Reducing substance misuse and related problems: How can unhealthy alcohol users and problem drug users be effectively intervened with in general hospital settings?

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Abstract

Background: There is a high prevalence of unhealthy alcohol use and problem drug use among patients presenting to general hospital settings. However, many unhealthy alcohol users and problem drug users in these settings are not even aware, or do not acknowledge that they have such problems. Their presentation to hospital for the treatment of other conditions offers an opportunity to engage with them. However, there is uncertainty over how best to identify, assess and intervene with this population.

Aim: To investigate how unhealthy alcohol users or problem drug users can be effectively identified, assessed and intervened with when they present to general hospital settings for the treatment of other conditions.

Methods: This thesis is based on six published papers that used systematic review, meta-regression and Delphi methods.

Main findings: To date, research on interventions for unhealthy alcohol use in general hospital settings has focused on brief interventions (BIs). Multiple session BIs are likely to be beneficial for unhealthy alcohol use in these settings. Where targeted screening and intervention is the strategy of choice, a focus on gastroenterology and emergency medicine is a promising way to target resources for unhealthy alcohol use. There is lack of evidence on how to effectively identify and intervene with problem drug users. The available evidence favours the ASSIST as the problem drug use screening instrument of choice. There is also lack of evidence to inform which comprehensive substance misuse assessment package to use in these settings.

Conclusions: There is still need for robustly designed research on how to effectively identify, assess and intervene with unhealthy alcohol users and problem drug users within general hospital settings. It is to be hoped that the body of work presented in this thesis will, effectively, contribute to the development stage for other primary research in the future.

Table of contents

List of tables

List of boxes

List of figures

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I would like to dedicate this thesis to my husband Stanley, son Anesu and daughter Farirai who inspire me and make me smile every day.

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I would like to thank my co-authors for making this collection of papers possible; and the ARiAS research team, a team of esteemed researchers whom I worked alongside with. A very sincere thank you also goes to the ARiAS management group.

Finally I would like to thank the NIHR for funding this work through the Collaborations for Leadership in Applied Health Research and Care for York, Leeds and Bradford.

Author's declaration

This thesis is based on a collection of six papers listed below. While all the papers are co-authored with others, I made significant individual contribution to each of them. Details of these contributions are provided below, signed by myself and one of the major contributory co-author for each paper.

1. Mdege, N.D., and Lang, J., on behalf of the ARIAS Research Group. (2001). Screening instruments for detecting illicit drug use/abuse that could be useful in general hospital wards: a systematic review. *Addictive Behaviors,* 36(12), 1111–1119.

Contribution of the candidate: I was involved in the conception of the research question and study design; and conducted the literature search. I was also involved in instrument and study selection and data extraction. I conducted the data analysis, synthesis and interpretation, and prepared the manuscript including subsequent revisions.

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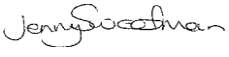
Noreen D. Mdege Jennifer Sweetman (nee Lang)

2. Sweetman, J., Raistrick, D., Mdege, N.D., and Crosby, H. (2013). A systematic review of substance misuse assessment packages. *Drug and Alcohol Review,* 32(4), 347-355.

Contribution of the candidate: I was involved in the conception of the research question and study design; and was responsible for conducting the literature search. I was also involved in instrument and study selection; data extraction, analysis, synthesis, and interpretation; and preparation of the manuscript including subsequent revisions, and approving the final version.



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Noreen D. Mdege Jennifer Sweetman (nee Lang)

3. Mdege, N.D., Fayter, D., Watson, J.M., Stirk, L., Sowden, A., and Godfrey, C. (2013). Interventions for reducing alcohol consumption among general hospital inpatient heavy alcohol users: a systematic review. *Drug and Alcohol Dependence,* 131(1-2), 1-22.

Contribution of the candidate: I was involved in all stages of the project from the conception of the research question, study design, writing of the protocol, through to study selection, data extraction and quality assessment. I analysed, synthesised, and interpreted the data. I was also responsible for writing the manuscript including subsequent revisions.


Noreen D. Mdege Judith M. Watson

4. Watson, J.M., Fayter, D., Mdege, N., Stirk, L., Sowden, A.J., and Godfrey, C. (2013). Interventions for alcohol and drug problems in outpatient settings: a systematic review. *Drug and Alcohol Review,* 32(4), 356-367.

Contribution of the candidate: I was involved in all stages of the project from the conception of the research question, study design, writing of the protocol, through study selection, data extraction, quality assessment, analysis, synthesis, and interpretation; and preparation of the manuscript including subsequent revisions and approving the final version.


Noreen D. Mdege Judith M. Watson

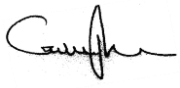
5. Mdege, N.D., and Watson, J. (2013). Predictors of study setting (primary care vs. hospital setting) among studies of the effectiveness of brief interventions among heavy alcohol users: a systematic review. *Drug and Alcohol Review,* 32(4), 368-380.

Contribution of the candidate: I conceived the research question and designed the study; and was involved in study selection, data extraction and quality assessment. I analysed, synthesised, and interpreted the data. I was also responsible for preparation of the manuscript including subsequent revisions.


Noreen D. Mdege Judith M. Watson

6. Mdege, N.D., Raistrick, D., and Johnson, G. (2014). Medical specialists' views on the impact of reducing alcohol consumption on prognosis of, and risk of, hospital admission due to specific medical conditions: results from a Delphi survey. *Journal of Evaluation in Clinical Practice,* 20(1), 100-110.

Contribution of the candidate: I was involved in conception of the research question and study design. I was responsible for questionnaire design, data collection, analysis and interpretation, and preparation of the manuscript including subsequent revisions.

Noreen D. Mdege Graham Johnson

The accompanying integrative chapter is the sole work of the candidate. The work in the thesis has not been submitted for examination at this or any other institution for another award.

1. Introduction

Unhealthy alcohol use and problem drug use have a major impact on population health, health service costs and society (United Nations Office on Drugs and Crime (UNODC), 2012; World Health Organization (WHO), 2011). Many unhealthy alcohol users or problem drug users do not actively seek help for these problems (Madras et al., 2009; WHO, 2011). They may however present to healthcare settings including hospitals with other illnesses or conditions that might or might not be related to unhealthy alcohol use or problem drug use (Madras et al., 2009; Crome, Bloor and Thom, 2006; Watson, 2000). Hospitals are therefore an opportune setting to identify patients with these problems and provide interventions. There is however uncertainty over how best to do this, including which interventions should be delivered.

This thesis is based on six papers (Table 1) that examine a number of key interrelated themes concerning the identification and provision of interventions for unhealthy alcohol use and problem drug use among adult patients presenting at general hospital settings. The full texts of the papers are provided as Appendix 1. This integrative chapter clarifies how these papers form a coherent body of work and make an original contribution to knowledge and understanding.

Before proceeding further, it is important to consider the definitions used for this thesis. Unhealthy alcohol use is defined as any level of drinking that causes problems or puts the drinker at risk of developing problems (Saitz et al., 2007). Problem drug use is defined as regular illicit drug use with or without drug use disorders or dependence (UNODC, 2014). Illicit drug use is defined as the use of drugs which are under international control (and which may or may not have licit medical purposes) but which are produced, trafficked and consumed illicitly (UNODC, n.d.). The six papers presented for this thesis utilised a variety of terms to refer to substance use. However, following reflection, unhealthy alcohol use and problem drug use have been adapted for this integrative chapter as terms that best capture the types of substance use on which these papers focus.

Table 1: List of Papers included as part of the thesis

Paper number	Citation
Paper 1	Mdege, N.D. and Lang, J., on behalf of the ARIAS Research Group. (2011). Screening instruments for detecting illicit drug use/abuse that could be useful in general hospital wards: a systematic review. *Addictive Behaviors,* 36(12), 1111–1119.
Paper 2	Sweetman, J., Raistrick, D., Mdege, N.D. and Crosby, H. (2013). A systematic review of substance misuse assessment packages. *Drug and Alcohol Review,* 32(4), 347-355.
Paper 3	Mdege, N.D., Fayter, D., Watson, J.M., Stirk, L., Sowden, A. and Godfrey, C. (2013). Interventions for reducing alcohol consumption among general hospital inpatient heavy alcohol users: a systematic review. *Drug and Alcohol Dependence,* 131(1-2), 1-22.
Paper 4	Watson, J.M., Fayter, D., Mdege, N., Stirk, L., Sowden, A.J. and Godfrey, C. (2013). Interventions for alcohol and drug problems in outpatient settings: a systematic review. *Drug and Alcohol Review,* 32(4), 356-367.
Paper 5	Mdege, N.D. and Watson, J. (2013). Predictors of study setting (primary care vs. hospital setting) among studies of the effectiveness of brief interventions among heavy alcohol users: a systematic review. *Drug and Alcohol Review,* 32(4), 368-380.
Paper 6	Mdege, N.D., Raistrick, D. and Johnson, G. (2014). Medical specialists' views on the impact of reducing alcohol consumption on prognosis of, and risk of, hospital admission due to specific medical conditions: results from a Delphi survey. *Journal of Evaluation in Clinical Practice,* 20(1), 100-110.

The work presented here was carried out as part of a larger programme of research entitled Addiction Research in Acute Settings (ARiAS). ARiAS aimed to investigate methods for improving the physical and mental health of unhealthy alcohol users and problem drug users identified within general hospital settings in Leeds, United Kingdom (UK). The general hospital settings

of interest were inpatient medical units, hospital outpatients/ ambulatory care (where medical care is provided on an outpatient basis, including diagnosis, observation, consultation, treatment, intervention, and rehabilitation services), and accident and emergency departments (including trauma centres) based at hospitals not specializing in the treatment of psychiatric disorders or addiction.

This introduction section comprises a number of subsections:

- The background section summarizes:
    - the extent of the problems associated with alcohol and illicit drug use at general population level, and
    - unhealthy alcohol use and problem drug use in general hospital settings including prevalence; presentation of unhealthy alcohol users and problem drug users; the role and impact of healthcare workers; an introduction to screening, assessment and interventions which demonstrate how the papers form a coherent body of work; and implementation challenges
- A description of the ARiAS programme
- The aim
- Objectives, and
- A description of the thesis structure.

1.1 Background

1.1.1 The extent of the problem

1.1.1.1 Alcohol

Alcohol is the world's third largest risk factor for premature deaths, disease and disability (WHO, 2010). In 2012, 5.1% of the burden of disease as measured in disability adjusted life years, and almost 6% of all deaths worldwide were attributed to alcohol (WHO, 2014). In the UK over the past decade alcohol has increasingly been recognised as one of the highest priority public health issues (Davies, 2014; Department of Health, 2013). In England in 2010, 26% of adult men and 17% of adult women reported drinking above the recommended units

in a typical week (21-28 for men; 14-21 for women) (Health and Social Care Information Centre (HSCIC), 2012; Office for National Statistics, 2012).

Unhealthy alcohol use is associated with a wide range of both acute and chronic physical health, mental health and social problems (WHO, 2004; WHO, 2014). The main causal impact on these problems is exerted by overall volume of alcohol consumed and patterns of drinking (Rehm et al., 2010). The relationship between these two main dimensions and the health and social harms is through three main intermediate mechanisms: direct biological effects of alcohol on organs and tissues, intoxication and dependence (Rehm et al., 2003; Rehm et al., 2010). In addition, the quality of alcohol consumed may also impact on health, for example through methanol or lead poisoning (Rehm et al., 2010). The main pathways and relationships are shown in Figure 1.

Jones and Bellis (2014) list 52 alcohol attributable conditions: 20 of these are wholly attributable to alcohol consumption (i.e. alcohol is 100% contributory e.g. alcoholic liver disease), and 32 are partially attributable to alcohol (i.e. only a proportion of cases are attributable to alcohol consumption e.g. oesophageal cancer). For the UK in 2012/2013, there were over a million hospital admissions with a primary or secondary diagnosis related to alcohol (HSCIC, 2014a). In 2012, 6,490 deaths in the UK were related to alcohol (HSCIC, 2014a). Unhealthy alcohol use costs the UK's National Health Service (NHS) approximately £3.5 billion per year, 78% of which is incurred for hospital-based care; and society as a whole approximately £21 billion annually (Department of Health, 2013).

Alcohol consumption can also affect the social behaviour of individuals, or their interaction with partners and other family members (Klingemann and Gmel, 2001).The social harms due to alcohol include workplace-related problems, family and domestic problems, public disorder and interpersonal violence (Klingemann and Gmel, 2001; Odlaug et al., 2015). The social consequences can also affect individuals other than the unhealthy alcohol user. For example family members can be affected by the unhealthy alcohol user's failure to fulfil social role obligations, or incidences of violence (WHO, 2004). These events

have an impact on society as a whole, for example through reduced economic productivity, or increased use of resources for criminal justice, healthcare systems and other social institutions (Gmel and Rehm, 2003).

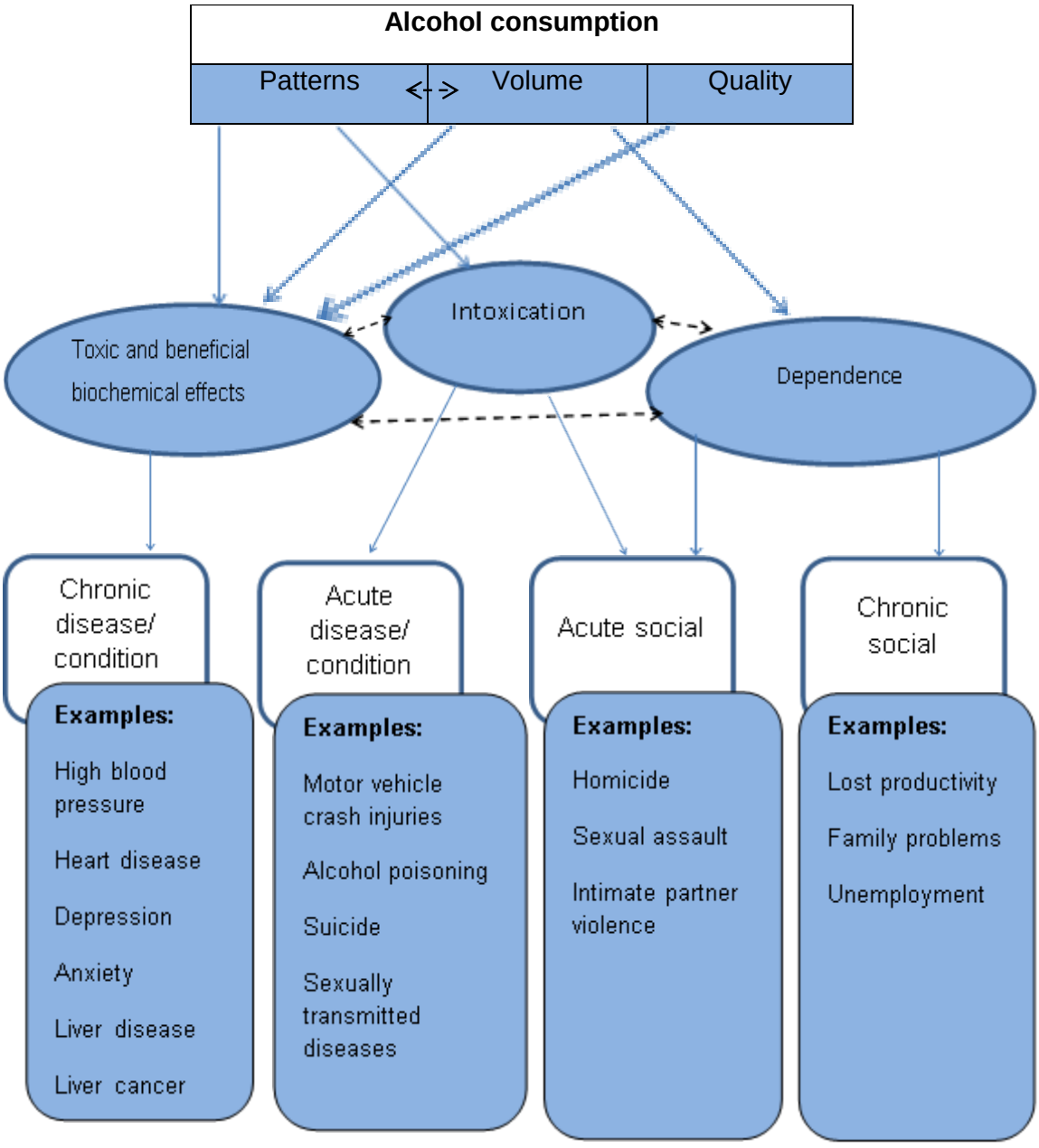


Figure 1: Model of alcohol consumption, mediating variables, and short-term and long-term consequences.

