence examining the effectiveness of these processes in healthcare. Additionally, none of the identified practices could be grouped into the ‘unwanted care’ category because patients were not asked to identify low-value PSPs during this research. Future research could explore how patients could be involved in the identification of low-value PSPs. The findings from this thesis indicate that elements of established typologies of low-value clinical care may be transferable for categorising low-value PSPs, however, further research is needed to develop understanding of what types of low-value PSP exist.

According to Rae et al (2018), safety clutter is sustained by environments in which it is not socially acceptable to question the value of safety or to admit that certain practices are not carried out according to policy. Adapting the environment so that it is acceptable to challenge certain practices is the first step to removing safety clutter. The survey study (Study 1, Chapter 2) encouraged healthcare staff to identify practices they thought were of low-value for safety and, in ward settings, prompted discussion between staff members about which everyday practices could be of low-value for safety. This demonstrates that healthcare staff are willing to question the value of PSPs when given the opportunity. Future attempts to

remove safety clutter could encourage healthcare staff to question the value of practices by using similar survey methods or allocating time in certain meetings to give healthcare staff the opportunity to openly question the value of certain practices for safety. This could make it more socially acceptable for healthcare staff to challenge PSPs which could then be evaluated further to determine whether they should be de-implemented. Therefore, the methods used in Study 1 (Chapter 2) to identify healthcare practices that staff perceive to be of low-value for safety could be applied to any healthcare setting to not only identify context-specific practices for potential de-implementation but also to make it more socially acceptable to question the value of certain PSPs.

7.3.2. Why are the identified low-value safety practices perceived to be of low-value?

The findings from Study 1 (Chapter 2) and Study 3 (Chapter 5) contributed to answering this research question. Having an understanding of the possible reasons why healthcare staff perceive PSPs to be low-value is useful, not only to inform the design of de-implementation strategies but it may also help to prevent the future implementation of low-value PSPs (Verkerk et al, 2018). Therefore, as part of the survey study analysis (Study 1, Chapter 2), researchers identified five cross-cutting themes that explained reasons why staff perceived the practices to be low-value. It is understood that no previous research has tried to understand why healthcare staff perceive certain PSPs to be of low-value. The five themes highlighted issues pertaining to: implementation, evidencing care, standardisation of practices, lack of impact and task allocation. Previous research has explored the possible reasons explaining why safety clutter arises in non-healthcare

organisations. It is therefore useful to consider whether the cross-cutting themes identified by Study 1 (Chapter 2) align with previous mechanisms that have been found to produce safety clutter.

Rae et al (2018) carried out observations in supermarkets, an energy distribution company and a water infrastructure construction business to investigate how safety clutter was generated over the course of 12 months. The most frequently occurring examples of safety clutter were categorised and three mechanisms that generate safety clutter across the different industries were identified. The first mechanism identified by Rae et al (2018): duplication, refers to several activities accomplishing the same safety function, but where the duplication contributes no additional safety. Clutter by duplication is different from intentional reproduction where redundancy is built into an organisation, for example patient identity being repeatedly checked by different members of healthcare staff which can increase safety. UK healthcare staff recognised several forms of duplication that contributed to the problem of safety clutter in Study 1 (Chapter 2). For example, documenting the same information in different formats was a frequently identified form of safety clutter. Rae et al (2018) posit that certain forms of clutter caused by this mechanism arise due to ‘inter-system duplication’ where multiple systems are used within the same organisation. Several survey responses referred to this problem, where healthcare staff are required to repeatedly record the same information on different Electronic Health Record systems in addition to handheld patient notes and incident reporting systems. Some participants also highlighted during Study 3 (Chapter 5) that they were required to document having carried out intentional rounding on both paper and electronic systems; something they

perceived did not increase the safety of care, but rather made it easier to access evidence of completed safety-related tasks when completing investigations or dealing with complaints. Rae et al (2018) provide a possible explanation for why so much value is placed on producing evidence of care, which can result in the duplication of processes: the volume of safety activity can be perceived as a proxy for the level of safety within an organisation. This can create a preference for tangible 'evidence' of safety and in this way increases the likelihood of introducing multiple safety practices that can perform the same safety function, thereby contributing to safety clutter. Increasing awareness of this form of safety clutter and its potentially negative impact on the quality of patient care could encourage policy makers to consider if it is possible to use data that is already being captured instead of implementing a new way of evidencing care.

Additionally, Rae et al (2018) identified 'generalisation' as a mechanism for producing safety clutter, whereby requirements that increase safety in certain situations are applied across many or all situations. This can lead to PSPs being carried out that do not enhance safety but place additional unnecessary burden on staff. Healthcare staff referred to this mechanism throughout the research conducted as part of this thesis. For example, the cross-cutting theme 'blanket policies' identified in Study 1 (Chapter 2) shed light on why some healthcare staff perceived certain routine risk avoidance care strategies to be low-value for safety. For instance, some participants perceived that checking pressure areas of mobile and independent patients was low-value because these patients are at low-risk of developing a pressure ulcer and would be unlikely to benefit from this safety practice. However, PSPs that have been standardised to

support staff in anticipating and preventing adverse events should not automatically be labelled as safety clutter even if they have been generalised (Vincent, Burnett, Carthey, 2013). Instead, it might be more appropriate to consider how the PSP could be made more specific (Wears, 2015). This highlights the importance of considering additional sources of information as well as staff perspective to identify target practices for de-implementation because healthcare staff may not be aware of the safety rationale underpinning certain PSPs. It may therefore be more difficult to identify safety clutter in healthcare settings that originates from generalisation due to the necessary standardisation of certain practices. Further research could explore certain standardised PSPs in more depth to understand exactly what part of the practice needs to be standardised, by whom and for what purpose.

Rae et al (2018) explain that the generalisation of safety rules in some situations removes the opportunity for individuals to use their critical judgement, potentially making it more difficult for them to adapt during unexpected situations. Senior nurses alluded to this issue during Study 3 (Chapter 5) where they mentioned that intentional rounding can disempower nurses because it promotes a 'robotic' style of nursing that removes the opportunity for staff to think and adapt to individual patient need. This aligns with previous research which has found that reducing unwarranted variation in practice through standardisation can diminish healthcare staff's perceived sense of professional autonomy (Evetts, 2002; Martin et al, 2017).

The final mechanism identified by Rae et al (2018) is 'over-specification,' where safety clutter is generated through the creation of paperwork to formalise risk assessments. The introduction of, for example, a

risk assessment checklist can make PSPs more complicated because the checklist must be completed, collected and checked. Over time, the checklist may become more complicated as managers identify new items for inclusion in the checklist. Healthcare staff identified this mechanism during Study 1 (Chapter 2) in relation to several practices, such as the need to carry out hand hygiene audits to evidence that they were compliant with hand hygiene regulations. Additionally, during Study 3 (Chapter 5), nurse managers discussed that the document used to evidence intentional rounding often did not reflect how care had been carried out because nurses do not have time to accurately complete the form as well as provide the care at regular intervals. Therefore, the present research did produce evidence that healthcare staff expressed frustration at safety clutter generated by over-specification. Due to external regulatory forces, de-implementing formalised risk assessments and audits from practice is likely to be difficult. Alternatively, when considering the introduction of a new form or checklist, leaders could explore less labour-intensive options such as bar code scanning to demonstrate that a risk assessment has been completed.

Therefore, throughout the research activities conducted as part of this PhD, healthcare staff discussed reasons why they perceived PSPs to be low-value, many of which relate to the mechanisms identified by Rae et al (2018). Based on the present findings, it is likely that duplication and over-specification are mechanisms that produce safety clutter in healthcare organisations. It is unclear if healthcare staff identified examples of safety clutter generated by the mechanism of generalisability or if they identified essential forms of standardisation to improve safety. It is understood that no other research has explored whether the mechanisms identified by Rae et al

(2018) can be applied to safety clutter in healthcare organisations. Further research is therefore needed to understand if these three mechanisms can be adapted to better suit the healthcare organisational context and if any additional mechanisms exist that generate safety clutter.

7.3.3. What types of interventions have been used to de-implement low-value care practices and what are the effects on patient safety?

At the inception of this thesis, there was limited understanding of the impact of de-implementing low-value healthcare practices on patient safety. Previous systematic reviews had explored the effect of de-implementation strategies in specific clinical settings and measured the reduction in the frequency of carrying out the low-value practice post-intervention, however, none of them had measured the impact of de-implementation on patient safety specifically (Rietbergen et al, 2020; Tabriz et al, 2022). Additionally, no previous systematic review had attempted to identify which particular behaviour change techniques (BCTs) were most effective in de-implementing low-value care practices. Therefore, there was limited understanding of 1) the potential effects of de-implementation interventions on patient safety and 2) the most effective BCTs to include as part of a de-implementation intervention. Study 2 (Chapter 3) aimed to address this gap in knowledge by exploring what types of interventions have been previously used to de-implement low-value healthcare practices and what the effect of using these has been on patient safety.

The review findings indicated that, amongst the included studies, there was evidence of a significant effect of the de-implementation interventions on the measured outcomes, however, the reduction was

relatively small in magnitude. Although this suggests that certain de-implementation interventions can have a positive impact on patient safety measures, due to the high level of heterogeneity between the included studies and the small number of included studies, it is difficult to identify common features across the interventions that should be included in future de-implementation interventions to increase the likelihood of effectively improving patient safety. For example, among the controlled studies that produced a significant effect, the interventions differed in terms of: included BCTs, target healthcare professional group, target behaviour, healthcare setting, measured outcome and mode of delivery.

The findings from the systematic review highlight several gaps in existing literature. Firstly, the majority of previous research that has tried to de-implement a low-value healthcare practice has focused on clinical tasks, namely reducing inappropriate medicines. Therefore, there is a lack of understanding regarding what types of intervention would be most effective when trying to de-implement a low-value non-clinical healthcare practice, such as a PSP. Additionally, this review found that none of the included studies used theory to inform the design of their de-implementation intervention. It was also not possible to draw conclusions on which BCTs were most effective at supporting de-implementation because similar BCTs were used across studies that produced significant and non-significant results.

The inconclusive findings of this systematic review align with Cupit et al (2023)'s research who report a paucity of good quality literature on de-implementation strategies. To address this gap, Cupit et al (2023) suggest that future research in this area: 1) uses theory to develop de-

implementation strategies and 2) uses qualitative process evaluations to assess de-implementation interventions so that it is possible to understand the influences that are specific to the healthcare context in which the intervention is carried out. This information will help to inform decisions about the extent to which one strategy that is effective in one context may translate to another.

Therefore, extensive further research is required to determine what types of de-implementation interventions are effective at improving patient safety. Testing the effectiveness of de-implementation strategies using more robust research designs (e.g. randomised controlled trials) to generate more reliable evidence is required alongside carrying out qualitative process evaluations to try and understand context-specific influences on the effectiveness of interventions. Future research should also explore interventions that target the de-implementation of non-clinical low-value practices.

7.3.4 What are the main perceived barriers and facilitators to de-implementing low-value safety practices in healthcare?

The findings from the interview study (Study 3, Chapter 5) and the intervention development process (Chapter 6) demonstrate a range of emotional, practical and bureaucratic barriers that can arise at different levels of the healthcare system when trying to de-implement a low-value PSP, including: fear, resistance from senior staff and lack of evidence of the potential benefits associated with de-implementing a low-value PSP. A number of facilitators were also identified, including effectively communicating the potential patient benefits of de-implementation to healthcare staff and giving nurses more autonomy. Findings from Study 3

(Chapter 5) and the intervention development process (Chapter 6) in relation to this research question can be summarised under two key reflections.

The first reflection relates to the importance of using an approach to de-implementation that targets multiple levels of the healthcare system. When identifying barriers and facilitators to de-implementation, participants recognised the need to not only prompt behaviour change amongst healthcare staff in order to facilitate de-implementation but also the need to change policy, alter existing electronic health record systems and even work to change the culture of the organisation to ensure sustainable de-implementation. Although there was some variation in the barriers and facilitators to de-implementation depending on the target low-value PSP being discussed, it was clear that the removal of any low-value PSP would require a multi-level approach. This is supported by previous literature (Augustsson et al, 2021; Grimshaw et al, 2020; Leigh et al, 2022; Norton et al, 2020). Therefore, future de-implementation efforts should work with a variety of frontline healthcare staff, commissioners and policy makers to understand the specific barriers to de-implementation that need to be addressed at different levels of the healthcare service.

The second reflection relates to the need to understand the specific context in which de-implementation will occur. The barriers and facilitators identified throughout this thesis are useful in anticipating the types of challenges that are likely to arise when de-implementing low-value PSPs, however, specific determinants to de-implementation of a low-value PSP will vary depending on the local policy and culture of the ward. For example, on wards where a ‘Just Culture’ is not in place, the barrier of ‘fear of malpractice’ may be much more pertinent than in other contexts. Therefore,

interviewing healthcare staff based on the ward on which the de-implementation intervention will be implemented is essential to understand the context in which the practice is already carried out to understand 'work as done'. The interview study (Chapter 5) and the intervention development process (Chapter 6) provide some potential determinants to de-implementing low-value PSPs that may need to be adapted when applied to different healthcare contexts. The interview and workshop methods provide a possible way of working with healthcare staff to establish potential barriers and facilitators to de-implementing low-value PSPs.

7.3.5. How feasible is it to co-design a behaviour change intervention with patients and healthcare staff that aims to stop healthcare staff carrying out a low-value safety practice?