Adapted from Rehm et al., 2003: Rehm et al., 2010; WHO, 2004.

1.1.1.2 Drugs

Between 16 million and 39 million adults worldwide are problem drug users (UNODC, 2014). As with alcohol consumption, problem drug use is also associated with a wide range of physical health, mental health and social problems (Degenhardt and Hall, 2012). Around 0.2 million drug related deaths were reported in 2012 (UNODC, 2014). In the UK estimates suggest there are about 380,000 problem drug users, a rate of 9.3 per 1,000 population (Davies et al., 2011). In England problem drug use was responsible for 1,957 deaths in 2013, an increase of 321 from 2012 (HSCIC, 2014b). It was also responsible for 7,107 hospital admissions with a primary diagnosis of drug-related mental health and behavioural disorders in 2013/14, a 8.5% increase from 2012/13; and 13,917 admissions with a primary diagnosis of illicit drug poisoning in 2013/14, a 76,7% increase since 2003/04 (HSCIC, 2014b).

The risk of morbidity and premature mortality from problem drug use is dependent on a number of factors including type of drugs used, patterns of use (number of different drugs used, frequency and route of administration), volume or dose and quality (Degenhardt and Hall, 2012). Similar to alcohol, the adverse effects of problem drug use are through three main intermediate mechanisms: direct toxic biochemical effects of drugs on organs and tissues, intoxication and dependence (Degenhardt and Hall, 2012). The risks include acute diseases or conditions such as overdose and accidental injury and chronic diseases or conditions such as cardiovascular diseases, blood borne viruses (e.g. HIV, hepatitis B and hepatitis C) and mental health disorders (Degenhardt and Hall, 2012; UNODC, 2014).

Problem drug use also has a negative impact on economic and social development (UNODC, 2014). It results in adverse social effects on drug users, such as stigma and discrimination; as well as adverse effects that drug users' behaviours have on public amenity (e.g. drug dealing and discarded injection equipment) and public safety (e.g. violence between drug dealers and property crime to finance illicit drug use). It also contributes to instability and insecurity (UNODC, 2014). Chronic social problems may also include family problems

and unemployment. Problem drug use is also associated with significant economic and social costs, including costs to the health service, criminal justice and other social services (Gordon et al., 2006).

1.1.2 Unhealthy alcohol use and problem drug use in general hospital settings

1.1.2.1 Prevalence

Evidence indicates a high prevalence of unhealthy alcohol use and problem drug use among patients presenting in general hospital settings (Crome, Bloor and Thom, 2006). Roche, Freeman and Skinner's (2005) review found average prevalence rates of self-report positive alcohol screen of 16.5% among hospital inpatients and 15.6% in emergency departments. In England, Pirmohamed et al (2000) reported that alcohol related problems accounted for 12% of accident and emergency attendances, and 6.2% of all hospital admissions. In Scotland, self-report alcohol positive screen prevalence of 18.6% (Cameron, Morris and Forrest, 2006) and 25% (Watson, 2000), and a prevalence of alcohol related illness of 25% (Hislop and Heading, 2004) have been reported among general hospital inpatients. A recent study by Johnson and colleagues (2014) reported a prevalence of 34.7% for unhealthy alcohol use in outpatient clinics at a large public hospital in Australia.

In England, Binks and colleagues (2005) reported prevalence of illicit drug use among patients attending an accident and emergency department of 16% for previous month use, and 10% for use within the previous 24 hours. In another study, 7% of adult patients presenting with chest pain at accident and emergency departments tested positive for cocaine use (Maric et al., 2010). Binks and colleague (2005) also reported that about 7% of all patients attendances were directly or indirectly related to illicit drug use, with 50% of these attendances requiring hospital admission.

The high prevalence of unhealthy alcohol use and problem drug use in general hospital settings means it may be beneficial to incorporate proactive

identification and interventions for these problems as routine practice within hospital settings (Roche, Freeman and Skinner, 2005).

1.1.2.2 Presentation of unhealthy alcohol users and problem drug users

As outlined earlier, many unhealthy alcohol users and problem drug users who present to general hospital settings are likely to be seeking treatment for other acute and/or chronic health problems (see Figure 1 for examples), and not specifically for substance use (Madras et al., 2009; Saitz et al., 2010; WHO, 2011). These individuals who are not seeking treatment for their substance use problems fall into different categories. Some individuals present with types of conditions that are only partially attributable to alcohol or the use of other substances (an example of such conditions is given in section 1.1.1.1), and are either not aware that they are unhealthy alcohol users or problem drug users, or do not acknowledge their drinking or drug use as problematic (Madras et al., 2009; WHO, 2011). In addition, there are individuals who present with conditions where abstinence is the hallmark of successful treatment, for example conditions that are wholly attributable to alcohol such as alcoholic liver disease (Frazier et al., 2011). They might however, not acknowledge their unhealthy alcohol use or problem drug use, or might not be willing to engage with interventions for these problems. These individuals may be identified by opportunistic screening in general hospital settings (Moyer et al., 2002). However, they may well be defensive about their behaviour and unwilling to receive any intervention (Moyer et al., 2002). How then can these patients be approached and engaged with, when they do not necessarily know or consider their alcohol consumption or illicit drug use to be problematic? This issue was the main driver of the ARiAS research programme (described in more detail in section 1.2).

Healthcare settings also encounter unhealthy alcohol users and problem drug users who are aware of, and acknowledge their substance use problems, and are willing to engage with interventions for these problems. Some individuals may already be receiving treatment or have received treatment in the past for these problems (Watson et al., 2015). Sometimes, patients will suffer from

severe, acute substance use-related withdrawal symptoms whilst in hospital, necessitating symptom-triggered therapy (Mayo-Smith, 1997). These different presentations to general hospital settings will have implications on what intervention approaches could be applied. This is discussed further in section 5.1.

There are also potential differences in patients that are encountered in the different general hospital settings. For example, the majority of attendances to outpatient settings and emergency departments are ambulatory attendances for: actual or suspected acute or chronic conditions which are sufficiently serious to require acute unscheduled care; planned return visits as a result of previous hospital presentations; or for clerical, nursing or medical processes to be undertaken (Australian Institute of Health and Welfare, 2013). These visits might or might not result in admission into hospital where a bed is allocated. Emergency departments may also encounter patients in transit: for example patients waiting for transport to another facility, or those who are admitted as inpatients through the emergency department (Australian Institute of Health and Welfare, 2013). On the other hand, most presentations to hospital inpatient settings are of patients with chronic or acute conditions that are sufficiently serious to require admission for further observation, tests and examinations or treatment as a hospital inpatient. Patients could be coming from other sections of the hospital, or another hospital or healthcare facility with admission pre-arranged by the referring medical officer/ healthcare professional and a bed allocated. There could also be patients in transit to other sections of the hospital or to another hospital or healthcare facility. These differences in presentation could have implications on the identification and intervention strategies that can be adopted, or the way that the appropriateness of these interventions is perceived for each setting (i.e. inpatient, accident and emergency, or outpatient setting). For example, there may be differences, by setting, on whether patients are generally considered well enough, or the average contact time with patients is considered sufficiently long, to allow the exploration of unhealthy alcohol use and problem drug use (Groves et al., 2010). However, the differences in presentations by setting are not as ‘clear cut’ as presented above. They will differ for example by country or from hospital to hospital.

1.1.2.3 The role and impact of healthcare workers

There is a wide range of service models for unhealthy alcohol use and problem drug use in general hospital settings: from multi-disciplinary general hospital-based alcohol care teams, to in-reach alcohol care teams which involve addiction specialist service personnel coming into the hospital on a regular basis (Baker et al., 2014; NSW Ministry of Health, 2015; Public Health England, 2014).

Services that can be offered will depend on the service model adopted, and include: identification and brief interventions, comprehensive assessment, care planning, other interventions including medically assisted alcohol withdrawal management, and safe discharge and referral to community services (Baker et al., 2014; Public Health England 2014; NSW Ministry of Health, 2015; Makdissi and Stewart, 2013). Likewise, the role of the different general hospital healthcare personnel depends on the chosen service model. However, it has been widely recommended that, as a minimum, healthcare professionals working within these settings, such as nurses, physicians and social workers, be able to provide screening and brief advice for unhealthy alcohol use and problem drug use (Heather, 2010; National Institute for Health and Clinical Excellence (NICE), 2008; NICE, 2011; NSW Ministry of Health, 2015; WHO, 2010). Although the impact of such services is still unclear, it is anticipated that they can result in improvements such as: improving quality and efficiency of care; reducing admissions, re-admissions and length of hospital stay for patients with substance use-related problems; contributing to reduction in substance use-related accident and emergency department attendances; and reducing substance use-related mortality (NSW Ministry of Health, 2015; Public Health England, 2014).

1.1.2.4 Screening, assessment and intervention

This section gives a brief overview of the processes of identification, assessment and intervention which form the integrated structure of this thesis. More detailed discussions are provided in sections 3 (screening), 4 (assessment) and 5 (interventions).

As briefly highlighted in sections 1.1.1.1 and 1.1.1.2, there are different levels and patterns of unhealthy alcohol use and problem drug use, and these are associated with different levels of risk and problems. The most commonly used categories are hazardous use, harmful use and dependence (Babor and Higgins-Biddle, 2001; Raistrick, Heather and Godfrey, 2006). Hazardous use is defined as a level and pattern of use that puts the user at risk of harmful consequences (which may be physical health, mental health or social consequences) (Babor and Higgins-Biddle, 2001; Edwards, Arif and Hodgson, 1981; WHO, 1994). Harmful use is where the level and pattern of use is already causing damage to physical or mental health (Edwards, Arif and Hodgson, 1981; WHO, 1993). Dependence is where the level and pattern of use has resulted in a dependence syndrome which is a cluster of cognitive, behavioural and physiological symptoms (Babor and Higgins-Biddle, 2001; WHO, 1993). This distinction among the different categories of unhealthy alcohol use or problem drug use, and the associated risk and problems, is important because it enables the matching of health needs of different types of users with the most appropriate intervention and intervention pathway (Institute of Medicine, 1990; McCambridge and Rollnick, 2014; NICE, 2010a; Raistrick, Heather and Godfrey, 2006). However, as Raistrick, Heather and Godfrey (2006, p19-20) point out, these categories are based on convenient cut-off points along the continuum of consumption and associated problems.

Identification of unhealthy alcohol users or problem drug users generally involves a screening process to identify those with, or at risk of developing, problems (NICE, 2010b). Identification is followed by making patients with a positive screen aware, and increasing their understanding, of the risks and problems associated with their alcohol or drug use.

It is recommended that, after being identified, non-dependent unhealthy alcohol users or problem drug users receive less intensive interventions such as brief interventions (BIs) aimed at motivating them to change or consider changing their alcohol or drug use behaviour (NICE, 2008; NICE, 2011; WHO, 2010). For the very heavy or dependent alcohol or problem drug users, the process might involve referral for detailed assessment and treatment in specialist treatment agencies (Babor et al., 2001; NICE, 2008; NICE, 2011).

From the description above, the key stages from identification to intervention for unhealthy alcohol use or problem drug use are screening, assessment and intervention (Connors and Volk, 2003; Raistrick, Heather and Godfrey, 2006). The interrelationship between these three stages can be summarized as in Figure 2 below. The research carried out for this thesis was similarly divided into three work streams: screening, assessment and intervention. Each of the six papers addresses a research question related to at least one of these work streams; thus forming a coherent body of work.

Although Figure 2 depicts a linear interrelationship, this is not always the case in practice (Connors and Volk, 2003; Raistrick, Heather and Godfrey, 2006). For example, for dependent alcohol or problem drug users, screening could be followed by a less intensive intervention such as a BI and then referral for detailed assessment and specialist treatment (NICE, 2008; NICE, 2011). There are other intermediary stages not represented here such as formulating a clinical diagnosis and treatment planning (Rasmussen, 2000; Teesson et al., 2012).

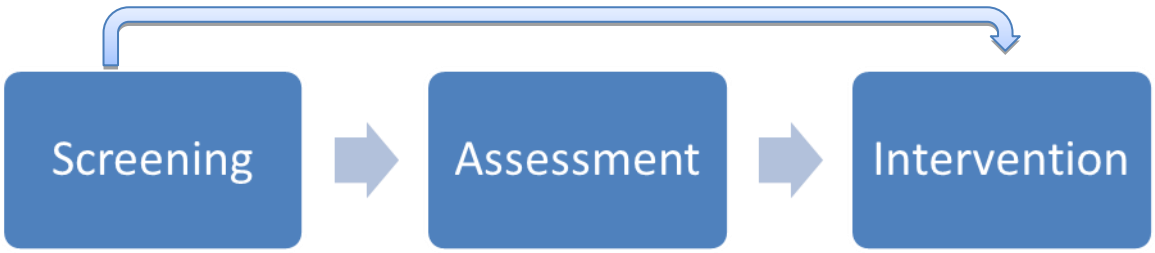


Figure 2: Interrelationships between stages of screening, assessment and intervention

Although pro-active identification and provision of interventions for unhealthy alcohol users and problem drug users who come into contact with health services has been recommended (NICE, 2008; NICE, 2011), implementation has not been realised in many healthcare settings because of a number of barriers. Some of these implementation challenges are discussed below.

1.1.2.5 Implementation challenges

Barriers to implementation include factors related to healthcare professionals, organization of care, as well as factors related to patients.

- Healthcare professionals

Overall, healthcare professionals working in general hospital settings regard screening and provision of interventions for unhealthy alcohol use or problem drug use within these settings worthwhile (Anderson et al., 2001; Brooker et al., 1999; Groves et al., 2010; Huntley, Patton and Touquet, 2004; Pauly, 2008). However, time constrains are often cited as a barrier (Anderson et al., 2001; Brooker et al., 1999; Groves et al., 2010; Huntley, Patton and Touquet, 2004;

Pauly, 2008). In addition, patients may not be in one department long enough to build rapport and allow the exploration of problems (Anderson et al., 2001; Groves et al., 2010). Some healthcare professionals question the compatibility of screening and interventions with the acute care paradigm and their role (Broyles et al., 2012). Raistrick, Tober and Unsworth (2015) reported low levels of therapeutic commitment from healthcare professionals, which has a negative impact on engagement with treatment and outcomes (Cartwright, Hyams and Spratley, 1996). Other barriers include healthcare professionals' negative views and attitudes towards unhealthy alcohol users and problem drug users; limited interdisciplinary collaboration and communication around alcohol-related care (Broyles et al., 2012); and lack of training, motivation, skills, as well as confidence to deal with these problems (Anderson et al., 2001; Brooker et al., 1999; Groves et al., 2010; McKeown, Matheson and Bond, 2003; McLaughlin, Mckenna and Leslie, 2000; Pauly, 2008). Some healthcare professionals consider questions about these problems as offensive and intrusive to patients (Brooker et al., 1999), and will not approach individuals they perceive as less likely to have such problems because of their age, gender or religion (Groves et al., 2010). The poor physical and mental state of patients at the time of presentation has also been reported as a barrier (Anderson et al., 2001; Groves et al., 2010).

- Organization of care

Implementation barriers include limited awareness by healthcare staff of substance misuse professionals or services on offer in the hospital (Groves et al., 2010), or other external sources of help (Anderson et al., 2001; McLaughlin, Mckenna and Leslie, 2000). Other barrier are: inadequate provision of services, including support services such as out of hours, long term and community support (Anderson et al., 2001; McLaughlin, Mckenna and Leslie, 2000), and inadequate alcohol assessment protocols and poor integration with the electronic medical record (Broyles et al., 2012). Lack of privacy when discussing unhealthy alcohol use or problem drug use can also render the screening and intervention process less acceptable to patients (Groves et al., 2010).

- Patients

Sometimes patients are not willing to engage with screening and interventions for unhealthy alcohol use or problem drug use because of the stigma they feel to be associated with it (Groves et al., 2010). They may also perceive their drinking or drug use as not risky or problematic (Madras et al., 2009; WHO, 2011). Those who do find screening and interventions useful and acceptable often prefer for them to be conducted in a private room (Groves et al., 2010). This can be very difficult to achieve in busy hospital settings. Some very heavy drinkers and problem drug users view generalist healthcare professionals as inadequately equipped to deal with substance misuse, with a preference for specialist addiction workers (Groves et al., 2010).

1.2 The ARiAS programme

The ARiAS programme was funded for just over 5 years from 2008 to 2013 by the National Institute of Health Research (NIHR) under the Collaborations for Leadership in Applied Health Research and Care (CLAHRC) initiative. ARiAS aimed to investigate methods for improving the physical and mental health of unhealthy alcohol users and problem drug users identified within general hospital settings in Leeds, UK.

The ARiAS programme was divided into two phases:

- *Phase 1* combined local data with the international evidence base in order to: understand the patterns of alcohol and drug related hospital admissions and patterns of care in Leeds; identify effective interventions for unhealthy alcohol users and problem drug users identified within general hospital settings; determine key gaps in knowledge; and inform the design and implementation of Phase 2.
- *Phase 2* was built on Phase 1 findings and consisted of a pilot randomised controlled trial (RCT) of the clinical and cost-effectiveness of interventions for general hospital inpatient problem drinkers.

More details on the ARiAS programme are available at http://www.york.ac.uk/healthsciences/research/mental-health/projects/arias/.

The work presented in this thesis was conducted between 2009 and 2012 as part of Phase 1. The specific aim and objectives are detailed below.

1.3 Aim

To investigate how unhealthy alcohol users or problem drug users can be effectively identified, assessed and intervened with when they present to general hospital settings for the treatment of other conditions.

The aim has two main dimensions: the type of substance use (unhealthy alcohol use and problem drug use), and the three key stages of screening, assessment and intervention.

1.4 Objectives

1. To identify and examine existing evidence on the psychometric properties of illicit drug use screening instruments that could be useful in general hospital settings.
2. To identify and examine existing evidence on the psychometric properties of substance misuse assessment packages.
3. To identify and examine existing evidence on the effectiveness of interventions for unhealthy alcohol use or problem drug use for individuals identified in general hospital settings.
4. To explore intervention characteristics, methodological issues and contextual factors that could impact on the effectiveness of interventions for unhealthy alcohol use in general hospital settings, in order to facilitate the development of more effective interventions.
5. To explore acceptable and feasible strategies for identifying and intervening with unhealthy alcohol users, and engaging them in treatment.

6. To identify critical evidence gaps on identification, assessment and intervention that will guide the development of a pilot RCT for phase 2 of the ARiAS programme, as well as future research programmes.

Each of the objectives maps onto the two dimensions outlined above (type of substance use and the three key stages) as presented in Table 2.

Table 2: Mapping of objectives onto the aim with regards to type of substance use and the three key stages

	Unhealthy alcohol use	**Problem drug use**
Screening	5, 6	1, 6
Assessment	2, 5, 6	2, 6
Intervention	3, 4, 5, 6	3, 6

The numbers within the cells represent the corresponding objectives as listed in 1.4.

Each paper addresses at least one of the objectives as indicated in Table 3 below.

Table 3: Mapping of papers onto objectives

Objective	**Paper(s)***
Objective 1	Paper 1
Objective 2	Paper 2
Objective 3	Papers 3, 4
Objective 4	Papers 3, 5
Objective 5	Paper 6
Objective 6	Papers 1 to 6

*Paper numbers are as indicated in Table 1

1.5 Thesis structure

This thesis is divided into six further separate sections. The next section, section 2, briefly summarizing the methods used. This is followed by three sections that reflect the three key stages, with a section on screening (section 3), assessment (section 4) and intervention (section 5). Section 6 focuses on implementation of screening, assessment and interventions. Section 7 contains the final remarks and recommendations.

As mentioned before, section 2 below summarises the methods utilized.

2. Summary of methods

The following methods were used: systematic review (Mdege et al., 2013; Mdege and Lang, 2011; Sweetman et al., 2013; Watson et al., 2013a), meta-regression (Mdege and Watson, 2013) and the Delphi method (Mdege, Raistrick and Johnson, 2014). These methods were used because they readily addressed the research objectives, and the time constraints due to funding timelines called for pragmatic scientific techniques that are quicker and more efficient than new empirical studies (Linstone and Turoff, 1975; Mulrow, 1994). The methods are only briefly described here as more detailed descriptions are provided within the relevant papers.

2.1 Systematic review and meta-regression methods

Systematic review methodology was utilised to: collate all empirical evidence that meets pre-specified eligibility criteria, summarize the evidence in order to answer specific research questions, and explain differences among studies on the same question (Crowther and Cook, 2007; Higgins and Green, 2008). Meta-regression was utilised to investigate whether particular covariates or potential effect modifiers explain any of the difference in the consistency of findings on intervention effects between studies conducted in different healthcare settings (Higgins and Green, 2008; Thompson and Higgins, 2002). The systematic reviews and meta-regression used explicit, systematic methods aimed at minimizing random and systematic bias to the assembly, critical appraisal, and synthesis of studies (Centre for Reviews and Dissemination, 2009; Crowther and Cook, 2007; Higgins and Green, 2008). This allows for more reliable findings from which conclusions can be drawn and decisions made (Centre for Reviews and Dissemination, 2009; Higgins and Green, 2008).

Systematic reviews and meta-regressions depend heavily on the availability and consistency of data across studies (Bartolucci and Hillegass, 2010). Unfortunately, for the systematic reviews and meta-regression conducted as part of this thesis, study reporting was poor. Study authors can be contacted for the unreported or poorly reported data (Centre for Reviews and Dissemination,

2009; Higgins and Green, 2008). However, this is only possible if time and other resources permit (Centre for Reviews and Dissemination, 2009). In addition, authors may not respond to data enquiries, particularly if the study is old. Sometimes outcomes are assessed and measured in many different ways across studies making pooling of results very difficult (McQueen et al., 2011; Pycroft, 2010), as was the case for the systematic reviews and meta-regression conducted as part of this thesis (Mdege and Lang, 2011; Mdege and Watson, 2013; Mdege et al., 2013; Sweetman et al., 2013; Watson et al., 2013a).

Another challenge encountered was that poor quality primary studies made it difficult to derive any robust conclusions from the findings of the systematic reviews or meta-regression (Mdege and Watson, 2013; Mdege et al., 2013; Watson et al., 2013a). In some cases, a few small studies were identified (Watson et al., 2013a). Any meta-analysis or meta-regression with very few small studies would very likely produce biased estimates due to the high possibility of publication bias (Crowther and Cook, 2007b).

The retrospective nature of systematic reviews and meta-regressions also present a problem, particularly for research fields where there is rapid advancement of ideas and methods. In such cases, findings of a systematic review could become obsolete very quickly. In addition, meta-regressions are entirely observational in nature because individuals within the studies are not randomized to go into one trial or another (Higgins and Green, 2008; Thompson and Higgins, 2002). Hence they suffer the limitations of any observational investigation, including possible bias through confounding by other study-level characteristics (Higgins and Green, 2008). However, if the meta-regression findings replicate findings from another study conducted in a different way, then this adds confidence to the findings (Higgins and Green, 2008).

2.2 The Delphi method

The Delphi method was utilised as a formal, systematic and structured communication technique for consensus development, priority setting and collective decision making (Keeney, Hasson and Mckenna, 2011; Linstone and Turoff, 1975). It relied on a panel of experts as a readily available source of knowledge and information, and served as an economical way of gathering knowledge and information on a topic where evidence does not exist yet, within the time frame it was required (Murphy et al., 1998; Raine et al., 2004; Glasier et al., 2003; NICE (UK) National Collaborating Centre for Acute Care (UK), 2003). The main premise was the assumption that group opinions are more valid and reliable than individual opinions (Keeney, Hasson and Mckenna, 2011). Although there has not been much research to confirm this assumption, the existing limited evidence suggests that comparable, and sometimes even different, expert panels can produce similar results; which supports the idea that making group rather than individual decisions could increase the validity and reliability of those decisions (Duffield, 1993; Walker, 1994). Hence the Delphi method was appropriate for the study reported in Paper 6 which explored the presence or absence of consensus.

Although it is widely acknowledged that experts can provide invaluable information, there are concerns about the lack of account, guidance or standards with regards to how or why experts are identified and selected (Keeney, Hasson and Mckenna, 2011; Linstone and Turoff, 1975). The Delphi survey conducted as part of the thesis utilised attributes of an expert that have been suggested in literature: their knowledge (e.g. a professional qualification), experience (e.g. length of time of actual practice in that field) and policy influence (Baker et al., 2006). However, critics have argued that neither knowledge on a particular subject nor practice experience necessarily qualify one as an expert (Keeney, Hasson and Mckenna, 2011; Baker et al., 2006). Others have argued that panels may not even need experts (Sackman, 1975), with research indicating similar results between panel groups with different levels of expertise (Walker, 1994). Another issue raised is the need for respondents who are relatively impartial so as to obtain information that reflects

current knowledge and perception (Goodman, 1987). However, because of the experts' interest in and involvement with the issue under investigation, it is difficult to see how impartiality could be achieved.

Typically, Delphi survey questions are generated by survey participants (Keeney, Hasson and McKenna, 2011; Murphy et al., 1998). However, for the Delphi survey reported here the questions were generated through literature scoping and consultation with a small group of stakeholders who were not part of the survey itself. This could have had a negative impact on the reliability and generalizability of the findings. The stakeholders involved included clinicians (two psychiatrists and an emergency medicine specialist), a psychologist, commissioning managers for alcohol services and a team of researchers. The other specialty areas of focus, namely cardiology, gastroenterology and oncology were not represented in this process. However, the framing of the questions was only highlighted as problematic by one oncologist.

After summarising the methods, section 3 will now discuss screening for unhealthy alcohol use and problem drug use, including a systematic review that was carried out as part of this thesis.

3. Screening

This section discusses screening which involves the use of procedures to identify individuals with alcohol or illicit drug use related problems or consequences, or those who are at risk for such problems (Connors and Volk, 2003; WHO ASSIST Working Group, 2002).

3.1 Screening for unhealthy alcohol use

Screening for unhealthy alcohol use can be done through biological markers of alcohol consumption, clinical indicators using physical examination, or the use of screening questionnaires/ instruments (hereafter referred to as screening instruments) (Raistrick, Heather and Godfrey, 2006).

Biological markers such as blood or breath alcohol concentration, mean corpuscular volume (MCV) and serum gamma-glutamyltransferase (GGT) can provide an objective indication of recent alcohol consumption (Leigh and Skinner, 1988; Rosman and Lieber, 1990). Biological markers are however largely recommended as adjuncts to screening instruments, and the reasons for this include the following: 1) some biological markers such as GGT are not specific to alcohol, which can lead to false positives (Raistrick, Heather and Godfrey, 2006); 2) some markers such as MCV have very low sensitivity for detecting heavy drinking (Helander, 2001); 3) laboratory testing is more expensive compared to other methods of screening (Raistrick, Heather and Godfrey, 2006); 4) usefulness can be limited by the short half-life after cessation of drinking, for example for blood alcohol concentration (Wolff and Marshall, 2006); and 5) they add little information that cannot be gained more cheaply and efficiently by self-report (Raistrick, Heather and Godfrey, 2006).

Some healthcare professionals prefer clinical history taking and physical examination as means of detecting harmful drinking (Raistrick, Heather and Godfrey, 2006). This involves looking for any physical disorders and signs (such as hypertension, gastrointestinal disorders, dilated facial capillaries or frequent accidents) (Saunders and Conigrave, 1990), as well as psychiatric and social

indicators (such as depression and anxiety) (Yang and Skinner, 2004) that are suggestive of harmful drinking. One drawback is that hazardous drinkers who do not have obvious signs of alcohol problems will be missed (Raistrick, Heather and Godfrey, 2006).

The use of standardized alcohol consumption screening instruments that are simple, brief, and easy to administer and interpret is the most highly recommended way of identifying unhealthy alcohol users in general hospital settings (NICE, 2011; Raistrick, Heather and Godfrey, 2006; WHO, 2010). Screening instruments are as valid and reliable (Babor et al., 2000; de Meneses-Gaya et al., 2009), and provide as much information as biological markers in a faster and much cheaper way (Raistrick, Heather and Godfrey, 2006). They also make it possible for generalists (i.e. healthcare professionals that are not alcohol or addiction specialists) or paraprofessionals to carry out the screening (Rasmussen, 2000). A substantial amount research and recommendations on which screening instruments for unhealthy alcohol use to use in general hospital settings exist (Connors and Volk, 2003; NICE, 2011). For example, the Alcohol Use Disorder Identification Test (AUDIT) is now widely recommended and used within research and practice worldwide (Babor et al., 2001; de Meneses-Gaya et al., 2009; NICE, 2011; Raistrick, Heather and Godfrey, 2006; Reinert and Allen, 2007). AUDIT has generated a very large amount of research spanning over a period of at least two decades, and has demonstrated very good psychometric properties in emergency departments, general hospital inpatient and outpatient settings in a range of populations and cultural groups (Babor et al., 2001; de Meneses-Gaya et al., 2009; Reinert and Allen, 2007).

3.2 Screening for problem drug use

Two approaches can be used to screen for problem drug use: biochemical tests such as urinalysis, hair testing and saliva testing; and standardized screening instruments such as the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) (Lanier and Ko, 2008; WHO ASSIST Working Group, 2002). One main advantage of using some standardized screening instruments

over biochemical tests is that, unlike the latter they distinguish between occasional users, non-dependent problematic use and dependence which is important for treatment planning (Hoffmann et al., 2003; Lanier and Ko, 2008; WHO ASSIST Working Group, 2002). Some standardized screening instruments can also distinguish between active and inactive problems which is useful in linking substance misuse to current health status (Brown et al., 2001; Humeniuk et al., 2008). As with alcohol, screening instruments are also much cheaper than biochemical tests.