The findings from the intervention development process (Chapter 6) contributed to answering this research question. Chapter 6 reported the first known application of the Theoretical Domains Framework (TDF) (Cane et al, 2012) to co-design an intervention specifically developed to de-implement a target low-value PSP. Healthcare staff identified a variety of de-implementation strategies such as: sharing learning from different areas of healthcare that have already stopped double-checking, support from senior managers in stopping the practice, providing evidence of the potential benefits for patient safety and making changes to electronic prescribing systems. These findings demonstrate that it is feasible for stakeholders to co-design a de-implementation intervention that aims to stop healthcare staff carrying out a low-value PSP. However, there are a number of considerations that future researchers should be aware of when co-designing a de-implementation intervention targeting low-value PSPs.

Firstly, reaching a consensus on the exact form of double-checking to use as a target for the de-implementation intervention was challenging. Healthcare professionals that took part in the workshops during the intervention development process (Chapter 6) were from a range of Trusts throughout the UK, all of which had slightly different policies and procedures relating to double-checking. Therefore, agreeing on the exact details of the target practice according to the AACTT framework (Presseau et al, 2019), was difficult because participants had different understandings of what the exact action of double-checking is, what context it is carried out in and the length of time it takes. This variability in participants' understanding meant that the initial activity of reaching consensus on the target form of double-checking took a lot longer than anticipated. Future research could overcome this difficulty by only involving healthcare professionals from one Trust or holding an initial 'orienteering session' prior to the workshops to develop a shared understanding of what double-checking is. This could make reaching a consensus on the specific details of the target practice easier.

Another consideration is that participants emphasised the need for evidence demonstrating the potential patient benefits associated with de-implementation as a key component of a de-implementation intervention during this research. This is congruent with previous research that has identified sharing credible evidence to support de-implementation with healthcare professionals as a facilitator for the de-implementation of low-value healthcare practices (Leigh et al, 2022). Previous evidence has suggested that healthcare staff's need for evidence to justify the removal of a practice is a key difference between implementation and de-implementation. Van Dulmen et al (2020) provide a possible explanation for

this, suggesting that emotional or extreme experiences tend to remain in the memory and cause people to misjudge the frequency or magnitude of events (Ubel & Asch, 2015). It therefore may be reasonable to assume that fear is a more prominent barrier to de-implementation than implementing something new. Van Dulmen et al (2020) posit that stronger evidence is therefore needed to convince healthcare professionals that stopping a certain practice will not cause harm. This aligns with Rae et al (2018)'s findings that evidence is often not demanded for adding new safety activities into organisations but is demanded for removing activities. Therefore, when trying to de-implement other low-value PSPs, it is likely that healthcare professionals will need evidence demonstrating that removing the practice will not increase the risk of harm to patients.

The third consideration relates to the finding that healthcare professionals suggested some strategies to overcome barriers to de-implementation that could not be mapped onto the TDF because they were outside the domains of the framework. This mainly applied to strategies that targeted change at the system-level of the healthcare service, for example, 'making changes to culture or policy'. Hasson et al (2018) emphasise the need to explore the barriers and facilitators of de-implementation at the system-level of the healthcare service because decisions made by individual HCPs will largely depend on the culture of their organisational group that is influenced by factors such as organisational norms, values and work processes. Therefore, future research should also endeavour to identify strategies to target change at the national policy level of the healthcare system to facilitate de-implementation alongside targeting change at the healthcare professional level. It may be possible to use other frameworks

alongside the TDF to guide the identification of strategies to prompt change at these levels. For example, Norton et al (2018) produced a framework to facilitate understanding de-implementation at the different levels of the healthcare system. Additionally, Pathiarana et al (2017) produced a framework that maps possible drivers and possible solutions to overuse at several different levels of the healthcare system.

To summarise, the findings of the studies conducted as part of this thesis as a collective have generated methodological learning underpinning how healthcare staff can be involved in the identification and prioritisation of potential low-value PSPs for de-implementation and how to facilitate their involvement in the co-production of a de-implementation intervention. The studies have also identified a number of gaps in the existing de-implementation literature and have contributed understanding of the potential barriers and facilitators to de-implementing low-value PSPs.

7.4 Limitations and directions for future research

The limitations of this thesis have been outlined and discussed throughout previous chapters alongside some potential directions for further study. However, three overarching, general considerations are discussed below.

7.4.1 The role of patients in de-implementation

Patient input was sought at several stages throughout this PhD i.e. visiting patient public panels, lay leader engagement and involving patients in the co-design workshops as part of the intervention development process (Chapter 6). However, the focus of this thesis has been on staff: asking staff to identify low-value practices, consulting staff to establish priority low-value PSPs for de-implementation, interviewing staff to identify barriers and

facilitators to de-implementing candidate PSPs and developing a de-implementation intervention targeting staff behaviour. Patients are directly impacted by low-value care and there is increasing recognition of the important role that patients have in driving de-implementation (Colla et al, 2017; Sypes et al, 2020b). For example, it has been reported that patient demand for tests and treatments can act as a barrier to reducing low-value care (Buist, 2016; Zikmund-Fisher, 2017). Previous evidence has encouraged the development of de-implementation interventions that not only target healthcare professionals, but also patients (Colla et al, 2017; Ellen et al, 2018; Prusaczyk et al, 2020). For example, Sypes et al (2020b) produced evidence that de-implementation interventions that engage patients through patient-targeted educational materials or shared decision-making tools are effective in decreasing the use of low-value care. The prospect of involving patients in de-implementation interventions was touched upon during the intervention development process (Chapter 6) where stakeholders (including patients) discussed the role that patients could have in carrying out a second check instead of an independent nurse, however, this was not included as part of the intervention because it was agreed that this could introduce too many issues relating to patient capacity to carry out the second check and who would be responsible if a medication error was made. Additionally, during the intervention development process (Chapter 6), patients expressed that, before taking part in the workshops, they were unaware of what double-checking was. Patients therefore explained that they would not want to be informed by healthcare staff that they were not going to perform a safety practice because this could cause unnecessary stress. Although investigating the role of patients in de-

implementing low-value PSPs was beyond the scope of this PhD, future research may seek to understand if there are certain healthcare settings in which patients would want to be informed that a routine low-value PSP was being stopped and if there could be a role for patients in facilitating de-implementation. Additionally, future research could test the effect of interventions that target both healthcare professionals and patients to de-implement a low-value PSP.

7.4.2 Generalisability of findings

The generalisability of findings from this thesis is limited predominantly to secondary healthcare settings because the vast majority of healthcare staff that took part in the research were based in hospitals. For example, the majority of participants that completed the survey in Study 1 (Chapter 2) were based in secondary care settings. It is therefore possible that different PSPs would be more frequently identified as low-value where the majority of participants worked in, for example, primary or community care settings due to differences in healthcare context. However, the same survey method could be applied to a variety of different healthcare settings.

The strategies developed by stakeholders during the intervention development process (Chapter 6), for example, educational materials, modifying electronic patient records systems and informal support meetings could be adapted to address barriers to de-implementing different low-value PSPs. Although barriers and facilitators to de-implementation will differ depending on the PSP itself and the context in which the target PSP is carried out, it is possible to tailor the strategies identified by the intervention development process to align with different low-value PSPs. This research therefore demonstrates a process for developing a theory-based, co-

designed de-implementation intervention that could be applied to different healthcare settings to identify and remove low-value PSPs from practice.

7.4.3 The impact of Covid on de-implementation

This PhD began in February 2019, approximately one year before the Covid-19 pandemic began in the UK. The pandemic placed extraordinary strain on the NHS which was already facing staff shortages and financial pressures (Iacobucci, 2014; Street, 2016). This increase in demand, paired with depleted resources forced healthcare professionals to prioritise critically-ill patients by stopping carrying out certain routine medical care practices such as wellness examinations, elective surgical procedures, preventive healthcare and cancer screening (Billings et al, 2021; Roth & Lazris, 2021). It has been estimated that during the spring of 2020, non-emergency medical care decreased by up to 60% (Cox & Amin, 2020; Mehrotra et al, 2020). The pandemic therefore changed the healthcare landscape and drastically reduced the amount of low-value care being carried out (Clarke et al, 2021). It is important to justify why the research carried out as part of this thesis did not take the opportunity to explore what healthcare professionals had stopped carrying out naturistically in practice.

The pandemic began soon after the list of the most frequently identified practices by healthcare staff had been produced (Study 1, Chapter 2). Conducting a natural experiment, at this point in the research, would have required Health Research Authority Ethical approval which would have been likely to take several months, especially due to delays in approval caused by the fast-track scheme that was prioritising new studies developing Covid-19 vaccines and diagnostics (Health Research Authority, 2020). Therefore, conducting a natural experiment would have caused significant

delays to data collection within this PhD. Additionally, it is likely that there would have been ethical issues associated with observing healthcare staff or using other data collection methods during a period of time when wards were understaffed and overrun with critically-ill patients, as well as the ethics of potentially unnecessarily exposing the researcher to the virus.

There is limited research that has reported the process of how healthcare organisations decided on which practices to stop during the pandemic and how healthcare professionals changed their behaviour to adhere to these new regulations (Clarke et al, 2020). However, there is much to be learned from this experience that could be applied to future de-implementation efforts. For example, it would be useful to understand if the fact that de-implementation took place during Covid has made staff more willing to remove certain low-value PSPs or if they are keen to reinstate them back into practice.

According to Oakes & Segal (2020), research should now endeavour to quantify how delays and interruptions to routine medical care caused by the pandemic impacted patient harm. For example, it is possible that in some healthcare organisations, some forms of double-checking were stopped during the pandemic due to staff shortages. It could be possible to analyse retrospective data to understand the impact of stopping double-checking on patient safety outcomes. Generating this form of evidence could help to facilitate interventions that aim to de-implement double-checking by providing healthcare professionals with ‘evidence of patient benefits’. Therefore, producing evidence of the impact of stopping certain practices on patient safety during the pandemic could be useful in motivating healthcare professionals to engage in future de-implementation efforts.

7.5 Practical implications

There are a number of practical implications that have emerged from this thesis for healthcare professionals, policy makers and researchers. Much of this has been described in previous chapters but some key points are expanded upon below alongside some potential directions for further study.

7.5.1 Implications for de-implementation theory

The development of the 'Patient Safety Practice De-implementation Prioritisation Criteria' contributes to understanding key factors that need to be considered when establishing priority low-value PSPs for de-implementation. This tool can be used to support the decision-making process when choosing a target for de-implementation when there are several possible candidate low-value PSPs being considered for removal. This novel criteria can be adapted to suit different healthcare settings and is a useful starting point that prompts consideration of a variety of objective (e.g. evidence base and economic cost) and context-dependent factors (e.g. staff motivation) to establish priority low-value PSPs for de-implementation.

Additionally, several findings produced by this PhD can be used to support existing conceptual theoretical frameworks that have been developed to guide the process of de-implementation. For example, healthcare staff identified barriers and facilitators to de-implementing low-value PSPs that could arise at different levels of the healthcare system. For example, the barrier, 'fear of harming a patient' applies to the healthcare professional level of the system, whereas 'ensuring a Just Culture is in place' refers to the organisational context within the system. This aligns with Norton et al (2020)'s framework that encourages the application of strategies

that target de-implementation at different levels of the healthcare system. Additionally, the findings from the intervention development process indicated that staff perceived it would be necessary to use a multi-component strategy to facilitate the de-implementation of a low-value PSP. This finding supports several existing de-implementation framework theories (Grimshaw et al, 2020; Niven et al, 2015; Norton et al, 2018)

Further, the methods used as part of this PhD research demonstrate a possible way of operationalising certain elements of existing conceptual de-implementation theories. For example, Study 1 (Chapter 2) and Chapter 4 demonstrate possible ways of involving healthcare staff in the identification and prioritisation of low-value PSPs for de-implementation. The methods used align with conceptual frameworks such as the 'Choosing Wisely De-implementation framework' (CWDF) which recommend that decisions about which low-value practice to de-implement should be informed by empirical studies and consensus processes involving key local stakeholders.

7.5.2 Implications for policy

The first implication for policy relates to decisions about which electronic health record system to adopt in healthcare settings. During the intervention development stage (Chapter 6), participants highlighted that, in order to facilitate the de-implementation of a form of double-checking, it would be necessary to make local changes to electronic health record systems. For example, in some settings, it is not possible to administer certain forms of medication without inputting two individual nurse registration codes into the electronic health systems to verify that a second, independent check has been carried out. When trying to de-implement the second check, it would therefore be necessary to change the electronic health record system to only

require one nurse code. Therefore, when policy makers are deciding which electronic health record systems to implement, preference should be given to systems that can be modified and tailored to local context.

A second implication for policy regards the prevention of implementing low-value PSPs in the first place. Previous research has established that many PSPs have been implemented into healthcare, despite having an insufficient evidence base demonstrating their effectiveness (Shekelle et al, 2013). To avoid the implementation of low-value PSPs in future, and thereby negate the need for active de-implementation efforts, policy makers, where appropriate, should only implement recommendations that are based on sufficient evidence. Extensive further research is required to establish what type (and how much) evidence would be sufficient to justify the implementation of a new PSP. Further, in anticipation of PSPs becoming obsolete after a period of time, when implementing new PSPs into practice, policy makers could stipulate the conditions under which the PSP would be considered low-value and therefore should be reviewed for de-implementation. Embedding de-implementation prompts into policy could increase healthcare staff's familiarity with the de-implementation process and thereby reduce feelings of fear when stopping certain low-value PSPs.

7.5.3 Implications for clinical practice

There are several implications for clinical practice from the research conducted as part of this thesis. For example, healthcare staff highlighted that effective de-implementation of low-value PSPs such as double-checking of medicines from practice would reduce frontline staff workload. On wards where double-checking is carried out frequently such as during the

administration of antibiotics on surgical wards, this could have considerable implications for reducing pressure placed on frontline staff. This freeing up of time could improve staff wellbeing and reduce staff burnout; something that has been found to contribute to a global shortage of nurses and negatively impacts the quality and safety of care (WHO, 2023). This increase in resources could also mean that healthcare staff have enough time to carry out certain high-value healthcare tasks according to policy which could have beneficial consequences for patient safety.

De-implementing low-value PSPs may also have positive clinical implications in terms of improving staff adaptability. Increasing staff professional autonomy was identified as a key facilitator to de-implementation in Study 3 (Chapter 5). Much previous safety literature has reported that increasing local autonomy in some situations can be beneficial for safety because it can increase organisational capacity for safe variation (Dekker, 2014; Hollnagel, Woods & Leveson, 2006; Hollnagel et al, 2015).

DH presented the key findings from this PhD research to the Improvement Academy (https://improvementacademy.org/) (a team of improvement scientists, patient safety experts and clinicians who use a theory-based approach to improve the delivery of healthcare) during a training event within the Improvement Academy. During the event, DH prompted discussion relating to what safety practices healthcare staff perceive to be of low-value and the potential challenges associated with removing them. Clinicians left the event with a better understanding of how de-implementing low-value PSPs could benefit patients and the team of improvement scientists expressed that they wanted to explore how to test a de-implementation intervention in practice.

7.5.4 Implications for research

Building upon the findings produced by this thesis, future research could focus on adapting and testing the de-implementation strategies developed by healthcare staff in a specific clinical setting. When adapting the strategies, future research should endeavour to involve a variety of stakeholders including policy makers and regulators in the process to try and uncover some of the additional barriers to de-implementation at the organisational level of the healthcare system.

Randomised controlled trials (RCTs) could be carried out to produce more reliable evidence of the impact of de-implementing a specific form of double-checking medicines on patient safety. The generation of more evidence in this area could also provide insight into which BCTs are most effective to include in de-implementation interventions.

Alongside conducting RCTs, qualitative process evaluations could be carried out to understand: 1) the extent to which healthcare staff engaged with the strategies, 2) the impact of the strategies on healthcare staff and patients, and 3) how barriers to de-implementation were overcome in practice.

7.6 Concluding comments

In recent years, the global need to eliminate low-value care has become increasingly important to prevent patient harm and reduce unnecessary spending (Nilsen et al, 2020b). Previous research exploring how to address low-value care has focused on clinical practices such as tests and treatments, however, ‘safety clutter’ represents an unexplored source of low-value care, comprising of administrative processes, checklists and activities

performed in the name of safety that do not contribute to the safe delivery of healthcare (Rae et al, 2018).

The research conducted as part of this thesis explored how to identify and de-implement low-value PSPs that contribute to the problem of safety clutter. The findings of this PhD have shed light on what healthcare staff perceive a low-value PSP to be and why. Additionally, insight has been gained into the potential challenges associated with de-implementing low-value PSPs and possible ways of overcoming these. The findings have also revealed a lack of evidence exploring the de-implementation of non-clinical practices. Further, this PhD has found that it is feasible to involve stakeholders in the development of an intervention that aims to de-implement a target low-value PSP, however, future research is needed to understand how to apply this learning in practice and test the effectiveness of de-implementation interventions on removing low-value PSPs. The findings within this thesis can be used to guide future efforts to identify and remove low-value PSPs in a range of clinical contexts.

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Appendix 2.1

UK Survey

We want to identify safety rules, processes and practices used in healthcare that you think are low-value or ineffective at improving patient safety. There may be potential to stop doing these things, freeing up more time to care. Your responses are anonymous.

1. **What is your job-title?**

   _____

2. **Which best describes where you are based most of the time in your work (please tick)**
   Primary Care ☐
   Hospital ☐
   Community ☐
   In-patient mental heatlh ☐
   Other ☐

3. **Which NHS region do you work in?**
   Cumbria and North East ☐
   Lancashire and Greater Manchester ☐
   Cheshire and Merseyside ☐
   Yorkshire and Humber ☐
   North Midlands ☐
   East- East of England ☐
   Central London ☐
   South East ☐
   South West ☐
   Wessex ☐
   West Midlands ☐
   Scotland ☐
   Wales ☐

4. **It is a waste of time doing 'x' because it doesn't make care safer. Please tell us what 'x' is below. You can list more than one answer.**

5. Please write any further comments in the box below.

If you wish to be entered into a <u>prize draw to win either £100, £75 or £50</u>, please give your email address below. Your email address will be stored separately to ensure your survey response is kept anonymous. Once the prize draw is completed we will destroy records of the email address:

_____

This research is funded by The Institute for Health Improvement Studies (THIS) Yorkshire and Humber Patient Safety Translational Research Centre (NIHR YH PSTRC). The views expressed here are those of the author(s) and not necessarily those of the NHS, the NIHR, or the Department of Health and Social Care.

Appendix 2.2

List of final UK practices

The following link contains the full final list of included practices:
http://links.lww.com/JPS/A521

Appendix 2.3

Australian Survey

In this exciting new research project, we want to identify safety rules, processes and practices used in healthcare that you think are low-value or ineffective at improving patient safety. There may be potential to stop doing these things, freeing up more time to care. Your responses are anonymous.

By submitting a completed survey, you are consenting to your responses being included in the research.

1. **What is your job-title?**

   _____

2. **Which best describes where you are based most of the time in your work (please tick)**
   Primary Care ☐
   Hospital ☐
   Community ☐
   In-patient mental health ☐
   Other ☐

3. **Which sector do you work in?**
   Private ☐
   Public ☐

4. **Which Australian State or Territory do you work in?**
   Queensland☐
   New South Wales☐
   Australian Capital Territory☐
   Victoria☐
   South Australia☐
   Western Australia☐
   Tasmania☐
   Northern Territory☐

5. **It is a waste of time doing ‘x’ because it doesn’t make care safer. Please tell us what ‘x’ is below. You can list more than one answer. Please try and be as specific as possible in your answer.**

6. **Please write any further comments in the box below, in particular, why you think 'x' is a waste of time.**

7. **What do you do to work around ‘X’?**

Thank you for completing this survey.

If you wish to be entered into a <u>prize draw to win either $100, $75 or $50</u>, please give your email address below. Your email address will be stored separately to ensure your survey response is kept anonymous. Once the prize draw is completed we will destroy records of the email address:

_____

Appendix 2.4

List of final 454 practices - Australia

The following link contains the full final list of included practices:
http://links.lww.com/JPS/A522

Appendix 3.1

PRISMA checklist (Preferred Reporting Items for Systematic Reviews and Meta-analysis

Section and Topic	#	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 68
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 68
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pages 68-74
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Pages 76-77
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 75
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Appendix 3.2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pages 76-78
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Pages 77-78
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Appendix 3.3
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Pages 78-80
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Page 79
Synthesis	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and	Page 79

Section and Topic	#	Checklist item	Location where item is reported
methods		comparing against the planned groups for each synthesis (item #5)).	
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 80
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 79
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 80
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Page 80
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	N/A
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/A
RESULTS			
Study selection	16	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 82
Study characteristics	17	Cite each included study and present its characteristics.	Pages 81-108
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Pages 109-111
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Pages 81-108 & 112
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Page 112
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A

Section and Topic	#	Checklist item	Location where item is reported
evidence			
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pages 112-119
	23b	Discuss any limitations of the evidence included in the review.	Pages 117-118
	23c	Discuss any limitations of the review processes used.	Pages 117-118
	23d	Discuss implications of the results for practice, policy, and future research.	Pages 118-119
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 75
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 75

Appendix 3.2

Example of full search strategy used in Allied and complementary medicine database (AMED). <2002 – 2020>

Underlined search terms were added to the updated search strategy in August 2021. Search terms that are not underlined were included in the original search strategy used in April 2020.

Line number	Search terms
1	(health* professional* or clinician* or nurs* or nurse practitioner* or doctor* or physician* or physician assistant or surgeon* or GP* or junior doctor* or "nurse-driven protocol" or registrar* or consultant* or pharmacist* or midwif* or allied health professional* or allied health practitioner* or medical staff* or medic or orthopaedic or "urgent care setting").ti.
2	(disinvest* or "decrease use" or "healthcare disinvestment" or discontinu* or abandon* or reassess* or obsole* or "medical reversal" or contradict or "re-invest" or reinvest or withdraw* or reduc* or "decline in use*" or "health technology reassessment" or "change in use*" or "de-implement" or "de-implementation" or deimplementation or "de-list" or "low value practice" or "low-value practice" or "low-value intervention" or "low value intervention" or "change in practice" or "de-adopt*" or "de-commission*" or "do not do*" or reallocation or remov* or replace or refute or "over use*" or stop* or "inappropriate use*" or relinquish* or ineffective or misuse or "re-appraisal" or "re-prioritisation" or "substitutional re-investment" or "evidence-based reassessment" or "clinical redesign" or disadoption or defunding or "resource release" or "withdrawing from a service" or "redeploying resources" or redeploy or reversal or "drop in use*" or undiffus* or exnovat* or "de-adoption" or deadoption or unnecessary or inappropriate or "over-prescribing" or "reducing inappropriate prescribing" or "inappropriate prescriptions" or "appropriateness of antipsychotic prescribing" or "reducing inappropriate antibiotic prescribing" or "inappropriate use" or “inappropriate prescription”).tw.
3	("safety metric*" or "unsafe healthcare*" or "healthcare safety*" or "patient safety*" or "patient harm*" or "patient incident*" or "safety thermometer*" or "medica* error*" or

	"diagnostic error*" or malpractice* or "near failure*" or "near miss*" or "safety event report*" or readmission* or "preventable harm" or "safety incident" or "safety outcome" or "safety data" or "incident report*" or "monitoring safety" or "safety reporting" or "patient safety outcome*" or "incident rate*" or "safety measure*" or "adverse event*" or harm* or "never event*" or "serious incident*" or "near miss*" or "prescribing error*" or "close call*" or "undesirable event*" or "unsafe care experience*" or "length of stay" or "prescribing outcome" or prescribing or "delayed prescribing" or "quality improvement methodologies" or "quality improvement strategies").tw.
4	(intervention* or evaluation*).tw.
5	1 AND 2 AND 3 AND 4
6	Limit 5 to English language.

Appendix 3.3

Data Extraction Details

General information:

- Author
- Year of publication
- Title
- Study country
- Study aims/ objectives
- Study Design

Intervention details:

- Occupation of targeted healthcare professionals.
- Number of participants at baseline
- Number of participants at follow-up
- Study duration (years, months, weeks)
- Type of intervention (multi-component, prompt-based, educational)
- Type of intervention (reducing, restricting, removing, replacing).
- Behaviour change techniques used
- Mode of intervention delivery
- Length of time over which intervention is delivered.
- Maximum follow-up time (following the end of the intervention)
- Intervention setting

Patient safety measure

- Patient safety outcome
- Source of information: patient safety outcome
- Behavioural outcome
- Source of information: measure of behavioural outcome
- Descriptive statistics carried out.
- Other forms of analysis used.
- Descriptive results/ findings
- Other forms of analysis results/ findings
- Randomised/ non-randomised
- Theoretical perspective

Appendix 4.1

Consultation Exercise Round 1 Survey

Hello,

There is an awareness in the NHS that some healthcare professionals perceive certain safety tasks to be unnecessary to enhancing patient safety. In a previous study, we asked 515 healthcare professionals to provide information about which practices they perceived to be unnecessary for ensuring patient safety. We categorised the most frequently mentioned practices into groups to arrive at a short-list.

This survey is designed to gather the views of healthcare professionals which will enable us to achieve a consensus of which practices should be taken forward to the next stage of evaluation.

You will now be presented with 8 different practices that healthcare professionals have identified as being unnecessary for enhancing patient safety. You will be asked to rate each practice on: 1) its importance for maintaining patient safety, 2) the extent to which it uses staff time/ resources.

Your answers to the questions below will determine which of these 8 practices to evaluate in more detail in terms of underlying evidence, opportunity cost and policy context. This will help us to decide which practices to take forward to consider for potential de-implementation.

Thank you for your time.

Section 1: Demographic information

Q.1 What is your age:

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

Q.2 What is your gender?

- Male
- Female
- Other [text box]

- Prefer not to say

What is your current job? [Text box]

What is your current or most recent clinical role? Please answer N/A if you do not have or have never had a clinical role

Please rate the following 8 practices based on your experience:

1. Paperwork (assessments): Performing risk assessments e.g. for Venous Thromboembolism (VTE). Healthcare staff are required to regularly conduct risk assessments on all patients to evaluate the likelihood of a patient developing a VTE (a blood clot).

- I know enough about this practice to answer questions about it: (Yes/No)
- Doing this practice is important for maintaining patient safety (0: Strongly disagree – 10: Strongly agree).
- Complying with this practice consumes a lot of staff time and/ or resources (0: Strongly disagree - 10: Strongly agree).

[Participants answered these three questions in relation to each practice]

2. Paperwork (assessments): Conducting falls risk assessments on non-risk patients in hospital settings: Healthcare staff are required to regularly conduct risk assessments on all patients to evaluate the likelihood of a negative health event e.g. a fall.

3. Checking skin/ pressure areas for mobile patients in hospital settings: Healthcare staff are required to regularly check the skin of patients for pressure damage even on mobile patients who are less likely to develop pressure damage.

4. Intentional rounding: Carrying out intentional rounding i.e. conducting regular checks on patients at set times to assess and manage their fundamental care needs.

5. Duplication: Routinely double-checking patient medication with a fellow member of healthcare staff, prior to administration.