The need for and potential utility of problem drug use screening instruments in general hospital settings is widely acknowledged (Brown et al., 2001; Madras et al., 2009; National Treatment Agency, 2007). However, reviews of evidence, guidance or recommendations on which screening instruments to use are scarce (Madras et al., 2009; WHO, 2008). Practice may therefore vary widely. Thus, Paper 1 focused on problem drug use in order to address this evidence gap.

3.2.1 Paper 1

Mdege, N.D., and Lang, J., on behalf of the ARIAS Research Group. (2011). Screening instruments for detecting illicit drug use/abuse that could be useful in general hospital wards: a systematic review. *Addictive Behaviors*, 36(12), 1111–1119.

Paper 1 aimed to identify and describe screening instruments that can be used to detect problem drug use in general hospital wards and review evidence for reliability, validity, feasibility and acceptability. A summary of the main results is presented in Box 1.

Box 1: Summary of main findings from Paper 1

1. Thirteen instruments were identified that are potentially useful for screening adult patients not known to have an illicit drug use problem in general hospital wards:

   ASSIST: Alcohol, Smoking, and Substance Involvement Screening Test

   CAGE-AID: Cut Down, Annoyed, Guilty, Eye-opener- Adapted to Include Drugs

   DAST: Drug Abuse Screening Test

   DHQ/ PDHQ: Drug History Questionnaire or Psychoactive Drug History Questionnaire

   DUDIT: Drug Use Disorders Identification Test

   DUS: Drug Use Screening

   NMASSIST: NIDA- Modified Alcohol, Smoking, and Substance Involvement Screening Test

   SMAST-AID: Short Michigan Alcoholism Screening Test Adapted to Include Drugs

   SIP- AD: Short Inventory of Problems- Alcohol and Drugs

   SDS: Severity of Dependence Scale

   SSI-SA: Simple Screening Instrument for Substance Abuse

   TICS: Two Item Conjoint Screen for Alcohol and other Drug Problems

   UNCOPE: Use, Neglect, Cut down, Objection, Preoccupied, Emotional discomfort.

2. From the available evidence:
   - Construct and concurrent validity was high for ASSIST, CAGE-AID and SIP-AD 15.
   - ASSIST, CAGE-AID, DAST (28, 20 and 10), SIP-AD (10 and 15), TICS and UNCOPE had good to excellent internal consistency.
   - The DAST-28 and DAST-10 also showed optimal test–retest reliability, whilst that for ASSIST suggests the need for improvement.
   - The sensitivity and specificity scores for the DAST-28, DAST-10, TICS and UNCOPE were optimal (~80%). Those for ASSIST,

Box 1: Summary of main findings from Paper 1

CAGE-AID, DAST-20 and SMAST generally indicate the need for improvement.

- The ASSIST and TICS were reported to be highly accepted by participants.

3. Usefulness of these instruments in general hospital wards may however be limited due to the following:
   - Most of these instruments have not been extensively evaluated in adult patients not known to have an illicit drug use problem, especially in general hospital wards. The ASSIST is currently the only instrument with some evidence of extensive evaluation, in different countries, populations and settings including general hospital wards.
   - A number of these instruments focus on dependence (CAGE-AID, DAST, SDS, SMART-AID) and some do not distinguish between non-dependent problematic use and dependence (TICS and UNCOPE). This could be problematic if the interventions or treatment pathways for patients depend on the level of drug use.
   - Some of the instruments (CAGE-AID, DAST, SMAST-AID and SSI-SA) do not distinguish between active and inactive problems. They only ask about life time illicit drug use experience.
   - The structure or format of some of the instruments could affect acceptability and feasibility of use. For example, the ASSIST in its current format appears bulky and this could deter its use.

4. There is insufficient comparative evidence on the psychometric properties, as well as acceptability and feasibility of use, to enable choice between the available screening instruments.

3.2.1.1 What does this study contribute to the body of knowledge?

This study makes an original contribution to literature in a number of ways. First, this was the first review to generate a list of instruments that could be used with this particular population. Second, it brought together existing evidence on the performance of these screening instruments. Thus, it is a very useful resource

for clinicians or researchers searching for such instruments. Third, it highlights a fundamental gap in the evidence base. By raising the profile of the issue, the chances of other researchers addressing this gap are increased. Fourth, it identifies some important screening instrument characteristics that appear to have been overlooked by the design of currently existing instruments (e.g. distinguishing between active and inactive problems and different levels of illicit drug use, and how the structure or format of the instrument could affect acceptability). This is useful information for researchers and research commissioners interested in developing and evaluating such instruments. Paper 1 has been cited in at least 13 peer reviewed journal articles (Ali et al., 2013; Boothroyd et al., 2013; Chuang et al., 2013; Evren et al., 2013; Evren et al, 2014a; Evren et al., 2014b; Evren et al., 2014c; Matuszka et al., 2014; McNeely et al., 2014; McPherson and Benson, 2013; Nydegger et al., 2014; Raistrick, 2013; Tantirangsee, Assanangkornchai and Marsden, 2014) and one Masters thesis (Eastman, 2013). Examples of the ways the findings have been utilized will be given in sections 3.3 and 3.4.

3.3 Implications of research findings to policy and practice

The utility of the identified screening instruments in general hospital wards may be limited by the lack of evidence on their performance in these settings (Harris, 2013; Raistrick, 2013). In reality however, many clinicians conduct some form of screening for problem drug use when necessary (Boothroyd et al., 2013). Without guidance, inappropriate screening tools or strategies could be used.

In order to inform policy and practice, a research brief targeted at policy makers, service providers and healthcare professionals was produced from Paper 1. Although in Paper 1 no recommendation was made on the best instrument to use in general hospital setting due to the paucity of evidence, this research brief recommended that, *based on the currently available evidence*, the ASSIST should be considered as the instrument of choice for a number of reasons. First, it is the only instrument that has been evaluated extensively in different populations and settings including general hospital wards, and has generally consistently exhibited good psychometric properties. Second, it has some

evidence of good acceptability by patients. Third, it exhibits a number of vital properties that are lacking in many of the other instruments that are: distinguishing between active and inactive problems, and distinguishing between different levels of illicit drug use. However, the use of the ASSIST has to be accompanied by further validation, including comparisons with other alternatives.

As highlighted earlier, after a positive screen healthcare professionals have to make patients aware of the risks and harms associated with problem drug use, and increase their understanding of these harms. This also applies for unhealthy alcohol use. There are many diseases/ conditions where either alcohol or drug use is *a component cause*: that is, alcohol or drug use is one among a number of components, which, when all are present, a sufficient cause for the condition is formed (WHO, 2008; WHO, 2014; Jones and Bellis, 2014). In practice this means that a clinician might know that the use of alcohol, or illicit drug use, at a certain level and pattern may result in the development of a particular condition. However, at individual level they will not know which individuals will develop the condition and which ones will not (Hollnagel, 1999). This raises a number of fundamental challenges for healthcare professionals. For example, how many of those who screen positive for unhealthy alcohol use or problem drug use would actually benefit from interventions aimed at their substance use? Understanding this is important as research has revealed concerns among health practitioners that screening might not benefit sufficient numbers of people to warrant the extra workload required (NICE 2010b).

In addition, how do you explain to the patient that their ill health *may* be due to drug use or alcohol, or that they are at risk of getting ill, in a way that actually convinces them to change their behaviour or seek help? Risk is based on population level data and not on individualised knowledge (Hollnagel, 1999). In addition, different levels and patterns of alcohol consumption are associated with different risks and risk levels. There is a wide range of drugs that can be used illicitly, as well as a variety of administration routes; both of which have an implication on the associated risks and risk levels. This means risk messages

have to be adapted depending on the patient's alcohol or illicit drug use circumstances, which can be challenging for healthcare professionals.

Very few healthcare professionals have any training in risk communication (Paling, 2003). There is also very limited understanding of how best to communicate risk in general, and whether risk information can alter individual risk perception and actually lead to change in health behaviour (Edwards et al., 2000). Fagerlin, Zikmund-Fisher and Ubel (2011) present 10 risk communication strategies that have shown strong, or at least preliminary, evidence for improving patient understanding and decision making on healthcare. The strategies range from the use of plain language, presenting absolute risks using frequencies (rather than presenting relative risks), through to using a risk format that clarifies how an intervention changes risks from pre-existing baseline levels. These strategies offer a starting point for exploring ways of communicating risk information that can result in behaviour change in the context of unhealthy alcohol use and problem drug use, and for training healthcare professionals in risk communication.

3.4 Implications for future research

There is a need for validation of problem drug use screening instruments in general hospital populations. This should include comparative evidence on the psychometric properties, as well as acceptability and feasibility of use, to enable choice between the available measures. In light of findings from Paper 1, Raistrick (2013) suggests the need for fewer instruments and more testing of the best ones. The list of potential screening instruments produced in this study is a useful reference from which instruments can be selected for evaluation and use. Some researchers have already used this list in this way (Boothroyd et al., 2013; Evren et al., 2013; Evren et al., 2014b; Evren et al., 2014c; Tantirangsee, Assanangkornchai and Marsden, 2014; Evren et al, 2014a). However, although a number of articles that have cited Paper 1 investigate the psychometric properties of problem drug use screening instruments, only one includes a general hospital population (Ali et al., 2013).

Research also needs to explore the perspectives of service users, clinicians, any other staff groups who are expected to administer the instrument and other relevant stakeholders. The views of these stakeholders can impact on the performance, acceptability, actual uptake and use of instruments in clinical practice. For example, it would be vital to understand different perceptions on how important different domains or questions are, how well they are understood, and how acceptable they are (Raistrick, 2013). It is also useful to know how user-friendly a screening instrument is in terms of structure and format.

The other issue to consider is the development of less bulky tools. Since the publication of Paper 1, a group of researchers have developed a new short screening instrument derived from the ASSIST, called ASSIST-Lite (Ali et al., 2013). They cited the observation from Paper 1 that the bulkiness of the ASSIST could deter its use as one of their reasons for developing this new short form that has been optimised for general medical settings. The original ASSIST has 8 questions, seven of which ask about ten different types of psychoactive substances. The eighth question asks about injection drug use. By comparison, the ASSIST-Lite asks about six types of psychoactive substances, and the researchers managed to remove between three and four questions from the ASSIST for each of the six types of substances, while preserving the ability to measure substance use disorder severity (Ali et al., 2013). The ASSIST-Lite demonstrated good psychometric properties in this study, using data from 2,082 participants drawn from nine countries, 70% of which were recruited from general medical settings. However, this figure was not disaggregated by the type of general medical setting. More studies in diverse settings, including general hospital settings, and cultures are needed for this new instrument, as well as other promising screening instruments.

In order to inform the policy and practice developments suggested in the previous section, future research also needs to explore better ways of communicating risk in order to increase engagement with and the success of interventions. This will inform training of healthcare professionals on risk communication.

4. Assessment

When an individual screens positive for unhealthy alcohol use or problem drug use they may, where necessary, be referred for comprehensive assessment as indicated in section 1.1.2.2. This assessment is briefly discussed below.

4.1 Assessment for unhealthy alcohol use and problem drug use

Assessment is designed to explore fully the nature and extent of a person's problems with alcohol or illicit drugs, and to gain an understanding of exactly how they might be helped (Raistrick, Heather and Godfrey, 2006). It involves closely examining a number of health and well-being domains. The important ones include substance use and dependence, psychological well-being, and social well-being (Edwards, Arif and Hodgson, 1981). Assessment can also include physical examination and other necessary specialized testing (Rasmussen, 2000). The product is a treatment/care plan (Raistrick, Heather and Godfrey, 2006).

Assessment needs may vary according to a number of factors such as the setting. A wide range of assessment tools for alcohol and illicit drug use problems exist. However, standardising assessment and outcome reporting to a certain degree facilitates the comparison of services locally, nationally and internationally (Raistrick, Heather and Godfrey, 2006). Paper 2 examines the utility of existing comprehensive assessment packages for alcohol and illicit drug use problems that can be used in any healthcare setting.

4.1.1 Paper 2

Sweetman, J., Raistrick, D., Mdege, N.D., and Crosby, H. (2013). A systematic review of substance misuse assessment packages. *Drug and Alcohol Review*, 32(4), 347-355.

Paper 2 aimed to identify and describe comprehensive assessment packages that can be used for alcohol and illicit drug use problems in any setting and review evidence for validity. The main findings are summarised in Box 2 below.

Box 2: Summary of main findings from Paper 2

1. Six comprehensive assessment packages met the inclusion criteria:

ASI: Addiction Severity Index

CUAD: Chemical Use, Abuse and Dependence Scale

Form 90: Form 90

MAP: Maudsley Addiction Profile

MATE: Measurements in the Addictions for Triage and Evaluation

SAOM: Substance Abuse Outcomes Module

2. There has not been enough relevant evaluation of the psychometric and user acceptability properties of most of these packages. Only the ASI has been extensively evaluated and translated.

3. There is insufficient evidence to support the use of comprehensive assessment packages.

4. The validation studies are generally of poor quality judging from the study reports, and study reporting is also poor.

4.1.1.1 What does this study contribute to the body of knowledge?

This review is the first to bring together information on comprehensive assessment packages that can be used in any setting and existing evidence on their performance. The review also highlights research gaps in the validation of the performance of these packages. This makes it a useful resource for clinicians or researchers with an interest in this area. The paper has been cited by one peer reviewed journal article (Fairhurst et al., 2014).

4.2 Implications of research findings to policy and practice

It is difficult to recommend any one comprehensive assessment packages due to the limited evidence and its poor quality. Based on the currently available evidence, the opinion of the authors of Paper 2 was that the best candidates for routine clinical use were the MAP, CUAD and the ASI. However, these packages work well for some services but not for others. There have been attempts in the past to make the ASI mandatory in the USA (Fairhurst et al., 2014). Although it is probably the most widely used assessment package in clinical and research settings in the USA, many services failed to comply (Cacciola et al., 2011; Mäkelä, 2004). Some of the problems encountered included that the ASI failed to cater for the wide variation in the needs of individuals with substance use disorders (Mäkelä, 2004). In addition, its use requires intensive training and continuous monitoring, which is both expensive and unrealistic (Mäkelä, 2004). An alternative for clinicians would be to have a set of single construct scales with good psychometric properties based on demographic characteristics of service users (Mäkelä, 2004). The implication of this is that different services will assess patients' healthcare needs in different ways. The lack of standardization can potentially present problems, particularly in healthcare systems where performance and payment for healthcare providers is determined by patients seen or treated, taking into account the complexity of the patient's healthcare needs, such as the Payment by Results scheme for alcohol and drugs in the UK (Department of Health Payment by Results Team, 2011; Thurgood et al., 2014).

4.3 Implications for future research

There is need for more validation of existing comprehensive assessment packages. It is probably better to have a small number of instruments that are continuously improved and validated in the light of new evidence. Each new application of a package has to be validated, as well as each translation, taking into account differences in substance use cultures (Cacciola et al., 2011; Mäkelä, 2004). There is also need to improve the quality of research, as well as

guidance on how best to measure, evaluate and report the different psychometric properties.

5. Intervention

This section discusses the available interventions for unhealthy alcohol use and problem drug use. The three papers (3, 4 and 5) focusing on interventions are very closely linked in terms of implications of findings to policy, practice and research. For this reason, the discussion of these issues is combined across the papers.

5.1 Interventions for unhealthy alcohol use and problem drug use

Interventions for unhealthy alcohol use or problem drug use include pharmacological and non-pharmacological approaches (NICE, 2008; National Treatment Agency, 2007; Raistrick, Heather and Godfrey, 2006). An example of a pharmacological approach is clinically managed detoxification which involves prescribing medication to minimise withdrawal symptoms, with the aim of rapidly achieving an alcohol or drug free state (Mayo-Smith, 1997; Raistrick, Heather and Godfrey, 2006). Pharmacological interventions are generally administered by specialist and competent healthcare professionals (NICE, 2011; Raistrick, Heather and Godfrey, 2006).

Non-pharmacological interventions mostly consist of psychotherapy, that is, verbal interaction between the patient and the therapist aimed at changing the behaviour and feelings of the patient (NICE, 2008; National Treatment Agency, 2007; Raistrick, Heather and Godfrey, 2006). These are used in a number of ways including: to prevent the progression of hazardous use to harmful use or dependence; to motivate behavioural change; and to maximize the likelihood of successful pharmacological treatment (Carroll and Schottenfeld, 1997). These interventions vary widely, for example in terms of mode of delivery (e.g. face-to-face, via the internet or telephone), personnel delivering the intervention (e.g. specialists in alcohol or addiction interventions, or generalists who are not alcohol or addiction specialists), format (e.g. individual/ group format) and intensity (e.g. duration of intervention) (Heather, 1995). The more intensive non-pharmacological interventions or treatments, typically consisting of eight or more sessions, are mostly directed at alcohol or drug dependent patients and

are generally delivered by specialists (Babor, 1994; Raistrick, Heather and Godfrey, 2006).

‘Moderate’ interventions, sometimes referred to as brief treatments and usually delivered over five to seven sessions, have been recommended for substance use treatment seeking moderately dependent drinkers in generalist or specialist settings (Babor, 1994; Raistrick, Heather and Godfrey, 2006). These interventions have also been suggested for those who are not seeking treatment for their substance use, but may be presenting with a condition where abstinence, as compared to a reduction in substance use, is critical for successful treatment (Frazier et al., 2011). Such interventions might include referral for further treatment in specialist services (Frazier et al., 2011; Makdissi and Stewart, 2013).

The less intensive interventions can be delivered by non-specialist healthcare professionals such as hospital physicians, nurses and social workers (Raistrick, Heather and Godfrey, 2006; Secretary of State for the Home Department, 2012). An example is brief interventions (BIs) which involve one to four sessions of engagement with a patient, and the provision of information/ advice designed to reduce risky alcohol or illicit drug consumption and related problems, or provide referral to additional care (Kaner et al., 2007; McQueen et al., 2011; Saitz et al., 2010). These non-specialist interventions are mainly directed at non-dependent hazardous and harmful drinkers (Babor and Higgins-Biddle, 2001; Raistrick, Heather and Godfrey, 2006; WHO, 1993); typically those who are not seeking treatment for unhealthy alcohol use, have less severe problems and whose intervention goal is reduced or non-problematic drinking as opposed to abstinence (Moyer et al., 2002). BIs have also been suggested for occasional and non-dependent problem drug users (Saitz et al., 2010). These interventions have attracted a great deal of attention in recent years because of their potential to be used opportunistically (i.e. they can be used for patients presenting to the health service for reasons other than their alcohol or drug use but who are then identified as unhealthy alcohol users or problem drug users) (Raistrick, Heather and Godfrey, 2006; Saitz et al., 2010). They can also be delivered by non-

specialist health professionals which means they can have a wide reach (Saitz et al., 2010; Secretary of State for the Home Department, 2012).

However, there is still uncertainty over whether these opportunistic interventions, or indeed a number of other interventions, can result in significant long-term reduction in alcohol consumption or illicit drug use among non-help seeking patients identified in general hospital settings (McQueen et al., 2011; Raistrick, Heather and Godfrey, 2006; Saitz, 2014). It is important to note that, despite the distinction depicted above between intensive treatment, brief treatment and brief interventions, it is not that 'clear cut' in practice. For example, what is considered a brief intervention by some researchers or clinicians might be considered brief treatment by others (Jönson et al., 1995).

Paper 3 and 4 were aimed at addressing the uncertainty over the effectiveness of interventions through systematically reviewing the currently available evidence. Although the systematic review focus was on both unhealthy alcohol use and problem drug use, Paper 3 focused on unhealthy alcohol use only because there were no eligible studies evaluating problem drug use interventions. The initial report submitted for publication consideration included problem drug use, and highlighted the research gap in this area. However, this inclusion was criticised by the peer reviewers who argued the report should concentrate on alcohol consumption where there is already a body of evidence.

5.1.1 Paper 3

Mdege, N.D., Fayter, D., Watson, J.M., Stirk, L., Sowden, A., and Godfrey, C. (2013). Interventions for reducing alcohol consumption among general hospital inpatient heavy alcohol users: a systematic review. *Drug and Alcohol Dependence*, 131(1-2), 1-22.

Paper 3 aimed to determine, from the available evidence, the effectiveness of interventions in reducing alcohol consumption among general hospital inpatient heavy alcohol users. Box 3 below summarises the main findings from Paper 3.

Box 3: Summary of main findings from Paper 3
1. Brief interventions of more than one session are likely to be more effective than usual care/ no intervention on reducing alcohol consumption, especially for non-dependent patients. 2. There was no clear intervention benefit from single session brief interventions and self-help literature (e.g. booklets, leaflets) on alcohol consumption outcomes, with indications of benefit from some studies but not others. 3. There were intervention benefits from single session brief interventions on motivation/ readiness to change. 4. Research on the evaluation of interventions for unhealthy alcohol use in general hospital wards have mostly been on brief interventions, especially single session brief interventions. 5. Many studies found significant improvements in all study groups for some outcomes including alcohol consumption. 6. All the interventions were non-pharmacological and alcohol focused. 7. There is great variability in the measures used to assess alcohol consumption across studies.

5.1.1.1 What does this study contribute to the body of knowledge?

This review recognizes the range of ways by which people's behaviour changes, from self-help through to more intensive intervention, as well as the diverse range of possible interventions that are available for unhealthy alcohol use (Pycroft, 2010). Hence, unlike previous reviews that focused on one type of intervention such as BIs (Emmen et al., 2004; McQueen et al., 2011), this review was not restricted by intervention type. In so doing, it highlighted that,

despite a diverse range of possible interventions, research with this population has mostly concentrated on alcohol focused BIs, especially single session BIs.

The review also explores the impact of different intervention characteristics such as format, modality or design on outcomes. In so doing it found that single session BIs have not demonstrated a clear benefit on alcohol consumption outcomes, despite more than two decades of research investment. On the other hand, BIs of two sessions or more, which have received much less research attention, seem to be more promising. This has important implications for research, policy and practice in this field. The paper has been cited by at least 10 peer reviews journal articles (Bergen et al., 2014; Chiappetta et al., 2014; Droste, Miller and Baker, 2014; Gordon et al., 2013; Govier and Rees, 2013; Heather, 2014a; Mdege and Chindove, 2014; Riper et al., 2014; Roerecke and Rehm, 2014; Shiles et al., 2013). It has mostly been cited for showing no clear benefit from single session BIs (Bergen et al., 2014; Chiappetta et al., 2014; Droste, Miller and Baker, 2014; Gordon et al., 2013; Heather, 2014a; Riper et al., 2014). Two articles restated the need for multiple session BIs (Roerecke and Rehm, 2014; Shiles et al., 2013).

5.1.2 Paper 4

Watson, J.M., Fayter, D., Mdege, N., Stirk, L., Sowden, A.J., and Godfrey, C. (2013). Interventions for alcohol and drug problems in outpatient settings: a systematic review. *Drug and Alcohol Review*, 32(4), 356-367.

Paper 4 was a review of available evidence on the effectiveness of interventions for alcohol and drug problems in general hospital outpatient settings. The main results are summarised in Box 4.

Box 4: Summary of main findings from Paper 4
1. Evidence for interventions to tackle either unhealthy alcohol use or problem drug use, or both problems at the same time, for patients identified in general hospital outpatient settings is scarce. 2. The few studies conducted in most general hospital outpatient departments have not found positive effects of brief interventions on reducing alcohol consumption and other outcomes, except in oral-maxillofacial clinics. 3. Interventions based on motivational techniques may be effective among unhealthy alcohol users identified in oral-maxillofacial clinics. This is however based on two studies. 4. Most studies were of poor quality judging from study reports, and the quality of study reporting was also poor.

5.1.2.1 What does this study contribute to the body of knowledge?

This is the first review to solely focus on interventions for unhealthy alcohol use and problem drug use in general hospital outpatient settings. This review also included any type of intervention for reasons already mentioned. The review informed a study on electronic alcohol screening and BI in hospital outpatient settings by highlighting the lack of evaluation of such interventions (Johnson, Kypri and Attia, 2013). Its conclusions were found consistent with findings from a recent RCT by Crawford and colleagues (2015) that found no BI impact on unhealthy alcohol use among people attending outpatient sexual health clinics. Other researchers have also restated the lack of research in this area (Fletcher, Nutton and Brend, 2014), and mixed findings from the few studies that exist (Riper et al., 2014).

The hospital outpatient clinics explored by paper 4 (as described in the introduction section 1) encompassed a wide range of patients: from those attending oral and maxillofacial, internal medicine, and HIV clinics, through to homeless and women's clinics. BIs for unhealthy alcohol use based on

motivational techniques seem promising in oral-maxillofacial clinics, whilst in general BIs have not worked well in other outpatient settings. This could suggest the need for tailoring interventions for each of the different outpatient settings. The results of the two ongoing trials identified in paper 4 are yet to be published (McCaul and Chander, n.d.; Rowe, n.d.).

The findings from Paper 3 and 4 resulted in another piece of work which aimed to explore how the effectiveness of BIs for reducing alcohol consumption in patients identified in general hospital settings could be improved. This is discussed below.

5.2 How can the effectiveness of brief interventions in general hospital settings be enhanced?

Systematic reviews in primary care settings have concluded that BIs are effective in reducing alcohol use in unhealthy alcohol users (Bertholet et al., 2005; Kaner et al., 2007; Moyer et al., 2002), whilst most in general hospital settings have reported inconclusive findings (Emmen et al., 2004; McQueen et al., 2011; Field et al., 2010). This difference in findings and conclusions could be due to a number of factors such as potential differences in the patient population, the actual interventions delivered, how the interventions are delivered and the environment within which interventions are delivered. There is a potential here for future BI studies conducted in general hospital settings to learn from what has been done in primary care.

Paper 5 takes up this opportunity and explores if there are any differences on intervention characteristics, study design or patient characteristics, between BI studies conducted in primary care and those conducted in general hospital settings that could explain the variance in the consistency of findings.

5.2.1 Paper 5

Mdege, N.D., and Watson, J. (2013). Predictors of study setting (primary care vs. hospital setting) among studies of the effectiveness of brief interventions among heavy alcohol users: a systematic review. *Drug and Alcohol Review*, 32(4), 368-380.

Paper 5 aimed to compare studies by their setting in order to identify differences between studies on BIs for heavy alcohol use conducted in primary care settings and those in general hospital settings. The main findings are summarised in Box 5.

Box 5: Summary of main findings from Paper 5

1. Studies comprising fewer intervention sessions were more likely to have been conducted in hospital settings than primary care settings.

2. Studies that did not exclude very heavy/ dependent drinkers were more likely to have been conducted in hospital settings than primary care settings.

3. Studies with a higher proportion of male participants were more likely to have been conducted in hospital settings than primary care settings.

5.2.1.1 What does this study contribute to the body of knowledge?

This study suggests the need to evaluate multiple session BIs, which is consistent with the findings from Paper 3. It also contributes to current debate on whether BIs are effective in reducing alcohol consumption among very heavy/ dependent drinkers. Whilst there is currently not enough evidence to either support or refute the effectiveness of BIs for this population, the results here suggest that the inclusion or exclusion of this population could be one of the reasons for differences in consistency of results between primary care and hospital settings.

Paper 5 has been cited by two articles, one on the need to assess intervention fidelity in trials where this is applicable (Chariot et al., 2014); and the other on the importance of addiction services in general healthcare settings (Shea, 2013).

5.3 Implications of research findings to policy and practice

The results from Papers 3 and 5 suggest that BIs for alcohol problems provided for individuals identified in general hospital settings should consist of at least two sessions. One session could be enough for improving motivation or readiness to change, but not to significantly reduce alcohol consumption. A recent review in primary care has also reported that brief multi-contact interventions (each contact up to 15 min) can achieve greater effect sizes compared with very brief (up to 5 min) and brief (>5 min, up to 15 min) single-contact interventions for unhealthy alcohol use (Jonas et al., 2012). This is consistent with findings in other areas such as smoking cessation where it has been demonstrated that interventions of low intensity do not significantly increase smoking cessation rates among hospitalised patients (Rigotti et al., 2012). Effective interventions are those where counselling interventions begin during hospitalisation and patient contact continues for at least one month after discharge (Rigotti et al., 2012). This could also be true for unhealthy alcohol users or problem drug users in general hospitals.

The feasibility of multiple session interventions in hospital settings is however questionable. A recent qualitative study conducted in England found very low levels of commitment to the delivery of substance misuse interventions among hospital setting healthcare professionals (Raistrick, Tober and Unsworth, 2015). The researchers suggested it is best if these interventions are delivered by trained addiction specialists, rather than trying to ‘piggy back’ them onto the services of other clinical specialties. In the UK it has been recommended that hospitals include alcohol liaison nurses or alcohol health workers (AHWs) whose roles are dedicated to tackling individuals with alcohol-related problems (HM Government, 2012; Royal College of Physicians, 2001). A recent survey of 48 NHS hospitals in England which I co-authored found that AHWs

predominantly target alcohol dependant adults, with those who are non-dependent being under prioritised (Baker et al., 2014). This means the opportunity to prevent non-dependent unhealthy alcohol users from progressing to more serious alcohol related problems and dependence is missed. There is need therefore to improve the AHW model, and to explore other models with active roles for interdisciplinary generalists and alcohol or addiction specialists (Broyles et al., 2012), in order to carter for all categories of unhealthy alcohol users.

It is very difficult to derive any recommendations for practice from Paper 4 due to the limited number of studies and weaknesses in study design. However, there could be unexplored potential to deliver multiple session interventions in hospital outpatient settings, particularly where patients are likely to have multiple appointments. Healthcare professionals might also find it easier to talk to outpatients about their alcohol consumption or illicit drug use as they are more likely to be in better physical and mental health states than those presenting to hospital inpatient settings or accident and emergency departments (Anderson et al., 2001; Groves et al., 2010).

5.4 Implications for future research

There is need for more research on the clinical and cost-effectiveness of multiple session BIs for unhealthy alcohol use in general hospital settings, and perhaps other interventions that are not BIs. Compared to primary care settings where it is possible to take advantage of future appointments for continued engagement with patients, in general hospital settings single session BIs could be more attractive to evaluate than multiple contact interventions because they seem more feasible. However, it is clear that these very short-term single session interventions might not result in lasting improvement on unhealthy alcohol use or problem drug use behaviour (Humphreys and Tucker, 2002; Pycroft, 2010). Building rapport and therapeutic alliance, which is important for the effectiveness of such interventions (Groves et al., 2010; Raistrick, Tober and Unsworth, 2015), could be difficult to achieve during a single session intervention. In addition, the patient's state of health when they present to

general hospital settings might make them less attentive or receptive to interventions for unhealthy alcohol use or problem drug use. It could therefore be that the current BI model consisting of a single session between an acutely ill patient and a healthcare provider with whom the patient might be meeting for the first time, with no distinction between non-dependent and dependent drinkers, might not be the most effective model for general hospital settings. Research should also include patients' and clinicians' perspectives on how and where multiple session interventions (or their difference components) should be delivered.