6. Incident reporting: reporting all safety incidents.

7. Some Infection control measures associated with dress/ uniform: Wearing masks and aprons or being ‘bare below the elbows’ in non-intervention settings.

8. Using medication compliance aids e.g. ‘Dosette boxes’ to dispense patient medication: A multi-compartment compliance aid stores scheduled doses of medications and prompts patients to take medication at specific times throughout the day.

Thank you for your time spent completing this survey. Your response has been recorded.

Appendix 4.2

Consultation Exercise Round 2 Survey

Dear Colleague,

We recently conducted the first round of an online consultation exercise where we asked a panel to rank 8 patient safety practices on: a) the importance of the practice in terms of maintaining patient safety and b) the extent to which carrying out the practice uses time and resources. For more background information on the findings from the Round 1 survey, please click here.

Based on the responses from the Round 1 survey, we eliminated 3 practices because the panel agreed that they were too important for maintaining patient safety to be considered for de-implementation. Please click here if you would like to learn more about the findings from Round 1.

We would now like to ask you some questions to better understand which of the remaining 5 practices would be appropriate to consider as candidates for de-implementation. This very brief survey will take no longer than 10 minutes to complete.

Section 1: Demographic information

Q.1 What is your age group:

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

Q.2 What is your gender?

- Male
- Female
- Other [text box]
- Prefer not to say

What is your current job? [Text box]

Section 2: Staff motivation questions.

Below are the five practices that are candidates for potential de-implementation based on the findings from round 1:

1. Checking skin/ pressure areas of independent patients regularly: Healthcare staff are required to regularly check the skin of patients for pressure damage even on mobile patients who are less likely to develop pressure damage.

2. Hourly nurse rounding checks: Conducting regular checks on all patients every 1-2 hours to assess and manage their fundamental needs.

3. Routinely double-checking all patient medication with a fellow member of healthcare staff, prior to administration.

4. Pharmacists dispensing medicines into dosage trays or boxes when preparing to discharge a patient: A multi-compartment compliance aid stores scheduled doses of medications and prompts patients to take medication at specific times throughout the day.

5. Conducting falls risk assessments on non-risk patients in hospital settings: Healthcare staff are required to conduct risk assessments on non-risk patients to evaluate the likelihood of a fall.

For each of the following practices...

1) Please rate how easy-difficult you think it would be for you to stop performing this practice (0: extremely easy; 10: extremely difficult).

2) Please rate how relaxed-anxious you would feel from a patient safety perspective about these practices not being carried out in healthcare settings (0: extremely relaxed; 10: extremely anxious).

3) Please rate how harmful-beneficial you think it would be if this practice were to be stopped in healthcare settings (0: extremely harmful; 10: extremely beneficial).

Thank you very much for completing the second round of this survey. Your time is greatly appreciated.

Appendix 4.3

Round 2: Background Information

Background information: There is an awareness in the NHS that some healthcare professionals perceive certain safety tasks to be unnecessary to enhancing patient safety. In a previous study, we asked 526 healthcare professionals to provide information about which practices they perceived to be unnecessary for ensuring patient safety. We categorised the most frequently mentioned practices into groups to arrive at a short-list containing 8 categories.

The first online survey was circulated to an expert panel of healthcare professionals that asked members to rate 8 categories on: 1) their importance for maintaining patient safety and 2) the extent to which the practices staff time/ resources.

Based on the average responses for each question, the following 3 practices were removed from the list:

1. VTE assessments.
2. Some infection control measures.
3. Incident reporting.

Appendix 4.4

Round 1 Feedback

The following three practices were not taken forward to the second round of the consultation exercise because the majority of the panel rated them as having high importance for maintaining patient safety.

1) '**Performing risk assessments for VTE in hospital settings'**.
   - Average 'importance' score (out of 10): 8.50 (SD=1.45).

2) '**Some infection control measures associated with dress/uniform'**.
   - Average importance score (out of 10): 8.67 (SD=1.68).

3) '**Incident reporting**: reporting all safety incidents.'
   - Average importance score (out of 10): 8.47 (SD=2.42)

Therefore, the panel perceived the above practices to be the most important from the list in terms of maintaining patient safety. For this reason, these three practices will not be taken forward to Round 2 or considered for de-implementation.

If you have any questions or feedback about this exercise, please email: psdh@leeds.ac.uk. Thank you again for your participation.

Appendix 5.1

Participant Information Sheet

Title of research project

Assessing the feasibility of de-implementing low-value safety practices: An interview study with NHS managers.

Invitation to take part

We would like to invite you to take part in a research study assessing the feasibility of de-implementing low-value safety practices. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the project?

Research suggests that there might be clinical and non-clinical practices that are carried out in the NHS which are not necessary or require a lot of resources (e.g. staff time) but have little benefit. There are some safety practices, for example, that take up staff time but which do not have a strong evidence base. It is therefore important that we are able to identify areas of low-value which could possibly be removed in order to save time and resources that could alternatively be used to maximise improvements in patient care.

In a previous study, we asked healthcare staff to identify safety practices which they perceived to be a waste of time because they do not contribute to patient safety. The most frequently mentioned practices were put into a short-list and, after considering the current evidence and using input from a panel of clinicians, we identified two safety practices for further consideration: 1) Routinely double-checking all patient medication with a fellow member of healthcare staff, prior to administration and 2) Conducting regular checks on all patients every 1-2 hours to assess and manage their fundamental needs.

We now want to understand more about these safety practices, what the current local and national policy is surrounding these practices and what the potential barriers would be to removing them from hospital settings.

This research involves conducting interviews with NHS managers to assess the feasibility of potential de-implementation of the two practices. The research aims to: 1) understand how and why the practices are carried out in the NHS, 2) the feasibility of removing each of the practices from healthcare settings and 3) NHS managers' attitudes towards removing each of the practices.

It is hoped that conducting interviews with NHS managers will identify the potential barriers and facilitators to removing each of the practices. This information will enable us to consider the practices we might take forward and what the factors that any intervention designed to support de-implementation would need to take into account.

Why have I been chosen?

You have been invited to take part in this study because you have management responsibility within a hospital in the UK.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep (and be asked to verbally give consent) and you can still withdraw at any time without it affecting any benefits that you are entitled to in any way. You do not have to give a reason. If you do decide to take part, you can withdraw from the study up to two weeks after the interview has taken place.

What do I have to do?/ What will happen to me if I take part?

You will take part in a single online interview that will last approximately 45 minutes.

Before the interview takes place, please note that the discussion will revolve around the following two safety practices:

Routinely double-checking all patient medication with a fellow member of healthcare staff, prior to administration.

Conducting regular checks on all patients every 1-2 hours to assess and manage their fundamental needs.

The interviewer will ask you questions relating to your understanding of how and why the practices are carried out in hospital settings. You will also be asked questions about your understanding of the surrounding policy and how you would feel if the practices were to be removed from healthcare. Questions asked during the interview will be open-ended and the style of the interview will be conversational.

What are the possible disadvantages and risks of taking part?

You may experience discomfort caused by discussing the removal of safety practices which you currently oversee in accordance with Trust policy. However, we hope that because you have been made aware of the practices in advance of the interview, you have had time to consider whether you feel comfortable taking part in the interview and can decide not to participate.

Additionally, we appreciate that you are very busy and aim to keep disruption to a minimum by scheduling the interview at a time that is most convenient for you.

What are the possible benefits of taking part?

Whilst there are no immediate benefits for those participating in the project, it is hoped that this work will contribute to research which may eventually lead to the removal of unnecessary safety practices. Removal of unnecessary practices could subsequently save time and resources which could be used differently to maximise improvements to the quality and safety of patient care.

Use, dissemination and storage of research data

Research data may be disseminated via publication in conference presentations, peer reviewed journals or publications on websites. However, identities will remain completely anonymous.

What will happen to my personal information?

Contact details (required to organise the interview) will be confidential and will be stored separately from the interview data in a password protected file. Only the research team will have access to the contact details. Anonymity will be maintained by assigning a unique code to all participants so that identities cannot be matched to interview data. This code will be written on the consent form and will be recorded on the audio-recorder before each interview. This will ensure that participants can withdraw from the study up to two weeks following their interview where transcripts will be anonymised.

What will happen to the results of the research project?

All the contact information that we collect about you during the course of the research will be kept strictly confidential and will be stored separately from the research data. We will take steps wherever possible to anonymise the research data so that you will not be identified in any reports or publications.

The results of this research study could be included in articles for academic journals or presentations at academic conferences. Although it won't be possible to give you individual feedback, a summary of the results will be made available once the study has been completed. If you would like to be informed of how to access a summary of the results once they are available, you will be asked to provide an email address after you have completed the interview. Your email address will be stored securely and will not be matched to any interview data.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?

You will be asked questions relating to two safety practices that healthcare staff have previously identified as being of 'low value'. The interview will focus on how and why the practices are carried out, what the potential barriers of removing the practice could be and how you would feel if the practice were to be removed. This information is relevant in order to assess the feasibility of removing safety practices which is the overarching aim of this research.

Will I be recorded, and how will the recorded media be used?

The video recordings of your activities made during this research will be used only for analysis. If you would prefer, you can choose to not be video recorded and instead we will just take an audio recording of the interview. No other use will be made of them without your permission, and no one outside the project will be allowed access to the original recordings. All recordings will be password protected and stored securely. Data will only be accessible by the researcher and supervisors for a period of five years, after which the data will be destroyed, where all copies of the data will be deleted.

Who is organising/ funding the research?

The Healthcare Improvement Studies Institute is funding this research.

The study is being undertaken within the Yorkshire Quality and Safety Research Group and the NIHR Patient Safety Translational Research Centre. For more information about the group and the work that they do please visit https://yqsr.org/

Contact for further information

You can find out more information by contacting Daisy Halligan by email (psdh@leeds.ac.uk) or by phone (07411477895).

Alternatively, you can contact Rebecca Lawton by email (R.J.Lawton@leeds.ac.uk).

Thank you very much for taking the time to read through the information.

University of Leeds Ethics reference number: PSYC-219
Date of approval: 26/02/21

Appendix 5.2

Interview Study Debrief Sheet

Assessing the feasibility of de-implementing low-value safety practices: An interview study with NHS managers.

Thank you very much for taking part in this study.

By taking part in this interview, you have helped us to better understand the feasibility of potentially removing low-value safety practices alongside the possible implications this could have on patient safety. Contributing to this research may eventually lead to the removal of unnecessary safety practices which could save time and resources that could be used alternatively to maximise improvements to the quality and safety of patient care.

If you have any further questions about any aspect of this study, please contact:

Daisy Halligan

School of Psychology,

University of Leeds,

Woodhouse,

LS2 9JT
Email: psdh@leeds.ac.uk
Telephone: 07411477895

University of Leeds Faculty Research Ethics committee (Reference: PSYC-219).
Date of approval: 26/02/2021.

Appendix 5.3
Participant Recruitment Poster

NIHR | Yorkshire and Humber Patient Safety Translational Research Centre

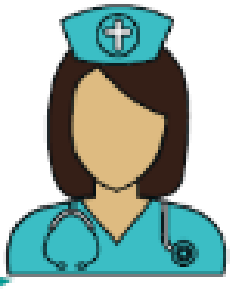
UNIVERSITY OF LEEDS

Are you an NHS manager? Are you interested in patient safety?

Can you spare 40 minutes to talk to us about your views on the costs and benefits of two safety practices?

1) intentional rounding and 2) double-checking the administration of medicines?

If so, we would love to hear from you.



My name is Daisy Halligan and I am a researcher at the Universtiy of Leeds, funded by THIS Institute. I am looking to interview matrons, heads of nursing, risk leads, clinical governance leads, ward managers and any other NHS managers who oversee the practices mentioned above to explore potential ways of safely increasing time available for patient care.
The single online interview will take 40 minutes and you will receive a £20 voucher as a gesture of appreciation.

Contact:

If you have any questions or would like to take part, please contact Daisy Halligan via email: **psdh@leeds.ac.uk.**

Please note this study is recruiting by social media and word of mouth / snowballing and NOT via direct NHS means. If you are being made aware of this study through an NHS email and you wish to participate it is advised that you need to do this in your own time. University of Leeds Ethics reference: PSYC-219. Date of approval: 26/02/2021.

THIS.Institute The Healthcare Improvement Studies Institute

Appendix 5.4

Interview Schedule

Title: Assessing the feasibility of de-implementing low value safety practices: An interview study with NHS managers.

Hello, my name is Daisy. I'm a researcher from the University of Leeds. Is now still a good time to talk? Before we begin, I thought I'd give you a bit more information about what this interview will involve. In a previous study, we asked healthcare staff to identify safety practices which they perceived to be of low value.
We have taken forward two of the most frequently mentioned practices to try and better understand why they are sometimes perceived to be low value and to explore the implications of potentially removing them from healthcare settings. We are really interested in hearing how you feel about these practices being identified as low value for safety and how you would feel about them being potentially stopped.

In this interview, I will be asking questions relating to:

1) **Routinely double-checking patient medication with a fellow member of healthcare staff, prior to administration**

and

2) **Conducting regular checks on all patients every 1-2 hours to assess and manage their fundamental needs.**

It is anticipated that this interview will take 45 minutes to complete. Before we start, do you have any questions?

Record participant's verbal consent (see Appendix 5.5).

Section 1 - Demographic questions:

Q1: What is your current job role?

Q2: How familiar do you feel with frontline practice in general?

Q3: What is the size of the hospital in which you are currently based?

Q4: Do you have a role in writing policy around or enforcing Practice 1 or Practice 2?

Section 2 – Specific practice questions:

Q3: In your organisation, what are the rules around **double-checking medication**

and how does this work in practice?