The differences observed in Paper 5 between BI studies conducted in primary care versus those in secondary care settings could also be explained by the limitations of meta-regression already mentioned in section 2.1. For example, since the methodology is observational in nature, there is the possibility that the results were biased through confounding by other study-level characteristics. The poor primary study quality which was observed also makes it difficult to derive any robust conclusions from the findings. However, the fact that the findings from paper 5 support findings from paper 3 particularly on the need for multiple session interventions, and those reported by other studies on the effectiveness of BIs among dependent unhealthy alcohol users (Moyer et al., 2002; Saitz, 2010), adds confidence to the findings (Higgins and Green, 2008).

There is also need for studies designed to explore which drinkers (i.e. hazardous, harmful and dependent drinkers) benefit from which interventions (Institute of Medicine, 1990; McCambridge and Rollnick, 2014; Raistrick, Heather and Godfrey, 2006). Most references to and recommendations for BIs suggest that they are expected to work for non-dependent hazardous and harmful drinkers, and not for dependent drinkers (Moyer et al., 2002; NICE, 2011; Raistrick, Heather and Godfrey, 2006; Saitz, 2010). However, many BI studies conducted in general hospital settings enrol a wide variety of participants in terms of severity of drinking and alcohol problems; from hazardous, through to harmful and dependent drinkers. For example, one study evaluating a single session BI had very high proportions of dependent drinkers (Saitz et al., 2007). Although the effectiveness of BIs for alcohol dependent

patients remains unknown (Saitz, 2010), observations in primary care suggest a reduction in intervention effect size if dependent drinkers are included (Moyer et al., 2002), and absence of BI effectiveness among dependent drinkers (Saitz, 2010). This might be the same for general hospital settings, although the uncertainty over the issue will continue until studies are designed to explore which drinkers benefit from which interventions.

Another research gap is on the evaluation of interventions that do not only focus on drinking behaviour, but also address directly any actual problems individuals might be experiencing because of their drinking (McCambridge and Rollnick, 2014). Undoubtedly, the volume of alcohol consumed is an important determinant of alcohol related harm (Norstrom and Ramstedt, 2005; WHO, 2014). Hence most policies and interventions are aimed at reducing total consumption of alcohol at individual level as well as in society. However, this has had a negative impact on the attention given to the problems associated with unhealthy alcohol use both on policy and intervention design, as well as on outcome measurement.

It has been suggested that BIs that focus on drinking less might be useful for hazardous drinkers for early intervention and secondary prevention (Heather, 2014b), whilst those employing motivational interviewing and addressing alcohol related harm in addition to drinking can be targeted at harmful and dependent drinkers (Heather, 2014b; McCambridge and Rollnick, 2014). However, findings from a WHO Collaborative study suggest the opposite, particularly for male patients: that is, simple advice works best for those who recognise their alcohol problem after having experienced a recent alcohol-related problem; whilst more extended counselling is needed for those who are ambivalent about their unhealthy alcohol use, which could include hazardous drinkers (Babor and Grant, 1992). Although this debate has mostly been in primary care, these issues are also relevant to general hospital settings. Only through adequately designed research can we address these issues.

There is a clear need to invest in more research on the effectiveness and cost-effectiveness of interventions for alcohol and illicit drug use problems in general

hospital outpatient settings. There is possibly untapped potential for delivering multiple session interventions in this setting as has already been mentioned.

Systematic reviews in this area have been criticised for not evaluating outcomes in relation to intervention content (McCambridge and Rollnick, 2014). However, we found that most studies did not describe the interventions in sufficient detail to allow for this exploration (Mdege et al., 2013; Mdege and Watson, 2013). Guidance on how to report non-pharmacological intervention details exist (Boutron et al., 2008). It might be worthwhile to investigate if the quality of reporting has improved since the publication of the guidance. In the case of no improvement it would also be useful to understand why that is and explore ways of facilitating improvement. As highlighted in section 2.1, another challenge encountered in this work was the variability of the methodological quality of studies, patient groups, the duration and content of interventions, control conditions, how outcomes were defined and measured, and time points for outcome measurements. This heterogeneous nature of this literature made quantitative pooling of trial outcomes impossible, and it was difficult to assess the overall effects of interventions across studies. These challenges have also been observed elsewhere (Kaner, Brown and Jackson, 2011). A number of strengths of the systematic reviews conducted as part of this thesis have already been highlighted in sections 2.1, 5.1.1.1 and 5.1.2.1. An additional strength is the fact that all the reviews systematically applied extensive search strategies to key databases covering health and social care research, and included scanning the reference lists of eligible studies.

Implementation of screening, assessment and interventions for individuals with alcohol and illicit drug use problems is challenging. Section 5 below will focus how some of the challenges can be addressed.

6. Implementation of interventions in general hospital settings

Results from the research studies conducted as part of this thesis present a number of potential policy and practice level implications. However, there are a number of significant implementation challenges that are encountered in general hospital settings (section 1.1.2.3). The section below will discuss how the impact of some of these barriers such as time constraints can be reduced through prioritising and targeting high risk patient groups and settings.

6.1 Addressing implementation challenges

Time constraints are the most commonly cited barrier to screening, assessment and intervention for unhealthy alcohol use and problem drug use (Beich, Thorsen and Rollnick, 2003; Patton et al., 2004; Sullivan et al., 2011). General shortage of resources such as financial and human resources is also a major barrier. Strategies such as self-administered screening, having dedicated addiction teams, or shifting the screening task from clinicians to other lower level workers can potentially improve screening and intervention rates (Raistrick, Tober and Unsworth, 2015). Targeted screening (i.e. screening specific high-risk patient groups) has also been suggested as a solution, not only for efficiency, but also for ensuring credibility of screening and any further intervention to both patients and clinicians (Beich, Gannick and Malterud, 2002; Hutchings et al., 2006; Prime Minister's Strategy Unit, 2004). For unhealthy alcohol use, a patient's presenting condition could provide a means of targeting those with a high likelihood of alcohol related problems who will potentially have the largest expected health gain from interventions aimed at reducing alcohol consumption (Patton et al., 2004). However, evidence on how to target patients in this way is limited, hence practice may vary widely. This is the subject of Paper 6 which focuses on the following medical specialties: gastroenterology, emergency medicine, cardiology and oncology.

Paper 6 utilized the Delphi method to explore whether there was consensus on the expected health gains by presenting condition among medical specialists.

6.1.1 Paper 6

Mdege, N.D., Raistrick, D., and Johnson G. (2014). Medical specialists' views on the impact of reducing alcohol consumption on prognosis of, and risk of, hospital admission due to specific medical conditions: results from a Delphi survey. *Journal of Evaluation in Clinical Practice*, 20(1), 100-110.

The sixth paper was aimed at investigating how to target patients for screening and interventions for unhealthy alcohol use based on their presenting medical condition. Box 6 summarizes the main findings.

Box 6: Summary of main findings from Paper 6

1. There was strong support from experts that reducing alcohol consumption could result in improvement in prognosis for gastroenterology and emergency medicine patients.

2. There were high levels of uncertainty over the prognostic benefits of reducing alcohol consumption for oncology and cardiology patients, except for alcoholic cardiomyopathy where there was unanimous consensus for high benefit.

3. The benefits of reducing alcohol consumption on hospital admissions due to the different conditions were not clear for all specialties.

4. The severity of a disease or condition was viewed as an important consideration. There was also strong support for the availability of aftercare and social support services within the community.

6.2 Study's contribution to the body of knowledge, and implication for policy, practice and future research

This study provides useful information for clinicians on which priority specialty areas to target for opportunistic screening and interventions for alcohol problems in hospital settings, where a targeting strategy has been adopted. A

focus on gastroenterology and emergency medicine patients may be an acceptable approach.

The study also highlights a number of unasked, unanswered and unemphasised questions for future research. For example, does perception reflect reality in terms of expected health gains from interventions aimed at reducing alcohol consumption for the different diseases or conditions? Is targeted screening by disease or condition more effective, cost-effective and acceptable than universal screening?

After discussing the six papers and the implications of their findings on policy, practice and future research, section seven contains the final remarks and conclusions.

7. Final remarks and recommendations

This integrative chapter has summarised the aims, objectives, methodology, results and conclusions from contributing papers. It has clarified how they form a coherent body of work and make a significant and original contribution to knowledge and understanding. The integrative chapter also specified the candidate's contribution to each of the papers.

The portfolio of work presented here aimed to address a number of evidence gaps regarding screening, assessment and interventions for unhealthy alcohol users and problem drug users in general hospital settings. First, there were no systematic reviews of evidence to guide the choice of problem drug use screening instruments or comprehensive substance use assessment packages to use. Second, there was lack of clarity on which interventions are effectiveness, or are most likely to be effective, for unhealthy alcohol use and problem drug use for general hospital patients. In addition, for unhealthy alcohol use there is lack of evidence on how to prioritise and target high risk patient groups and settings by presenting condition when resources are scarce. Overall, the portfolio of work has highlighted that the currently available body of evidence does not provide clear answers on how unhealthy alcohol users and problem drug users can be effectively intervened with in general hospital settings. However, there are still a number of policy, practice and research recommendations that can be drawn from this work. These are summarised below.

7.1 Policy and practice recommendations

Although there is lack of evidence demonstrating the validity of screening instruments for problem drug use, and the effectiveness of interventions for both unhealthy alcohol use and problem drug use within general hospital settings, identifying and addressing these issues in patients is still important (Boothroyd et al., 2013; Heather, 2014b; Saitz, 2014). When relevant to care, patients need to be asked about alcohol and/or drug use as such information could be critical to appropriate diagnosis and care.

Four main policy and practice recommendations can be drawn from the work presented here. First, currently available evidence favours the ASSIST as the screening instrument of choice. Second, instead of comprehensive assessment packages, clinicians can use a set of single construct scales with good psychometric properties based on the demographic characteristics of the service users. Third, BIs for unhealthy alcohol users in general hospital settings should consist of at least two sessions as such interventions are more likely to be effective than usual care or no intervention. Single session brief interventions might be attractive from the feasibility and implementation perspectives. However, they have not demonstrated any clear benefit when compared to usual care or no intervention on alcohol consumption outcomes. Fourth, the findings from Paper 6 suggest that a focus on gastroenterology and emergency medicine patients is a promising way to target resources for opportunistic screening and interventions for unhealthy alcohol use by presenting condition in hospital settings.

Together these conclusions inform policy and practice on screening, assessment and interventions for unhealthy alcohol users and problem drug users in general hospital settings.

7.2 Research recommendations

The main areas where research studies are most needed in this field are highlighted below and in Box 7.

There is need for randomised controlled trials (RCTs) evaluating the effectiveness of interventions for unhealthy alcohol use and problem drug use in hospital inpatient and outpatient settings. These trials need to investigate if multiple session brief interventions are effective, particularly for non-dependent hazardous and harmful alcohol users and drug users. It is encouraging to see that from the seven on-going hospital inpatient studies listed in Paper 3, at least three are multiple session interventions. Brief treatments also need to be evaluated for moderately dependent drinkers and drug users, including non-treatment seekers with conditions where abstinence is critical for successful

treatment. In addition, there is need for research on interventions (either pharmacological or non-pharmacological) aimed at dependent patients since studies have shown large proportions of alcohol or illicit drug dependent patients in general hospital settings. Research should also incorporate process evaluation relating to the design and delivery of the interventions, mechanisms of action and the active ingredients of interventions (Gaume et al., 2014). An exploration of the key barriers and facilitators affecting the implementation of such interventions in general hospital settings is also needed. This could include using quantitative data from RCTs as well as qualitative data exploring the perspectives of patients, clinicians and other stakeholders.

Box 7: Main research recommendations

1. There is need for randomised controlled trials evaluating multiple session BIs and other interventions that are not BIs, for unhealthy alcohol users and problem drug users identified in general hospital settings.

2. The evaluation of interventions in general hospital settings need to incorporate process evaluation, as well as the exploration of key barriers and facilitators affecting intervention implementation.

3. There is need for the design and evaluation of the psychometric and diagnostic properties of screening instruments for problem drug use in general hospital settings.

For problem drug use, there is optimism that screening and BIs could be effective since they have shown success for smoking cessation and unhealthy alcohol use (particularly in primary care) (Saitz, 2014). However, evidence generated from other behaviours might not be directly transferable to problem drug use. It has been suggested that the criminogenic nature of problem drug use (i.e. prohibited use, by law, of a substance) might have an impact on the transferability of intervention effectiveness evidence generated from tobacco or alcohol use. However, there is lack of evidence to support this notion. It will be interesting to contrast the intervention effectiveness evidence for problem novel

psychoactive substance (NPS) use as it develops, with the developments in problem drug use (as defined in this thesis) with regards to whether the legality/ illegality of a substance *per se* makes a difference. NPS use is the use of a new narcotic or psychotropic drug, in pure form or in preparation, that is not controlled by the United Nations drug conventions and not prohibited by law, but which may pose a public health threat comparable to that posed by substances listed in these conventions (European Monitoring Centre for Drugs and Drug Addiction, 2006). Problem drug use is often more socially proscribed when compared to tobacco use and unhealthy alcohol use (Saitz, 2014). Thus, there could be significant differences in the way that problem drug users engage with, interacts with and respond to interventions when compared to tobacco users or unhealthy drinkers. For example, qualitative studies have reported lack of trust between problem drug users and healthcare professionals (Chan, 2008; Merrill et al., 2002; Morgan, 2006). In some studies, healthcare professionals, as well as the drug users themselves, perceived problem drug users as blameworthy and unworthy of care (Chan, 2008; Crockett and Gifford, 2004; Pauly, 2008). These views could be different for non-dependent unhealthy alcohol use and tobacco use. Hence the need for research that is specific for problem drug use.

Studies on the design and evaluation of the psychometric and diagnostic properties of screening instruments for problem drug use in general hospital settings are needed in this field. This could include the optimisation of the already existing instruments to suit general hospital settings by making them less bulky and ensuring they can distinguish between active and inactive problems as well as different levels of substance use.

7.3 How the portfolio of work informed phase 2 of the ARiAS

The work described within this thesis formed the phase 1 developmental work that informed the ADAPTA pilot RCT in phase 2 of the ARiAS programme (Watson et al., 2013b), as demonstrated in Figure 3.