Q2: How do you feel about **double-checking medication** being previously identified by healthcare staff as being of low value?

- Why do you think some healthcare staff identified **double-checking medication** as being of low value?

Q4: What implications does **double-checking medication** have for staff time and resource use?

Q5: What do you think the impact would be on safety if healthcare staff stopped carrying out **double-checking medication**?

- What would the broader impact be?

Q6: What other issues might you anticipate if **double-checking medication** were to be removed?

If not touched upon, what potential barriers to removing the practice would you anticipate?

- Do you think there could be any possible benefits if **double-checking medication** were to be removed?

The above 6 questions will at this point be asked in relation to practice 2.

Q3: In your organisation, what are the rules around **intentional rounding** and how does this work in practice?

Q2: How do you feel about **intentional rounding** being previously identified by healthcare staff as being of low value?

- Why do you think some healthcare staff identified **intentional rounding** as being of low value?

Q4: What implications does **intentional rounding** have for staff time and resource use?

Q5: What do you think the impact would be on safety if healthcare staff stopped carrying out **intentional rounding**?

- What would the broader impact be?

Q6: What other issues might you anticipate if **intentional rounding** were to be removed?

- Do you think there could be any possible benefits if **intentional rounding** were to be removed?

Thank you very much for completing this interview. Is there anything you would like to add before we finish the interview or do you have any questions?

Appendix 5.5 Consent to take part in: Assessing the feasibility of de-implementing low-value safety practices: An interview study with NHS managers.	Add your initials next to the statement if you agree
I confirm that I have read and understand the information sheet dated DD/MM/YYYY explaining the above research project and I have had the opportunity to ask questions about the project.	
I understand that my participation is voluntary and that I am free to withdraw at any time during the interview without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. Following the interview, I will have a period of two weeks during which I can withdraw from the study. After this period of time, I will no longer be able to withdraw.	
I understand that members of the research team may have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.	
I understand that the data collected from me may be stored and used in relevant future research in an anonymised form.	
I understand that relevant sections of the data collected during the study, may be looked at by individuals from the University of Leeds or from regulatory authorities where it is relevant to my taking part in this research.	
I agree to take part in the above research project and will inform the lead researcher should my contact details change.	

Name of participant	
Participant's signature	
Date	
Name of lead researcher	Daisy Halligan
Signature	
Date*	

Appendix 6.1

Patient Participant Recruitment Poster

NIHR | Yorkshire and Humber Patient Safety Translational Research Centre

Invitation: patients and unpaid carers

Who: Do you have any experience of taking any form of medication whilst in hospital? If so, we would love to hear from you! We are looking for patients or carers to attend a minimum of 4 online workshops.

What: The workshops will involve working with healthcare staff to develop an intervention that can be used to reduce the workload of healthcare staff and improve the safety of care.

When: The **first workshop** will take place online on the 17.01.22 at 11:30-13:00 (subsequent workshops will be held over February and March - exact dates/times to be agreed with participants).

Where: Online using Microsoft Teams.

Maximum time of each workshop: 90 minutes
You will be given a £30 voucher as a token of appreciation for each workshop that you attend.
To express an interest in taking part in the workshops please email Daisy Halligan (PhD Student) at: psdh@leeds.ac.uk before the 14th January.

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Appendix 6.2

Staff participant recruitment poster

NIHR | Yorkshire and Humber Patient Safety Translational Research Centre

Invitation: Hospital-based healthcare professionals

Who: If you are currently working in the NHS as a nurse, senior nurse, pharmacist or patient safety manager.

What: Double-checking medicines takes time, yet evidence of the benefits of this practice are weak. In these workshops, we will develop a way of reducing or stopping double-checking for some medicines. The workshops will also involve patients and carers so that we can work together to explore the safest way of doing this.

- **Workshop 1: Thursday 17th Februray 11:30.**
- **Workshop 2: Tuesday 1st March 11:30.**
- **Workshop 3: Thursday 17th March 11:30.**

Where: Online using Microsoft Teams.

Maximum time of each workshop: 90 minutes
You will be given a £30 voucher as a token of appreciation for each workshop that you attend.
To express an interest in taking part in the workshops please email Daisy Halligan (PhD Student) at: psdh@leeds.ac.uk before the 10th February.

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Appendix 6.3

Workshop 1: Information Sheet

Hello and thank you for expressing an interest in taking part in the first online workshop on the **17th January at 11:30-13:00 on Microsoft Teams**. I really appreciate your help and thought you would find it useful to have some background information so you know what to expect on the day.

What is workshop 1 trying to achieve? To make sure that everyone involved is aware of: 1) What the practice of double-checking medicines is, 2) Why it can be seen as unnecessary and 3) why we are developing an intervention to help stop this practice.

What will the other workshops involve? Following Workshop 1, you will have the opportunity to participate in three further joint workshops (with healthcare staff) during which practical ways of stopping certain forms of double-checking medication will be discussed. You will receive more detail closer to the time of subsequent workshops.

What is double-checking medicines? Medication errors can cause serious patient harm in healthcare settings. Administering medication is a vulnerable time for patients because staff are managing several competing priorities and distractions, as they attempt to undertake the safe administration of medications.

Medication errors are **always avoidable** and, as most take place during the actual giving of the medicine to the patient, nurses are the professionals mostly involved in such errors.
It is commonly assumed that when administering certain 'high-risk' medication, having two nurses double-checking will reduce the risk of error.

The process of **double-checking** is a practice where two nurses check that prescribed medication is given correctly and safely. To ensure this, the following '6 rights' are checked:

1. Right time
2. Right route i.e. injection, IV, oral.
3. Right medicine
4. Right dose
5. Right patient
6. Right formulation

Despite the significant resources required to carry out double-checking, its effectiveness in reducing medication errors and maintaining patient safety remains unclear. Safely removing or reducing this practice could free up healthcare staff time, allowing them to spend more time providing **valuable direct patient care.**

To join Workshop 1 click on this link:

https://teams.microsoft.com/l/meetupjoin/19%3ameeting_ODgyNTUxMDAtNTg2NC00OWJjLWE3ZjQtOTE5 MjEwMGU0MWMy%40thread.v2/0?context=%7b%22Tid%22%3a%22bdeaeda8-c81d-45ce-863e5232a535b7cb%22%2c%22Oid%22%3a%22e68a579d-1e25-435c8e87-4127debd1269%22%7d

If you experience any difficulties joining the workshop, please email: psdh@leeds.ac.uk. I will be in the meeting room from **11:15** to help set up. Following this workshop, you will be emailed a **£30 Amazon Voucher**.

Appendix 6.4

Workshop 1 Summary: What is double-checking?

Double-checking

- Patients/carers shared their understanding of what double-checking is. Questioned why the 'right person' was low down on the '6 rights list'. Highlighted that patients are often unaware of this practice taking place.

- PE questioned whether technology (e.g. scanning barcodes) could be used to remove the need for a second nurse checker. Would it be possible for the electronic medical record system to somehow incorporate a digital second-check? It was highlighted that distraction would still be a factor even if the process of double-checking was electronically recorded. GJ suggested that the bar code could act as the second check rather than a second nurse. However, this could put the potential for error 'further down the chain' of administering medication because someone would need to place barcodes on the medicine in the first place.

- JS mentioned how advanced machines are in shops e.g. it is now possible to scan a tag and it tells you when it was bought, how much it was, where it was purchased what size the garment was. If this technology is available in shops, surely it can be somehow applied in healthcare to remove the need for double-checking?

- The group discussed whether it is time for a shift from nurses doing the check to pharmacists doing the second check? This would, in theory, free up nursing time without removing the safety blanket.

- JG highlighted that in her experience, distraction can cause error when carrying out double-checking. Dedicating the nurse with a sign saying 'do not distract' sometimes prevents people interrupting the nurse and thereby enhances the quality of the second check.

- DS expressed concern about the potential for new technological solutions to be unhelpful because they are sometimes implemented ineffectively. Technology doesn't always improve the quality of care. Good ideas can be poorly executed which makes the care worse. DH highlighted the importance of testing de-implementation interventions in real-world settings to ensure it works in practice and to understand the implications on patients.

- RD shared her experience of dispensing medicines in the past and said that she felt much more responsible when she knew someone was going to follow up on her work. She said she didn't get the same

feeling of acuity when no one checks your work. RD expressed to her manager in her previous role that she was worried about not having her work checked but was told that there was no evidence that having someone check your work makes any difference. It sometimes makes you more thorough.

- AB said that patients are often not made aware of double-checking and it might be beneficial to communicate what is going on with patients.

- PE mentioned that pharmacists would be keen to be involved in double-checking because so much of what they do is now electronic, they might want to engage with patients face-to-face. PE also raised the point that there are other checks that take place before double-checking so perhaps a change could be made earlier along in the chain.

- Discussed the potential to involve patients in the process of double-checking. This is often carried out in practice anyway where nurses will informally check in with patients during the double-checking process.

- Involving the patient is a good idea but can all patients be equally involved in this process? How could we overcome barriers? e.g. English not being first language. Involving patients in double-checking would also help with the discharge process. Discussed the value of double-checking with patients in preparation for discharge.

- If patients could be involved in double-checking of their medicines whilst in hospital that would be really useful because when they leave hospital, they might panic that their dose has been decreased or their pill is a new colour but if they're involved during the checking process, they'd be better prepared.

- RD shared her own experience of her medication not being written up correctly and the powerlessness patients can feel when their medication is taken off them in hospital. Involving patients in double-checking whilst in hospital makes discharge more of a gradual process rather than everything being pinned on the moment of discharge.

De-implementation

- De-implementation requires working **with** the patient and not doing it **to** the patient.

- PE said that any changes implemented must be communicated widely to all patients. Discussed how this might work when not many patients are aware of double-checking medicines. He suggested giving patients an information leaflet about the change taking place which they don't have to read but it's good to give them the option.

- Empowering patients with medication in hospital is a brilliant concept. Totally trusted to do it when you're at home but treated like a child when out of hospital. But how can we include all patients to be involved in their own medications administration? Overcoming barriers around language and disability.

- Everyone needs an induction to the ward when research takes place to ensure that people understand what change is taking place. Patients need to be aware.

- Discussed the financial implications of de-implementation. Would it be more expensive to implement the change? DH explained that it is very difficult to anticipate the financial impact of de-implementation without piloting the intervention. It might be possible that there would be a short-term increase in spending followed by long-term savings due to the reduction in nurse time.

- Must be able to 'sell' the intervention. Need to educate healthcare staff and patients about why we are doing what we are doing. The purpose is not about saving money - it's about keeping patients safe. Need to communicate a potted history why we are where we are to initiate the change. Think about how the intervention can be engaging for everyone.

Co-design

- Discussed that it's very important to treat patients/carers on the same level. Everyone is treated as equals. Distribution of power. Lateral thinking.

- Although it might seem at the beginning of co-design that everyone is on different pages, when you spend a bit more time as a group, you understand that everyone has the same motivations but we come from different perspectives.

AOB

- DH outlined the aims for the subsequent workshops.
- DH will circulate a poll to capture everyone's availability for future workshops.

- Future dates to be circulated as soon as everyone has confirmed their availability using the poll.

Appendix 6.5

Workshop 2: Information Sheet

Hello and thank you for expressing an interest in joining the online workshop taking place on **Thursday 17th February at 11:30-13:00 on Microsoft Teams** (see Teams joining link below). I really appreciate your help and thought you might find it useful to have some background information so you know what to expect on the day.

- **What is Workshop 2 trying to achieve?**

1) Update or remind everyone on the discussions that took place in **Workshop 1** which only involved patients and carers.

2) Reach an agreement on the medicine to target the 'stopping double-checking' intervention on.

3) To discuss as a group how such an intervention (stopping double-checking) would best be carried out.

- **What will the other workshops involve?**

Workshops 3 and 4 will involve identifying the main barriers to implementing this intervention and discussing how to overcome these barriers. We will also work together to refine this behaviour change intervention (targeting stopping double-checking for the agreed medication).

In **Workshop 1**, we discussed:

- What **double-checking** medicines is and why it can be perceived as a low-value practice.
- What **de-implementation** is (reducing, restricting, replacing or removing completely).
- What **co-design** is ("*The meaningful involvement of research users during the study planning phase of a research project.")*

In preparation for **Workshop 2**, please could you think about the following?

- Which medicines that are double-checked would you feel **most comfortable** stopping?
- How could we stop carrying out double-checking on the agreed target medicine?

To join Workshop 2 click on this link:
https://teams.microsoft.com/l/meetupjoin/19%3ameeting_ODgyNTUxMDAtNTg2NC00OWJjLWE3ZjQtOTE5MjEwMGU0MWMy%40thread.v2/0?context=%7b%22Tid%22%3a%22bdeaeda8-c81d-45ce-863e5232a535b7cb%22%2c%22Oid%22%3a%22e68a579d-1e25-435c8e87-4127debd1269%22%7d

If you experience any difficulties joining the workshop, please email me (Daisy Halligan) at: psdh@leeds.ac.uk. I will be in the meeting room from **11:15** to help set up and welcome you. After participating in this workshop, you will be emailed a **£30 Amazon Voucher** by way of thanks.

Appendix 6.6

Workshop 2: Summary

Thank you all so much for attending the second workshop on the **17th February**. It was fantastic to hear your thoughts on the different types of medication we could target when developing an intervention around stopping double-checking.

I have tried to summarise the key points from the workshop below:

Question 1: "what form of double-checking should we develop an intervention around stopping?"

- We could stop double-checking medicines that do not require weight calculations or critical thinking during administration e.g. avoid high-risk medicines used in oncology and paediatrics that often require weight-based calculations to ensure the correct dose is given.

- Instead, an intervention could be developed that targets medicines that come in a pre-filled/ pre-prepared syringe and don't require any calculations.

- We can't target controlled drugs because there are legal requirements in place depending on the Trust policy.

- Medicines need to be targeted where the policy to double-check is 'recommended if possible' rather than 'absolutely essential'.

- Target drugs could be identified by comparing different Trust policies e.g. If drug X is only single-checked in Bristol Royal Infirmary, could we stop double-checking drug X in Leeds Teaching Hospitals?

- It could be possible to target drugs that can be purchased over the counter but require a double-check when administered in hospital e.g. paracetamol.

- Insulin could be a potential target practice to stop because this is only double-checked in some healthcare settings and often the patient self-administers this drug at home. Involving patients in double-checking insulin has been done in the past but unsure about the effectiveness of the intervention.

- Could stop double-checking in emergency situations where it potentially causes more harm due to the delay in administering the medication e.g. IV antibiotics in cases of sepsis. Other time-critical medicines might be less of an issue e.g. anti-epileptics.

Question 2: "*how* could we de-implement a form of double-checking?"

- Medicines that the patient is used to administering themselves outside of hospital. In such cases, the patient could perform the second check rather than a

nurse. This could empower the patient and save time for nurses. However, there would be issues surrounding patients' potentially fluctuating capacity to carry out the task. A patient who is almost well enough to go home vs. a patient who is acutely ill. How could we involve patients in double-checking and ensure that it is inclusive for everyone? Many barriers to ensuring inclusivity e.g. language. Would we need to add in a procedure to assess that a patient is well enough to double-check the medication?

- A pharmacist could carry out the second check instead of a nurse. However, often, there is only one pharmacist working on one or two wards at a time so hospitals would be unlikely to be able to make this change.

- Often patients are already involved in an informal way during the administration of medicines. It is beneficial for their discharge (more aware of how to take the medicine when they go home) but sometimes this is not possible due to time pressures.

- Could use a barcode system to act as a second check in discreet situations where there is no need to calculate the dose. The barcode check could verify that you are about to administer the correct type of medication. This has been done more in the US and is being explored in the UK.

Additional Points Discussed

- Really important to consider how we will measure the impact of this intervention on safety. Will we measure the impact of the intervention through the time it saves nurses or a reduction in the number of adverse events or in another way?

- Discussed the issue of accountability when potentially involving a patient in a second check. If a patient carried out a second check and a medication error occurred, would the patient be responsible?

- Discussed reducing the number of times that double-checking is carried out to try and increase the quality of double-checks taking place in other higher-risk situations.

Conclusion

In Workshop 3, we will explore three key areas identified in Workshop 2 to try and identify a form of double-checking that people might be more willing to de-implement:

1) Medicines that patients self-administer at home but are double-checked in hospital.

2) Medicines which can be bought over the counter but are double-checked in hospital.

3) Medicines which are double-checked in some hospitals but not in others.

Appendix 6.7

Workshop 3: Information Sheet

Hello and thank you for expressing an interest in joining the online workshop taking place on **31st March at 11:30-13:00 on Microsoft Teams** (see Teams joining link below). I really appreciate your help and thought you might find it useful to have some background information so you know what to expect on the day.

- **What is Workshop 3 trying to achieve?**

1) Recap on the discussions that took place in **Workshop 2** during which we identified three categories of medicines to explore further during Workshop 3 as potential target forms of double-checking.

2) Reach an agreement on one target form of double-checking (from the three categories of medicines discussed during Workshop 2) to use as a target for the de-implementation intervention.

3) To discuss as a group how such an intervention (stopping double-checking) could be carried out in practice.

- **What will the other workshops involve?**

Workshop 4 will involve identifying the main barriers and facilitators to de-implementing the chosen target form of double-checking.

In **Workshop 2**, we discussed:

- Different forms of **double-checking** that we could consider stopping.
- The difficulties that might be associated with trying to stop double-checking of these different medicines
- We identified 3 groups of medicines for further discussion during workshop 3:

1) Medicines that patients self-administer at home but are double-checked in hospital e.g. insulin.

2) Medicines which can be bought over the counter but are double-checked in hospital e.g. paracetamol.

3) Medicines which are double-checked in some hospitals but not in others e.g. certain antibiotics.

In preparation for **Workshop 3**, please could you think about the following?

- Which medicine (chosen from one of the three categories identified above) would you most want **to stop double-checking**?
- How could we stop carrying out double-checking on the agreed target medicine?

To join Workshop 3 click on this link:
https://teams.microsoft.com/l/meetupjoin/19%3ameeting_ODgyNTUxMDAtNTg2NC00OWJjLWE3ZjQtOTE5MjEwMGU0MWMy%40thread.v2/0?context=%7b%22Tid%22%3a%22bdeaeda8-c81d-45ce-863e5232a535b7cb%22%2c%22Oid%22%3a%22e68a579d-1e25-435c8e87-4127debd1269%22%7d

If you experience any difficulties joining the workshop, please email me (Daisy Halligan) at: psdh@leeds.ac.uk. I will be in the meeting room from **11:15** to help set up and welcome you. After participating in this workshop, you will be emailed a **£30 Amazon Voucher** by way of thanks.

Appendix 6.8

Workshop 3 Summary

- DH highlighted the key discussion points from Workshop 2 and outlined the three categories of medicines that Workshop 3 was going to explore in more depth:

Category 1: Medicines that patients self-administer at home but are double-checked in hospital.

Category 2: Medicines that can be bought over-the-counter but are double-checked in hospital.

Category 3: Medicines that are double-checked in some hospitals but not in others.

- **Activity 1** involved going into breakout rooms and discussing two questions: 1) Which category of medicines would you most want to de-implement? Why? 2) Can you provide some examples of the types of medicine that might be included in this category?

Rebecca's Breakout Room Summary

- Discussed that medicines in categories 1 and 2 might be easier or less worrying to stop for both healthcare professionals and patients. However, the majority of medicines that fit into categories 1 and 2 are not double-checked so there might not be much value in stopping double-checking medicines in these categories.

- It's really important to understand why the policies in double-checking differ depending on the location. More research is required in this area.

- Unaware of which drugs are double-checked in some settings but single-checked in others. Identifying medicines that are single-checked in some settings but double-checked in others might be a good place to start.

- We should try to think about why the double-check is being carried out: do drugs look similar? Do they need calculating? Is there an alternative way of preventing medication error without performing a double-check?

- Self-administering medicines – it's important to be aware that some patients' family members/carers administer drugs.

- In some areas, all IVs are checked but in other areas of the same hospital, they might not be e.g. in paediatrics, all IVs are checked because the calculations for administering medicines in children are so complex. However, in ICU, double-checking is sometimes not required because staff in these areas administer these medicines so often that they have competency assessments to ensure they are able to administer the medicine. This assessment thereby removes the need to double-check. Competency assessments could be a possible alternative to carrying out double-checking.

- It is important to understand the reasons why you are asking for the double-check – some reasons are more valid than others.

- Really interested to look at some areas that do double-check and others that don't. Policies and procedures that differ between hospitals in the same area may be really difficult for bank staff to work with. It is a good opportunity to think about why we are carrying out this double-check.

- A study exploring the different practices of double-checking across a region would be valuable.

- Perhaps double-checking for some medicines has come about as a knee-jerk reaction

- A medicine that was mentioned as a possibility for stopping double-checking was insulin. Insulin is not checked in the community – this could be a good target drug to focus the intervention on stopping.

Faiqah's Breakout Room Summary

- The group decided that a good starting point for choosing a group of medicines to stop double-checking would be identifying medicines that fit into all three categories.

- Discussed involving patients as a second checker for medicines that they usually self-administer at home (category 1). Participants mentioned that this would provide the biggest benefit to patients and staff because it will save most time for nurses.

- If a patient was involved in carrying out the double-check, accountability wouldn't be a problem as long as the patient was risk assessed prior to being involved in the double-check.

- The patient is going to go home and self-administer the medicine once discharged, so you might as well get them started in hospital where they can be monitored.

- Alternatively, double-checking of drugs in hospital that patients usually self-administer at home could be stopped completely rather than involving patients in the second check. However, some participants mentioned apprehensiveness surrounding the possibility that, while in hospital, a patient's medicine regime may change and new medicines may interact with old medicines that could cause unexpected problems.

- "Anything that a patient normally administers on their own before coming into hospital, we shouldn't double-check".

- The group preference was to focus on low-risk self-administered medicines.

- Examples of groups of medicines that double-checking could be stopped for included inhalers and oral anticoagulants (because they are regularly

stopped for brief amounts of time e.g. when a patient visits hospital for surgery).

- Although participants thought stopping double-checking of category 1 drugs would not be any more unsafe for patients, it was anticipated that the Trust would be risk adverse to this idea. To overcome adversity, education would be needed for staff to understand the reasons why we would be stopping the double-check.

- Discussed whether some medications fall into more than one category. Processes differ across and between Trusts.

- Additional examples of medicines that could be targeted included: paracetamol and insulin.

- Discussion also addressed: 1) whether patients are aware that double-checking takes place and 2) the other safety checks that take place prior to administration of medicine.

Daisy's breakout room summary:

- Discussed de-implementing double-checking of category 1 by involving patients in the double-checking process. However, there are several problems with involving patients in second checking medicines that they usually self-administer at home (category 1) e.g. patient capacity to carry out this check may fluctuate throughout their stay in hospital.

- Discussed 'SAM-POD' (self-administration of medicines) and if this could be applied when trying to involve patients in a second double-check.

- Insulin was mentioned as a potential target medicine within category 1, however, it is not double-checked across all trusts. Therefore, this medicine also fits into category 3.

- Medicines that you can buy over the counter are often not double-checked in hospital and the example of paracetamol is difficult because oral paracetamol is very different to IV paracetamol in terms of risk.

- IV medications might be a good medicine group to target because it takes so much time for nurses and there is a lot of potential for that to reduce pressure on staff and improve the safety of care. There might be some exceptions to stopping double-checking of certain IVs e.g. double-checking should still be carried out when administering potassium because there is a perceived higher-risk associated with this form of IVs.

All groups returned to the 'main room' and summarised their discussions. The following point was made in the Teams chat: **'We need to make sure we are not getting double-checking of medicines being administered by health care staff confused with medicines we think would be suitable for self-administration.'** There was a brief discussion on how these two concepts are different.

Activity 2: All participants were asked to write a group of medicines or one medicine into the Teams chat to make a decision on their chosen target for de-implementing double-checking.

Type of Medicine	Number of Votes
Mild analgesia e.g. paracetamol tablets	1
IV fluids/meds	3
Medicines that can be bought over the counter but are double-checked in hospital settings	2
Insulin (not from vial and for diabetes).	**6**
Parkinson's medication	1

As a group, it was decided that we will take insulin forward as the target medicine to develop the intervention around stopping double-checking. Potential issues were then briefly discussed with trying to remove this medicine:

- Insulin is not double-checked in all hospitals.
- Discussed that patients carrying out the second check instead of a nurse isn't really de-implementing double-checking because it is the same practice in a different form. Additionally, to ensure the patient has the capacity to carry out a second check, this would introduce additional checks to ensure the patient has capacity to independently check their own insulin which could be perceived to be implementation rather than de-implementation.
- Agreed target medicine: A nurse not double-checking insulin that is administered sub-cutaneously using a pen device to a patient who has stable diabetes at a time when the patient usually receives insulin in hospital.
- Concluded by saying the focus of the next workshop will be to think about how double-checking of insulin could be stopped in healthcare settings and then think of the barriers and facilitators to achieving this.

Next steps:

- As mentioned in Workshop 3, it is really important that **we don't get double-checking of medicines being administered by health care staff confused with medicines we think would be suitable for self-administration.**
- To avoid this, we will target insulin that **can't** be self-administered e.g. insulin that is administered to the patient by a healthcare professional.
- Workshop 4 will involve exploring the potential barriers and facilitators to stopping this form of double-checking.

Appendix 6.9

Workshop 4: Information Sheet

Hello and thank you for expressing an interest in joining the online workshop taking place on **Thursday 17th March at 11:30-13:00 on Microsoft Teams** (see Teams joining link below). I really appreciate your help and thought you might find it useful to have some background information so you know what to expect on the day.

- **What is Workshop 4 trying to achieve?**

1) Update or remind everyone on the discussions that took place in **Workshop 3** which involved patients and carers.

2) Confirm the exact form of double-checking to take forward as the target for this de-implementation intervention.

3) To identify key barriers and facilitators to stopping the target form of double-checking and discuss how we could overcome these barriers in practice.

In **Workshop 3**:

- We agreed on the target form of double-checking that the intervention would focus on stopping: **insulin administered by a nurse using a pre-filled pen device.**

In preparation for **Workshop 4**, please could you think about the following?

- What do you think the main barriers to de-implementing the target form of double-checking could be?
- How do you think we could overcome these barriers to de-implementation?

To join Workshop 4 click on this link:
https://teams.microsoft.com/l/meetupjoin/19%3ameeting_ODgyNTUxMDAtNTg2NC00OWJjLWE3ZjQtOTE5MjEwMGU0MWMy%40thread.v2/0?context=%7b%22Tid%22%3a%22bdeaeda8-c81d-45ce-863e5232a535b7cb%22%2c%22Oid%22%3a%22e68a579d-1e25-435c8e87-4127debd1269%22%7d

If you experience any difficulties joining the workshop, please email me (Daisy Halligan) at: psdh@leeds.ac.uk. I will be in the meeting room from **11:15** to help set up and welcome you. After participating in this workshop, you will be emailed a **£30 Amazon Voucher** by way of thanks.