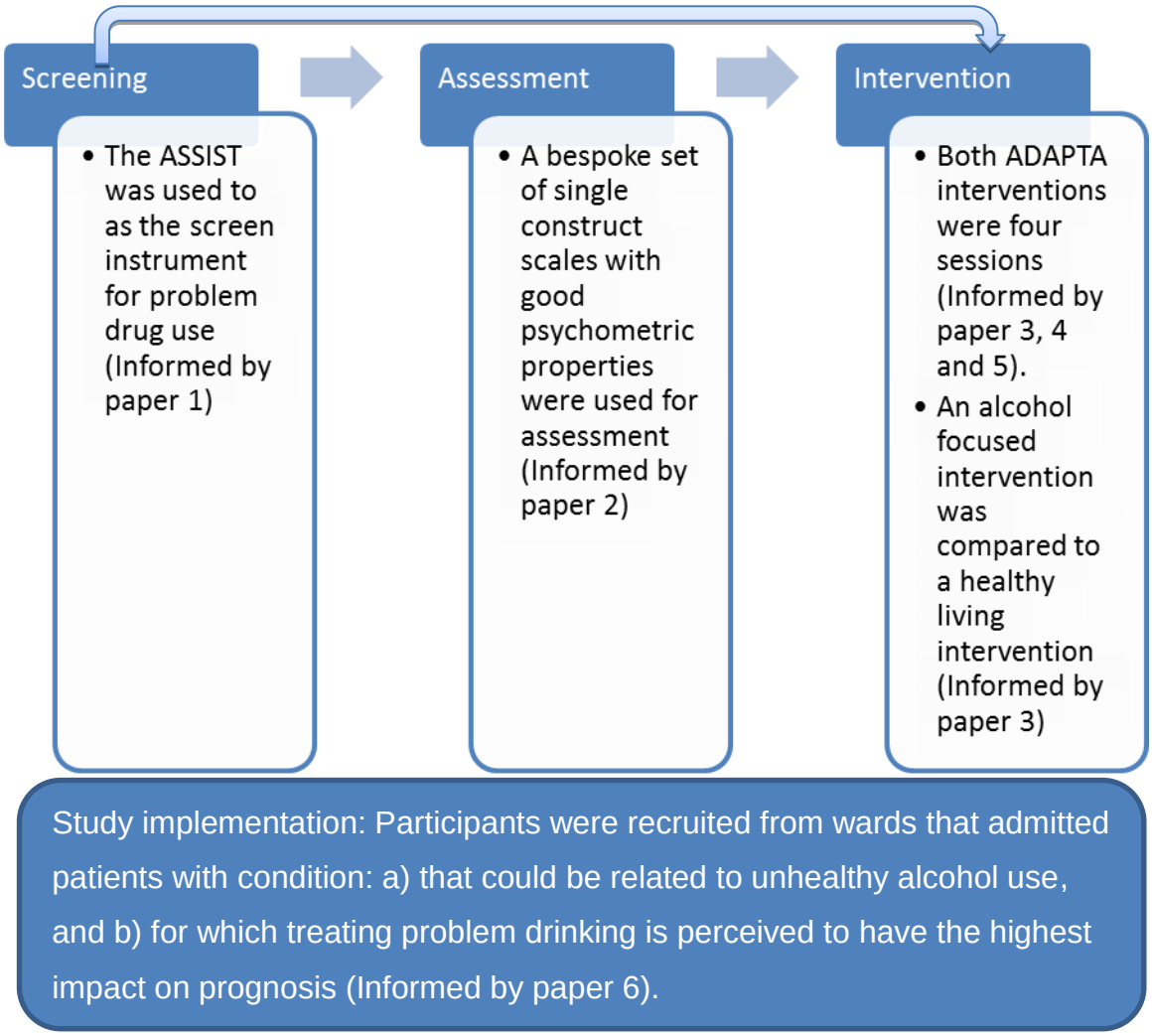


Figure 3: An illustration of how the presented body of work informed the ADAPTA pilot trial

In conclusion, there is great potential for identifying, assessing and intervening with unhealthy alcohol users and problem drug users in general hospital settings. The health, social and economic dividends from effective interventions could be very great. However, fundamental challenges stand in the way of realising such outcomes. First, many of the unhealthy alcohol users and problem drug users might not even be aware, or acknowledge, that they have such problems. Second, too little is known about the most effective ways of identifying and intervening with patients in this setting. Lastly, there are

considerable barriers to engaging healthcare professionals and patients in this process. This thesis, and the body of work that it comprises, has contributed to this knowledge base, but there continue to be glaring gaps in our understanding that future research needs to address.

Appendix 1: Papers 1 to 6

Addictive Behaviors 36 (2011) 1111–1119

Contents lists available at ScienceDirect

Addictive Behaviors

Screening instruments for detecting illicit drug use/abuse that could be useful in general hospital wards: A systematic review

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ABSTRACT

Aim: To identify and describe screening instruments for detecting illicit drug use/abuse that are appropriate for use in general hospital wards and review evidence for reliability, validity, feasibility and acceptability.
Methods: Instruments were identified from a number of screening instrument databases/libraries and Google Scholar. They were independently assessed for eligibility by two reviewers. MEDLINE, EMBASE, PSYCINFO, and Cochrane Library were searched for articles published up to February 2010. Two reviewers independently assessed the identified articles for eligibility and extracted data from the eligible studies.
Results: 13 instruments, ASSIST, CAGE-AID, DAST, DHQ/PDHQ, DUDIT, DUS, NMASSIST, SIP-AD, SDS, SMAST-AID, SSI-SA, TICS and UNCOPE were included in the review. They had 2 to 28 items and took less than 10 min to administer and score. Evidence on validity, reliability, acceptability and feasibility of instruments in adult patients not known to have a substance abuse problem was scarce. Of the 21 studies included in the review, only one included participants from general hospital wards. Reported sensitivity, specificity and predictive values varied widely both between studies of the same instrument and also between different instruments. No study was identified comparing two or more of the included instruments.
Conclusion: The review identified and described 13 instruments that could be useful in general hospital wards. There is however lack of evaluation of illicit drug use screening instruments in general hospital wards. Currently clinicians or researchers searching for a simple, reliable, general screening instrument for current drug use to guide practice or research in general hospital wards do not have enough comparative evidence to choose between the available measures.

Contents

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1. Introduction

The misuse of illicit drugs has a major impact on population health, including accounting for the loss of 11.6 million Disability Adjusted Life Years (DALYs) annually worldwide, which is 0.8% of the total burden of disease (World Health Organization (WHO), 2002). In England illicit drugs were responsible for 1738 deaths in 2008; 42,170 hospital admissions with a primary or secondary diagnosis of drug-related mental health and behavioral disorders in 2008/9; and 11,090 admissions with a primary diagnosis of drug poisoning in 2008/9 (NHS Information Centre, 2009). The economic and societal costs of illicit drug use are substantial. In England the use of Class A drugs (those treated as the most harmful and so carry the harshest penalty e.g. cocaine and heroin) was associated with economic and social costs of around £15.4 billion in 2003/04 of which £488 million (3%) were health service use costs (Gordon, Tinsley, Godfrey, & Parrott, 2006).

Empirical information on the effectiveness and cost-effectiveness of methods for both identifying and treating substance misusers is scarce (Bernstein et al., 2005; Madras et al., 2009; WHO, 2008). Although illicit drug use is associated with increased risk of a number of health problems (Mertens, Lu, Parthasarathy, Moore, & Weisner, 2003; Swanson et al., 2007), the majority of people with illicit drug use disorders do not seek treatment as they are unaware they have a problem (Madras et al., 2009). There is mounting evidence of a high prevalence of drug misuse among inpatients in general hospital wards (Brown, Leanard, Saunders, & Papasouliotis, 1997; Crome, Bloor, & Thom, 2006). Such wards therefore provide opportunity to engage patients who are unaware they have a problem or may not seek care. Whilst hospitalized, potential interventions are less time-limited and patients may also link their illicit drug use and hospitalization, thereby providing a "teachable moment", such as suggested for alcohol misuse (Mitka, 1998; Saitz, Palfai, Cheng et al., 2007). Hospitalized patients generally have more severe medical conditions than those in primary care which allows health professionals to argue more effectively for screening and intervention if the medical conditions are related to illicit drug use (Emmen, Schippers, Bleijenberg, & Wollersheim, 2004).

Identification of illicit drug use problems is useful for: optimizing treatment effectiveness for the diagnosed health problem; directing behavioral interventions to influence future drug use; and reducing health care costs (Crome et al., 2006; Mertens et al., 2003). This is particularly important for patients presenting with medical conditions where illicit drug use could be a contributing factor. Research has suggested screening alone, without any further intervention, significantly influenced participants to reduce their substance use, which could concomitantly reduce associated health problems and other consequences (Copeland, Swift, Roffman, & Stephens, 2001; WHO, 2008). According to Gossop, Marsden, and Stewart (1998, 2001) the total cost savings to society are greater than £3 for every extra £1 spent on drug misuse treatment. Standardized illicit drug screening instruments can be useful tools for identifying illicit drug use problems and facilitating treatment (Hoffmann, Hunt, Rhodes, & Riley, 2003; Lanier & Ko, 2008; WHO ASSIST Working Group, 2002). However various factors may hinder health professionals from using standardized screening instruments including: lack of time, inadequate training, low confidence, and negative attitudes to both its purpose and the 'target group' (Crome et al., 2006).

The aim of this review is to identify and describe screening instruments for detecting illicit drug use/abuse that are appropriate for use in general hospital wards, and review evidence for reliability, validity, feasibility and acceptability. We used specified criteria to identify the screening instruments (see Section 2.2.1). For the identified instruments, we explored 1) their ability to distinguish between different levels of substance abuse (i.e. active and inactive problems, abstainers/non-problematic use, abuse and dependence; 2) reliability and validity; 3) specificity, sensitivity and predictive values; 4) the extent to which the scale has been tested with different population groups, cultural or geographical locations; 5) the perceived relevance of the instrument for a particular group or setting; and 6) the acceptability of the instrument to patients and those administering it. These are among the essential features for finding the best match between a screening instrument and the proposed screening exercise (Crome et al., 2006). To the best of our knowledge, no such review of illicit drug use screening instruments that could be used in general hospital wards has been completed before.

2. Methods

2.1. Search strategy

A three stage search strategy was used. First, in February 2010 an extensive search for illicit drug screening instruments was conducted in the following: the Alcohol and Drug Abuse Institute Library (http://lib.adai.washington.edu), a regularly updated database of screening, assessment and outcome measurement instruments for alcohol and drug abuse; National Institute of Drug Abuse, USA (http://www.nida.nih.gov/NIDAHome.html); Addiction Research Institute of the Centre for Social Work, The University of Texas at Austin (http://www.utexas.edu/research/cswr/nida/instrumentListing.html); Centre on Alcoholism, Substance Abuse and Addictions (CASAA) (http://casaa.unm.edu/inst.html) and Google Scholar. The identified instruments were selected for inclusion in the review using the criteria in Section 2.2.1.

Secondly, for each selected instrument from the first stage, literature searches were conducted in Medline (1950—February Week 4, 2010), PsycIFO (1806—February Week 4, 2010), Embase (1980–2010 Week 09), and Cochrane Library (Issue 4, 2010) for published evidence of each instrument's performance. The instrument's full name and/or acronym were used in combination with the following phrases: substance-related disorders; drug misuse/abuse/addiction/dependence; substance misuse/abuse/addiction/dependence; and opioid/amphetamine/cocaine/marijuana/cannabis/benzodiazepines in combination with misuse/abuse/addiction or dependence. The search was conducted in February 2010 and limited to English language. No date limits were applied.

Thirdly, the identified studies from the second stage were cross-checked to identify supplementary instruments and any research on the identified instruments not already revealed in the first and second stages of the search.

2.2. Selection criteria

2.2.1. Types of screening instruments

We included screening instruments to detect illicit drug use in adult patients not known to have a substance abuse problem, that are short enough for use in general hospital wards (10 min or less to administer and score), and do not require specific training to administer, score and interpret results. Although instruments which take less than 10 min could be preferred in some settings, a cut off of 10 min was chosen because instrument with the shortest time were often reported as taking 5 to 10 min to complete and score. Specific training requirements would affect sustainability of routine screening because of the high turnovers of staff which might be associated hospital settings.

Screening instruments for one or two specific drugs only and dual diagnosis (illicit drug use and mental health disorders) were excluded. We were interested in screening instruments that take into account the diverse nature of illicit drugs that some patients could be using, therefore those only screening for one or two specific drugs would not cover an adequate range of illicit drugs to be useful in general hospital wards. Although many people with drug problems also experience a range of other psychiatric and psychological problems, screening for dual diagnosis is a lengthy process which might require clinicians with necessary expertise (Barnaby, Drummond, McCloud, Burns, & Omu, 2003; Dawe & Mattick, 1997), hence may not be feasible in general hospital wards.

2.2.2. Types of studies

We included studies evaluating any of the following: validity, sensitivity and specificity, predictive values, reliability, acceptability, feasibility. We excluded studies only including patients already identified or diagnosed as having a substance abuse disorder, those conducted in populations other than adults, and studies on one or two specific drugs only.

2.3. Selection process for inclusion of instruments and studies

Two reviewers (NM and JL) independently assessed the instruments for inclusion using the pre-specified selection criteria. Differences in opinion were resolved through consensus.

All titles and abstracts retrieved from the search process were independently screened by NM and JL to identify all potentially relevant studies. Full articles were then independently judged by NM and JL according to the pre-specified criteria and classified as included, excluded, or unclear. Differences in opinion were resolved through consensus. Where a study was classified by both reviewers as unclear, eligibility was determined through discussion.

2.4. Data extraction

NM and JL independently extracted data from the published sources using a data extraction form. The extracted information included study identifiers (lead author, publication year); general instrument characteristics (number of items, time required, completion, format, availability); recall period, type of instrument, distinguishing between active and inactive use, distinguishing between abstainers/low risk users, hazardous/harmful and dependent users; and validity, reliability, acceptability, feasibility, sensitivity, specificity, and predictive values. The data extraction form was piloted on 3 papers and adjusted accordingly. Differences in data extraction were resolved through discussion.

3. Results

3.1. Screening instruments

Seven hundred and eight instruments were identified, of which: 543 instruments were for detailed assessment after a person has already been identified as having a problem using a shorter screening method, 46 were for adolescents and 95 were for alcohol only or other addictive behaviors. Of the remaining twenty four screening instruments three were specific for one or two drugs only, five took more than 10 min to complete and score, one was for dual diagnosis, and one requires specific training. We also excluded one instrument (Substance Use Inventory) as we were not able to obtain enough information to assess its eligibility for the review despite extensive efforts, including contacting the developers of the instrument. Although some studies have used the Substance Use Inventory for research purposes, our search did not identify any studies on its evaluation. Thus, thirteen screening instruments were selected for this review:

ASSIST: Alcohol, Smoking, and Substance Involvement Screening Test
CAGE-AID: Cut Down, Annoyed, Guilty, Eye-opener- Adapted to Include Drugs

DAST: Drug Abuse Screening Test

DHQ/PDHQ: Drug History Questionnaire or Psychoactive Drug History Questionnaire

DUDIT: Drug Use Disorders Identification Test

DUS: Drug Use Screening

NMASSIST: NIDA-Modified Alcohol, Smoking, and Substance Involvement Screening Test

SMAST-AID: Short Michigan Alcoholism Screening Test Adapted to Include Drugs

SIP-AD: Short Inventory of Problems-Alcohol and Drugs

SDS: Severity of Dependence Scale

SSI-SA: Simple Screening Instrument for Substance Abuse

TICS: Two Item Conjoint Screen for Alcohol and other Drug Problems

UNCOPE: Use, Neglect, Cut down, Objection, Preoccupied, Emotional discomfort.

3.2. General instrument characteristics

All instruments included in the review have 28 items or less and take at most 10 min to complete and score (Appendix A). Eight (CAGE-AID, DAST, DHQ/PDHQ, DUDIT, SMAST-AID, SIP-AD, SDS and TICS) are designed for self-administration by patients, three are interviewer administered (ASSIST, DUS, and UNCOPE) and two are either self or interviewer administered (NMASSIST and SSI-SA).