Appendix 6.10

Workshop 4 Summary

- DH re-iterated that the overall purpose of the workshops is to better understand the process of de-implementation in hospital settings. Our previous research indicated that double-checking of medicines is low-value for patient safety and therefore we aim to develop an intervention designed to stop double-checking a specific group of medicines/ medicine.
- In Workshop 3, we reached a consensus to focus the intervention on stopping a form of double-checking that targets a specific form of insulin. However, it is important that we are all talking about exactly the same form of insulin so that we can understand the specific barriers to stopping this medicine.
- DH then briefly outlined the timeline of the workshops and what the purpose of Workshop 4 would be: to discuss the barriers and facilitators to stopping the double-checking of insulin.
- A discussion took place that confirmed the choice of target medicine.
- DH reiterated that we did not want to involve patients in de-implementing double-checking because the purpose of this research is to remove practices and not add new ones which might occur if we target self-administration of medicines e.g. capacity checks.
- DH asked the group if they were happy to focus on the form of insulin that was previously agreed upon in Workshop 3. The following considerations were mentioned by the group:
  - Insulin for diabetes only.
  - Administered **sub-cutaneously** and NOT via infusion.
  - Should only be carried out on patients who are established on an insulin regime → not recently diagnosed with diabetes. (What do we mean by recently diagnosed? Diagnosed in last three months? Diagnosed during that admission?) → for discussion during discussion facilitators + barriers.
  - Important also to monitor when patients are transitioning from insulin A to insulin B it might not be appropriate to stop the double-check at this point.
  - It is probably best to have the target practice just as the medicine i.e. sub-cutaneous insulin for diabetes in a pen device. Then don't worry about the situation because its about the medicine and you can't expect someone to remember when the policy applies in what clinical situation because they'll see so many different things. **It needs to be at the medicine level**.
  - Insulin comes either as a **pre-filled syringe or a pen** that you put a cartridge into and very rarely insulin comes in a vile where you use a needle to administer it but that's very rare and hardly ever done and it shouldn't be included.
  - One participant mentioned it is more about stability of condition rather than whether the patient has been recently diagnosed. If the patient is stable and it's a dose they've been on for a few days i.e. the patient is not using a sliding scale.
  - Also, some patients are on really complex regimes of insulin which may warrant additional scrutiny due to the amount or the different types of insulins being administered. For example, additional insulin might be administered due

to the 'sick day rules' e.g. if ketones are raised outside of the normal range, this would require immediate insulin for extra caution.

- When patients come in for elective surgery, their dose might be halved on the day so it would be different to what they'd normally take.
- These ideas feed into how we define when the patient is stable i.e. not when ketones are raised but that is different to those on a sliding scale.

Agreed specific form of target insulin:

"Insulin administered sub-cutaneously by a healthcare professional to a diabetic patient using a pen device."

Activity 1: In breakout rooms, please discuss barriers and facilitators to stopping double-checking of this type of medicine.

- Important point made by patient: if this change were to take place, would patients be informed that double-checking of their insulin would no longer be taking place? DH said patients would probably not be aware of double-checking taking place in the first place so it might be more distressing to tell patients that a safety practice is no longer happening.
- In the community, insulin isn't double-checked but the risk is lower in the community because you don't have to choose from lots of different types of insulin which look and sound very similar.
- If mixing pen-filled insulin syringes, sometimes the strengths are very different which is another factor that requires consideration when stopping double-checking.
- **Barrier = confidence of staff**
- In hospital, you have to prescribe it, you have to know the right dose (not recorded in the GP record). You could have 10 units or 100 units - could be a very easy typo to make but have catastrophic consequences. Therefore, the first check (carried out by the nurse, pharmacist or doctor) in an emergency is important. Then the medication should be formalised by a pharmacist or a diabetes specialist. One participant said that a diabetes verification step might be a good idea where somebody (even if its two nurses or one nurse) takes responsibility for double-checking that everything is correct and then signs that somewhere but you need a process where everything is checked – usually it would be a pharmacist but they're not always there on a weekend so we can't rely on a pharmacist.
- Big risks with insulin. You absolutely need to make sure that it is correct before administering it to the patient.
- Discussed that the second check is sometimes not valuable i.e. if there is a hierarchy in carrying it out therefore it might as well not be done in some circumstances.
- There are 6 different types of device that can be used to administer insulin.
- **Barrier:** leadership of the hospital would need to buy into it. If the hospital has always carried out the practice and then tries to stop it, that would be a big deal.
- **Barrier:** behaviour change for the nurses.
- **Barrier:** worry about making a medication error.

- **Facilitator** → 'ease staff burden and make staff more productive' sell this benefit to senior leaders to get them on board. Once benefits of intervention are known, communicate this clearly to overcome senior leader reluctance.
- This intervention also has potential to 'raise the potential of the pharmacy' – their part in this could be enhanced if they were involved in intervention.
- **Facilitator** → involving key stakeholders e.g. diabetes nurse specialists or diabetologists. Absolutely need to get them onboard with this intervention because a lot of care for diabetic patients is carried out by these people**.**
- **Facilitator** → message that is communicated to healthcare staff must be really simple because making change in healthcare is so complicated. In each organisation, people like to change and shape messages to make it fit the organisational communications strategy so need to make the message something that at first glance people can understand.
- **Facilitator** → evidence/ stats of patient benefit.
- **Barrier** → what might the impact be on nurse registration if they make a mistake whilst carrying out the intervention? (Fear)
- **Facilitator** → reassurance that nurses will be protected if they make a medication error when not double-checking.
- **Facilitator** → link it into the just culture guidelines.

Gill's group:

- **Barriers:** complexity of patients receiving insulin.
- **Facilitator:** keep it simple by defining it at the medicine-level which would minimise confusion in practice e.g. insulin for diabetes administered sub-cutaneously by a healthcare professional using a pen-filled device.
- **Barrier:** staff will be fearful due to change but there will be others for whom this change will be a relief therefore we could use the staff who are on-board to act as buddies/ mentors to support less-keen healthcare staff with making the change e.g. could discuss concerns.
- **Barrier:** electronic recording of double-checking insulin. The systems are set up to need two signatures so you would need to alter the configuration of the system so that it only requires one signature. It is possible but would take time to make such a significant change across different areas of the hospital.
- **Barrier:** convincing strategic leads e.g. clinical director to make the change. Vicarious liability. Trusts will rely on that reassurance that two members of staff have checked the drug prior to administration.
- **Facilitator:** highlighting that stopping double-checking could save time which could potentially also increase the likelihood of timely administration of insulin.

Faiqah:

- **Barriers:** risk, litigation, accountability. When a participant asked nurses in their Trust 'why do you like to double-check medicines?' 'Shared accountability' was a commonly given answer. If someone else is checking the medicine – we would be removing that which could be a barrier to some people.
- **Barriers:** fear of change → it's a cultural change which might be difficult.

- **Facilitators:** thinking about the historical reasons for why double-checking came in and thinking do they apply today? Are they relevant? Insulin is manufactured in more manageable devices now so it might be less important?
- **Facilitators:** nurses might think that removing this practice is 'cutting corners' so it would be really important to get the potential patient benefits across.
- **Facilitators:** getting the point across to staff that the intervention has the potential to save a lot of time and also empower staff. This would come along with the fact that the support that nurses receive will still remain i.e. there will always be a preceptor in place for anything they may need or a pharmacist on the ward.
- **Facilitator:** this change must be underpinned and supported by a just culture. If there is a mistake, you don't want to undo all hardwork by launching into a blaming investigation.

  - "We need to look at medicines that are already double-checked by healthcare professionals. No patients are involved in the decision making when administering insulin because the decision is already made. Don't go down the rabbit hole.

  - "Am I competent enough to administer this insulin without a double-check? We think the answer is yes because the evidence is not there for the vast majority of double-checking that we do. Must keep focused on this or it becomes overly complicated."

  - "As well as convincing ward staff it will be really important to convince senior leaders/ governance/ patient safety e.g. medical director. Vicarious liability is paramount and must make sure that the patients and staff are safe."

Daisy:

- **Barriers**: staff confidence – if you've carried out double-checking on drugs for decades that will be really scary.
- **Barriers**: must safeguard staff from blame if something went wrong.
- **Barriers**: leadership of hospital i.e. senior members of staff might be reluctant.
- **Facilitators**: educating and training nurses and senior leaders around the potential benefits of this change and involving key stakeholders in the development of the intervention e.g. diabetes specialists.
- **Facilitators**: communicating message of change in very clear and simple way to ensure that it is not misconstrued from Trust to Trust – minor changes can arise due to different organisational communication strategies.

Break

**How* could we de-implement this target category of medicines?*

- A road map could be a good idea. It is likely that the confidence of staff will come from senior leaders so it would be important to get their buy in first and also important to buy into the just culture.

- Senior management teams would need to understand the evidence behind this change. They'd need to understand the risk, benefit what mitigations would need to be in place.

- Big barrier due to lack of evidence → when there is no evidence yet, how do you bring about the change? Needs buy-in from senior leaders because they will have to sign-off policies.
  → evidence of safety would be most important and whether it increases or decreases error (group thinks this evidence doesn't exist yet).

- Could sell it to senior leaders/ senior medical team through a pathfinding exercise – no evidence yet but would they like to provide it because the potential implications are large. Using improvements or start small-scale and use the evidence as you go. This would mitigate the risk. It would be important to monitor errors, time saved and reduction in delays. Use an improvement science approach to build the evidence as you go to build the pathfinder.

- A senior leader would probably like to see a risk assessment to understand what the potential risks might be and how it is unlikely and the expected benefits and how it might offset those potential risks.

- Ensuring a just culture → Organisational cultural change that has to be demonstrated for people to start believing it exists. It would need to be written into the policy changes that we would be making.

- If people thought (including senior management) that a just culture was being adopted, the impact would be huge in terms of coming forward for near misses/ errors. There is a nervousness around cultural change e.g. going from double to single checking due to worries that the error rate would go up. But if you are based in a Trust that is quite punitive, staff would not want to report errors. Errors would happen but learning wouldn't be there. In a truly Just Culture organisation, people should report **everything** and in organisations that embed the Just Culture, they do report everything.

→ higher reporting rates is not the sign of a bad Trust, it is a sign of a good Trust because then they are also reporting near misses so if you make these changes without the Just Culture in place, you are starting on the back foot. It can take a long time e.g. five years to get that culture properly embedded in a Trust. It is a barrier now because it is not embedded yet but it will be a facilitator once it is.

- If a Just Culture is going to work it has to involve HR staff in tandem with patient safety staff – one without the other means JC won't work. Everyone must be onboard at every stage of the journey and it is a very long journey.

Next Steps:

➔ DH will go through the discussions had today and then identify key barriers and facilitators to stopping the double-checking of the target insulin. I will then use behaviour change theory to map behaviour change techniques onto the barriers

and see how we could use the facilitators to make implementation of the intervention easier.

- ➔ Share the prototype with all participants and highlight how everyone's ideas have fed into the intervention. Participants will be asked to give feedback on the prototype if they're willing and then we can make modifications until a consensus is reached on the intervention.
- ➔ Mentioned the possibility of a 'Sharing and Learning Event' later down the line to show participants how their ideas fed into the intervention design and reflect on process/ provide feedback.
- ➔ DH will send out vouchers and an evaluation form.

Appendix 6.11

Reduced list of 32 BCTs following application of the Theory & Techniques Tool (Johnston et al, 2020)

Barrier/ Facilitator	**Domains:** Constructs	**Behaviour Change Techniques**
Barrier: Resistance from senior members of staff (workshops and interviews)	**Social influences:** Power, group conformity, social pressure, intergroup conflict.	- Social comparison - Provide information about others' approval - Social support (practical
Barrier: Fear of harming patient (workshops and interviews)	**Emotion:** fear, stress	- Reduce negative emotions
	Beliefs about consequences: Outcome expectancies, beliefs, anticipated regret	- Anticipated regret - Comparative imagining of future outcomes.
	Beliefs about capabilities: Professional confidence, perceived competence, perceived behavioural control, self-confidence	- Verbal persuasion about capability - Focus on past success
	Skills: Skill development	- Behavioural practice/ rehearsal
Barrier: Preference for shared accountability (workshop)	**Beliefs about capabilities:** Professional confidence, perceived	- Verbal persuasion - Focus on past success

	competence, perceived behavioural control, self-confidence.	
Barrier: Medication safety policy (workshop)	**Environmental context and resources:** Organisational culture/ climate, critical incidents	- Prompts/ cues
Barrier: Electronic prescribing systems design that requires two signatures (workshop)	**Environmental context and resources:** Resources/ material resources, barriers and facilitators	- Prompts/ cues - Adding objects to the environment - Restructuring the physical environment
Barrier: Lack of evidence of benefits of stopping DC (workshops and interviews)	**Beliefs about consequences:** Outcome expectancies, beliefs	- Comparative imagining of future outcomes - Information about social and environmental consequences - Information about health consequences
	Beliefs about capabilities: perceived behavioural control, professional confidence	- Verbal persuasion about capability

Facilitator: Clear communication of potential benefit to patients and staff (interviews and workshops)	**Beliefs about consequences:** Characteristics of outcome expectancies	- Salience of consequences - Information about health consequences
	Goals: goal priority	- Review outcome goal
Facilitator: Nurses are protected from litigation if a medication error occurs after they have followed this intervention (workshops)	**Beliefs about consequences:** Beliefs, outcome expectancies	- Information about social and environmental consequences - Information about health consequences
	Social influences: social support, social norms.	- Social support (practical) - Social comparison - Information about others' approval.
	Environmental context and resources: Organisational culture/ climate	- Prompts/ cues.
Facilitator: The change must be underpinned by a just culture (workshops)	**Beliefs about capabilities:** Empowerment, professional confidence, perceived behavioural control	- Verbal persuasion about capability - Focus on past success

Facilitator: Support from senior leaders/ senior medical team (workshops and interviews)	**Social influences:** social support, power, modelling	- Social support (practical)
	Environmental context and resources: organisational culture/ climate	- Prompts/ cues

Appendix 6.12

Workshop 5 Information Sheet

Hi everyone,

Thank you so much for your involvement in this project so far! Your insight has been invaluable and has driven the development of this intervention. We really appreciate that you are willing to take part in an additional workshop to understand how we can overcome the previously discussed barriers to stopping the double-checking of a target medicine in healthcare settings.

I thought it might be useful to briefly recap the workshops that you took part in earlier this year:

- **Workshop 1:** What is de-implementation, what is double-checking and what is co-design (patients only).
- **Workshop 2:** Discussions took place about what form of double-checking we should develop an intervention around stopping. We also discussed *how* these forms of double-checking could be removed from practice.
- **Workshop 3:** We discussed three categories of medicines that were identified in Workshop 1 in more depth in breakout rooms. At the end of the workshop, everyone voted on their preferred target medicine. '**Insulin administered by a nurse using a pre-filled pen device'** received the most votes and was therefore chosen as the target medicine that the intervention would focus on.
- **Workshop 4:** Staff and patients identified some potential barriers and facilitators to stopping the target form of double-checking. We also answered the question 'how could we de-implement this form of double-checking from healthcare settings?'

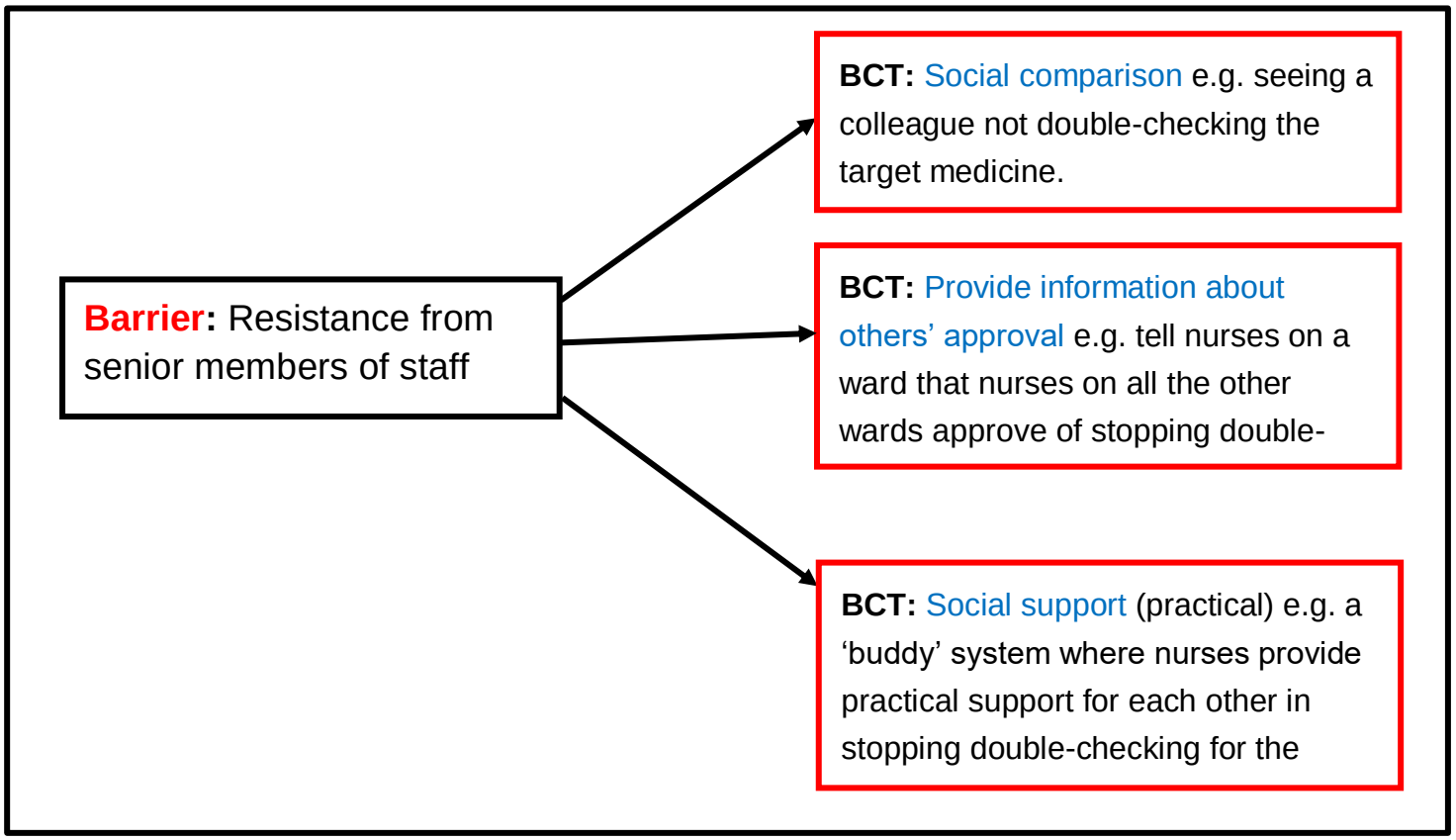
Since Workshop 4, we have gone through the recordings of all the workshops that took place and identified the key barriers and facilitators to de-implementing the target medicine that were discussed repeatedly by both staff and patients. The boxes below describe the key barriers and facilitators to de-implementing the double-checking of insulin administered by a nurse using a pre-filled pen device.

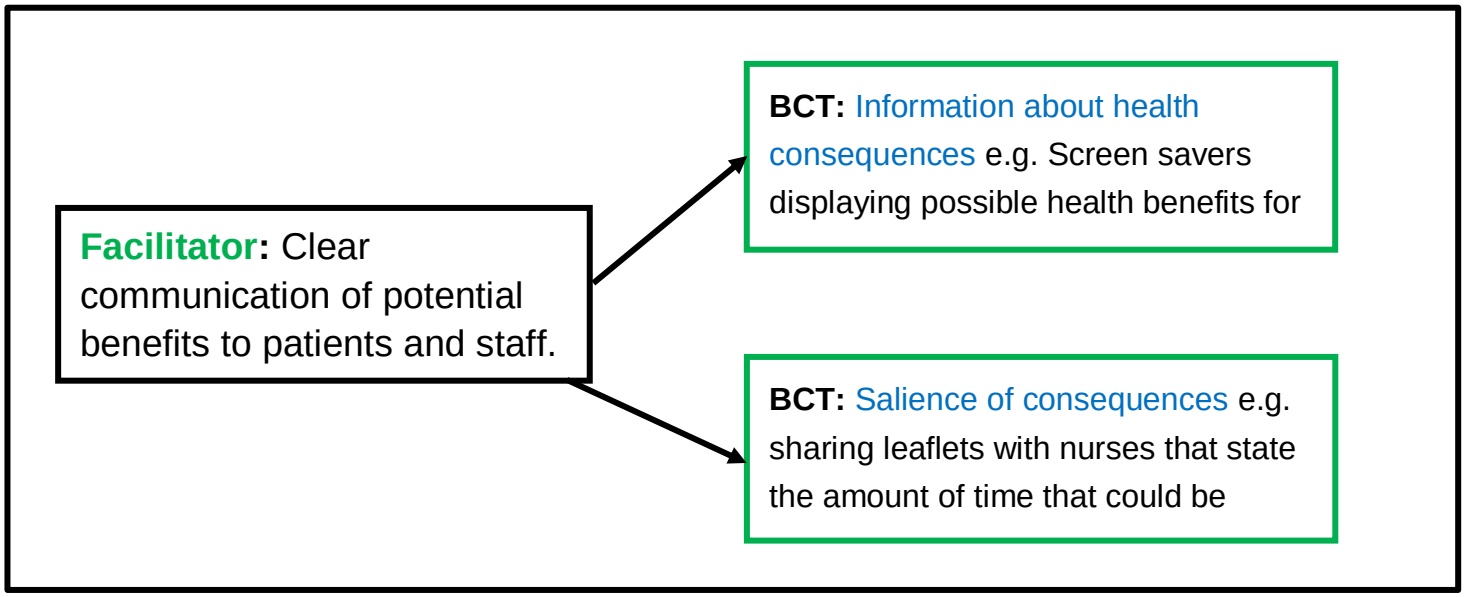
Barriers	Description
Resistance from senior members of staff	It is likely that more senior members of healthcare staff who have a lot of responsibility for ensuring the ward is safe will be reluctant to remove this practice because it was originally implemented to prevent medication errors.
Fear of harming patient and becoming liable	Nurses described feeling scared about making a medication error after not double-checking the target medicine which could harm the patient and have legal implications.
Preference for shared accountability	Double-checking the target drug ensures that one nurse is not solely responsible for the administration of a drug. When administering a high-risk medicine, it can be reassuring to have another nurse who is able to verify your decision.
Lack of evidence of benefits of stopping DC	There is a lack of empirical evidence demonstrating that stopping double-checking doesn't increase medication errors. Evidence is needed to convince healthcare professionals of the benefits of removing this practice.

Facilitators	Description
Clear communication of potential benefit to patients and staff.	There is a need to effectively communicate the specific patient benefits to staff relating to the stopping of double-checking. Staff might otherwise assume that removing the practice is in the interest of cost-cutting which is unlikely to motivate staff to stop carrying out the practice.

Support from senior leaders/ senior medical team	Support and encouragement from senior colleagues will be essential in facilitating the removal of this practice due to their influence on the behaviour of more junior members of healthcare staff.
The change must be underpinned by a just culture.	Nurses need to be reassured that if they don't carry out a double-check on the target medicine and a medication error takes place, they will not be blamed for the incident.

As part of the intervention development process, we then used behaviour change theory to map behaviour change techniques (BCTs) onto the barriers and facilitators above. Examples given below.





- At this point in the intervention development process, we are now trying to understand: 1) which specific BCTs should the intervention focus on (it doesn't need to include them all) and 2) how could the BCTs be implemented in practice? I.e. how could we operationalise a BCT such as social comparison in your healthcare setting?

- This contextual information will increase the likelihood of the intervention successfully working in practice.

- In the workshop, we will therefore be discussing the following BCTs:

Barriers	BCTs
Resistance from senior members of staff	- Social Comparison. - Provide info about others' approval. - Social support (practical).
Fear of harming patient and becoming liable	- Reduce negative emotions. - Anticipated regret. - Comparative imagining of future outcomes. - Behavioural practice/ rehearsal.
Preference for shared accountability	- Verbal persuasion about capability. - Focus on past success.
Lack of evidence of benefits of stopping DC	- Information about social and environmental consequences. - Information about health consequences.

Facilitators	BCTs
Clear communication of potential benefit to patients and staff.	- Information about health consequences. - Salience of consequences.
Support from senior leaders/ senior medical team	- Prompts/cues. - Social support (practical).
The change must be underpinned by a just culture.	- Verbal persuasion about capability. - Focus on past success.

- Once we have some ideas about how the intervention could be implemented in practice, using some of the BCTs above, I will use your ideas to create a prototype of the intervention. I will then share the intervention with you and give you the opportunity to provide feedback and suggest any changes.

- Please let me know if you have any questions or suggestions about the upcoming workshop.

Thank you again for your ongoing contribution. Looking forward to seeing you on the **11th August at 13:00-14:00!**

Appendix 6.13

Barrier/ Facilitator	Key Behaviour Change Techniques	Intervention Strategies	Context
Barrier: Resistance from senior members of staff	**1) Social comparison**	• Share learning from different healthcare contexts that have already stopped double-checking.	In community settings, nurses do not double-check the administration of medicines because the resources aren't available. There are also examples of wards that have already stopped double-checking certain medicines e.g. some types of antibiotics. It could be possible to share learning from these examples to reduce resistance from more senior members of staff.
Barrier: Fear of harming patient and becoming liable	**2) Anticipated regret**	• Raise awareness of expectations of future regret about performing double-checking relating to patient safety specifically.	It would be important to emphasise that the main objective of stopping the double-checking of the target medicine would be to benefit patients rather than cut costs. For example, it would be better to emphasise that continuing to double-check the target medicine could cause medication delays for patients which could pose risks to safety

			instead of highlighting the associated financial cost of double-checking.
Barrier: Lack of evidence of benefits of stopping DC	**1) Information about the social and environmental consequences**	• Provide evidence by carrying out a 'mini-audit' of double-checking the target form of insulin. This could be gathered via a small scale plan-do-study-act study. • Information could be disseminated via verbal presentations, screen saver campaigns, ward meetings or staff meetings.	Gathering evidence that either: 1) double-checking doesn't prevent medication errors or 2) stopping double-checking doesn't increase medication errors would be essential when trying to get nurses on board with stopping double-checking the target medicine.
	2) Information about health consequences		Sharing information relating to the possible consequences of stopping double-checking during staff meetings could help gauge staff attitude towards changing their behaviour.
Facilitator: Support from senior leaders/ senior medical team.	**2) Social support (practical)**	• Schwartz rounds.	Scheduled 'Schwartz round' style meetings involving senior nurses would provide staff with the opportunity to reflect on how they feel about moving from double to single-checking to help them feel more supported.
Facilitator: The change must be			Provide education to staff at different levels of the healthcare service on how to achieve

underpinned by a Just Culture			a Just Culture. It is more likely that staff would feel more confident with stopping double-checking of the target medicine if they felt supported and confident in their working environment.