3.3. Types of instruments

Six of the thirteen instruments are conjoint screening instruments (CAGE-AID, SMAST-AID, SIP-AD, SSI-SA, TICS and UNCOPE) (Appendix B) which enquire simultaneously and collectively about experiences with alcohol and other drugs (Brown, Leonard, Saunders, & Papasouliotis, 2001). For example one of the questions on UNCOPE is "Have you ever neglected some of your usual responsibilities because of using alcohol or drugs". Three instruments enquire about drugs collectively and exclude alcohol (DAST, DUDIT and SDS). An example of a question from the DAST-28 is "Have you ever neglected your family or missed work because of your use of drugs". Four instruments enquire about illicit drug use in a disaggregated manner and include alcohol, as well as tobacco in some instances (ASSIST, DHQ/PDHQ, DUS and NMASSIST). For example, one of the questions on ASSIST is "In your life, which of the following substances have you ever used? a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.), b. Alcoholic beverages (beer, wine, spirits, etc.), c. Cannabis (marijuana, pot, grass, hash, etc.), d. Cocaine (coke, crack, etc.), e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)…"

3.4. Ability to distinguish between different levels of substance abuse

3.4.1. Active and inactive problems

CAGE-AID, DAST, SMAST-AID, and SSI-SA do not distinguish between active and inactive problems as they only ask about lifetime experience with illicit drugs (Appendix B). ASSIST, DHQ/PDHQ, DUDIT, DUS, NMASSIST, SIP-AD, SDS, TICS and UNCOPE are able to make this distinction because they ask about illicit drug use in the past year, 6 months, 3 months or 30 days.

3.4.2. Abstainers/non-problematic use, abuse and dependence

Four of the instruments distinguish between abstainers/non-problematic use, abuse and dependence (ASSIST, DUDIT, NMASSIST and SSI-SA) (Appendix B).

3.5. Literature Search

Of the 794 studies identified, 265 were duplicates and 474 were judged as irrelevant. The full papers of the remaining fifty five studies were retrieved and assessed for eligibility. Thirty four studies were excluded at this stage (9 were not related to the aims and objectives of this review, 7 were in adolescents, 5 looked at 1 or 2 drugs only, 4 were on alcohol use/abuse, 4 were guidelines for instrument use, 4 were conducted in substance abusers, 1 was a duplicate). The remaining twenty one were included in the qualitative synthesis. Below are the results from the studies that met the inclusion criteria.

3.6. Validity

Three of the included studies evaluating the validity of ASSIST cover 8 countries (Table 1). They included participants from drug treatment, primary health care and psychiatric settings. These studies reported: high construct validity with positive correlations of 0.40 to 0.81 ($p<0.001$) (Hides et al., 2009; Newcombe et al., 2005); high concurrent validity with positive correlations of 0.59 to 0.89 ($p<0.001$) between the ASSIST and other similar instruments (Hides et al., 2009; Humeniuk et al., 2008; Newcombe et al., 2005); and high discriminative validity that is the ability to discriminate between non-problematic use (low risk), abuse (moderate risk) and dependence (high risk) (Humeniuk et al., 2008; Newcombe et al., 2005).

One study by Leonardson et al. (2005) evaluated the validity of CAGE-AID in diabetes clinic patients in the USA and reported high concurrent and divergent validity.

Blanchard et al. (2003) reported high concurrent validity for SIP-AD 15 ($r=0.35$ to 0.59 $p<0.001$) in outpatient substance abuse treatment patients in the USA. Good discriminative and convergent validity were also reported (Blanchard et al., 2003).

Brown et al. (2001) reported high validity for TICS in a sample of primary medical care patients in USA.

No validity studies were identified for DAST, DHQ/PDHQ, DUDIT, DUS, NMASSIST, SIP-AD10, SMAST-AID, SDS, SSI-SA, and UNCOPE.

3.7. Reliability

The reliability of ASSIST was reported in three studies covering 11 countries and participants from drug and alcohol abuse treatment, primary health care, psychiatric and general medical settings (Table 2). High internal consistency was reported, with Cronbach's alpha scores of 0.77 and above (Hides et al., 2009; Humeniuk et al., 2008). Good to excellent test–retest reliability was also reported with a kappa score range of 0.58 to 0.90 (WHO ASSIST Working Group, 2002).

Leonardson et al. (2005) reported high internal consistency (Cronbach's alpha score 0.92) for CAGE-AID in a study in diabetic clinic patients in the USA.

The eight studies evaluating the reliability of DAST covered 3 countries: USA, Canada and India. The study populations included psychiatric patients, adults seeking evaluation for attention deficit/hyperactivity disorder, female offenders and adult workers (drug users and nonusers). High internal consistency was reported for DAST-28, DAST-20, and DAST-10 with Cronbach's alpha scores of 0.86 and above (Carey et al., 2003; Cassidy et al., 2008; Cocco & Carey, 1998; El-Bassel et al., 1997; McCann et al., 2000; Saltstone et al., 1994; Staley & El-Guebaly, 1990). Kappa scores of 0.85, 0.71 and 0.78 were reported for DAST-28, DAST-20 and DAST-10 respectively (Cocco & Carey, 1998; El-Bassel et al., 1997).

Two studies, one conducted among men who have sex with men and another conducted among outpatient substance abuse treatment patients, in the USA evaluated the reliability of SIP-AD. High internal consistency was reported for SIP-AD 10 and SIP-AD 15 with Cronbach's alpha scores of 0.93 and above (Blanchard et al., 2003; Hagman et al., 2009). High test–retest reliability was also reported for SIP-AD 10 (Hagman et al., 2009).

For UNCOPE, a study among prisoners in the USA reported high internal consistency with Cronbach's alpha score of 0.85 (Hoffmann et al., 2003).

Table 1
Validity.

Instrument (Reference)	Reference test	Population	Country	Construct validity	Concurrent validity	Discriminative validity	Other validity
ASSIST (Humeniuk et al., 2008)	A battery of other instruments	1047 participants from drug treatment and primary health care settings	Australia, Brazil, India, Israel, Thailand United Kingdom USA, Zimbabwe	$r=0.48–0.76$ ($p<0.001$)	$r=0.59–0.88$ ($p<0.001$)	High	–
ASSIST (Newcombe et al., 2005)	A battery of other instruments	150 participants from drug treatment and primary health care settings.	Australia	$r=0.40–0.81$ ($p<0.001$)	$r=0.67–0.89$ ($p<0.001$)	High	–
ASSIST (Hides et al., 2009)	Structured Clinical Interview for DSM-IV (SCID-IV) and other instruments	214 first episode psychosis patients	Australia	–	$r=0.41–0.63$ ($p<0.001$).	–	–
CAGE-AID (Leonardson et al., 2005)	A battery of other instruments	50 American Indians from a diabetes clinic	USA	–	High	–	High divergent validity
SIP-AD 15 (Blanchard, Morgenstern, Labouvie, Morgan, & Bux, 2003)	SCID and Statistical Manual for Mental Disorders and other instruments	252 new outpatient substance abuse treatment patients	USA	–	$r=0.35–0.59$ ($p<0.001$)	Good	Good convergent validity
TICS (Brown et al., 2001)	CIDI-SAM	702 primary medical care patients	USA	High	High	–	–

Table 2
Reliability.

Instrument (Reference)	Reference test	Population	Country	Internal consistency Cronbach's alpha score	Test retest kappa score	Inter-rater reliability
ASSIST (WHO ASSIST Working Group, 2002)	A battery of other instruments	236 volunteers from drug and alcohol abuse treatment, general medical settings, and psychiatric facilities.	Australia, Brazil Ireland, India, Israel Palestinian Territories Puerto Rico United Kingdom Zimbabwe	–	0.58 to 0.90	–
ASSIST (Humeniuk et al., 2008)	A battery of other instruments	1047 participants from drug treatment and primary health care settings	Australia, Brazil, India Israel, Thailand United Kingdom USA, Zimbabwe	0.77–0.94	–	–
ASSIST (Hides et al., 2009)	(SCID-IV) and other instruments	214 first episode psychosis patients	Australia	0.90	–	–
CAGE-AID (Leonardson et al., 2005)	A battery of other instruments	50 American Indians from a diabetes clinic	USA	0.92	–	–
DAST-28 (Staley & El-Guebaly, 1990)	DSM-III substance abuse diagnosis	250 Psychiatric patients	Canada	0.94	–	–
DAST 28 (McCann, Simpson, Ries, & Roy-Byrne, 2000)	Psychiatric diagnosis of substance abuse or dependency	143 adults seeking evaluation for attention deficit/ hyperactivity disorder.	USA	0.92	–	–
DAST-28 (El-Bassel, Schilling, Schinke, Orlandi, & Sun, 1997)	Battery of questionnaires	176 adult workers (identified drug users and nonusers).	USA	0.92	0.85 (n = 20)	–
DAST-20 (Cassidy, Schmitz, & Malla, 2008)	SCID based diagnosis.	84 first episode psychosis patients	Canada	0.998	–	–
DAST-20 (Saltstone, Halliwell, & Hayslip, 1994)	Questionnaire	540 Female offenders	Canada	0.88–0.91	–	–
DAST 20 (Cocco & Carey, 1998)	Psychiatric diagnosis of substance abuse or dependency	97 Psychiatric outpatients with Axis I mental disorder other than substance use/dependence	USA	0.86	0.71 (n = 45)	–
DAST 10 (Cocco & Carey, 1998)	Psychiatric diagnosis of substance abuse or dependency	97 Psychiatric outpatients with Axis I mental disorder other than substance use/dependence	USA	0.92	0.78 (n = 45)	–
DAST-10 (Carey, Carey, & Chandram, 2003)	Discharge diagnosis of substance use disorders	671 newly admitted psychiatric patients	India	0.94	–	–
SIP-AD 15 (Blanchard et al., 2003)	SCID and statistical manual for mental disorders and other instruments	252 new outpatient substance abuse treatment patients	USA	0.93–0.96	–	–
SIP-AD 10 (Hagman et al., 2009)	DSM-IV drug dependency symptoms	469 non-treatment seeking men who have sex with men	USA	0.956	High	–
UNCOPE (Hoffmann et al., 2003)	Diagnostic interview covering the DSM-IV criteria	310 prisoners	USA	0.85	–	–

We did not identify any eligible study on inter-rater reliability. No eligible reliability studies were identified for the following: DHQ/PDHQ, DUDIT, DUS, NMASSIST, SMAST-AID, SDS, SSI-SA, and TICS.

3.8. Sensitivity, specificity and predictive values

Three studies covering 8 countries and including participants from drug treatment, primary health care and psychiatric settings reported on the sensitivity and specificity of ASSIST (Table 3). The reported sensitivity was from 54% to 97% and specificity ranged from 50% to 96%, depending on the illicit drug (Hides et al., 2009; Humeniuk et al., 2008; Newcombe et al., 2005). The results were consistent between studies although they measured different aspects: discriminating between abuse and dependence (Humeniuk et al., 2008), discriminating between those with and those without illicit drug use problems (Hides et al., 2009) and discriminating between non-problematic use, abuse and dependence (Newcombe et al., 2005). No study reported on predictive values of ASSIST.

From two studies conducted in the USA, sensitivity of the CAGE-AID ranged from 70% to 92% and specificity ranged from 48 to 90% depending on the cut off score (Brown & Rounds, 1995; Hinkin et al., 2001). The results from the two studies were markedly different. This could be because the studies were conducted in different populations (one in primary care patients and the other in drug abusers and non-abusers). The reported positive predictive value (PPV) for CAGE-AID ranged from 12% to 36% and the negative predictive value (NPV) was at least 98% depending on the cut off score (Hinkin et al., 2001).

For DAST-28 three studies, two in the USA and one in Canada, reported sensitivity of at least 82% and specificity of 71% to 93.9% (El-Bassel et al., 1997; McCann et al., 2000; Staley & El-Guebaly, 1990). The PPV ranged from 23% to 95.7% and the NPV ranged from 74% to 98% (El-Bassel et al., 1997; McCann et al., 2000; Staley & El-Guebaly, 1990).

Two studies in psychiatric patients, one in USA and one in Canada, reported sensitivity ranging from 55% to 89% and specificity ranging from 68% to 86% for DAST-20, depending on the cut off score (Cassidy et al., 2008; Cocco & Carey, 1998). The PPV ranged from 74% to 79% and the NPV from 68% to 84% for cut off scores of 3 and 6 (Cassidy et al., 2008).

For DAST-10, three studies in psychiatric patients reported a sensitivity range of 65% to 85% and specificity range of 68% to 98% (Carey et al., 2003; Cocco & Carey, 1998; Maisto et al., 2000). Two of the studies were conducted in the USA and one was conducted in India. DAST-10 had a PPV range of 35% to 73% and an NPV range of 93% to 99% at different cut off scores (Carey et al., 2003; Maisto et al., 2000).

Brown and Rounds (1995) reported sensitivities ranging from 40% to 51% and specificities of 92% to 95% using different cut off scores for SMAST-AID in a primary care practice study conducted in the USA.

Table 3
Sensitivity, Specificity, Positive Predictive values (PPV) and Negative Predictive Values (NPV).

Instrument (Reference)	Reference test	Population	Country	% Sensitivity (cut off score)	% Specificity (cut off score)	% PPV (cut off score)	% NPV (cut off score)
ASSIST (Humeniuk et al., 2008)	Hair analysis compared to self-reported use in last 3 months	1047 participants from drug treatment and primary care settings	Australia, Brazil, India, Israel, Thailand, UK, USA, Zimbabwe	54–97	50–96%	–	–
ASSIST (Newcombe et al., 2005)	Global continuum of risk and substance involvement score.	150 participants from drug treatment and primary health care settings.	Australia	58–90	64–91	–	–
ASSIST (Hides et al., 2009)	SCID-IV and other instruments	214 first episode psychosis patients	Australia	63–81	62–76	–	–
CAGE-AID (Hinkin et al., 2001)	DSM-III-R diagnosis for lifetime drug abuse/dependence.	901 drug abusers and non-abusers.	USA	92 (1) 81(2) 73(3)	48 (1) 72(2) 90(3)	12(1) 18(2) 36(3)	99(1) 98(2) 98(3)
CAGE-AID (Brown & Rounds, 1995)	DSM-III-R diagnosis for lifetime drug abuse/dependence	124 patients from a primary care practice	USA	79(1) 70 (2)	77(1) 85(2)	– –	– –
DAST-28 (Staley & El-Guebaly, 1990)	DSM-III substance abuse diagnosis	250 Psychiatric patients	Canada	96–82 (5/6 to 10/11)	81–91 (5/6 to 10/11)	75–63 (5/6 to 10/11)	94–98 (5/6 to 10/11)
DAST-28 (McCann et al., 2000)	Psychiatric diagnosis of substance abuse or dependency	143 adults seeking evaluation for attention deficit/ hyperactivity disorder.	USA	85(6)	71(6)	23(6)	98(6)
DAST-28 (El-Bassel et al., 1997)	Battery of questionnaires	176 Adult workers including identified drug users and nonusers	USA	80.9(6)	93.9(6)	95.7(6)	74.7(6)
DAST-20 (Cassidy et al., 2008)	SCID based diagnosis.	84 first episode psychosis patients	Canada	55 (6) 85(3)	86(6) 73(3)	79(6) 74(3)	68(6) 84(3)
DAST 20 (Cocco & Carey, 1998)	Psychiatric diagnosis of substance abuse or dependency	97 Psychiatric outpatients with Axis I mental disorder other than substance use/ dependence	USA	89–84 (2/3–5/6)	68–83 (2/3–5/6)	–	–
DAST 10 (Cocco & Carey, 1998)	Psychiatric diagnosis of substance abuse or dependency	97 Psychiatric outpatients with Axis I mental disorder other than substance use/ dependence	USA	95–74 (1/2–3/4)	68–86 (1/2–3/4)	–	–
DAST-10 (Carey et al., 2003)	Discharge diagnosis of substance use disorders	1349 newly admitted psychiatric patients	India	65(3)	98(3)	41(3)	99(3)
DAST-10 (Maisto, Carey, Carey, Gordon, & Gleason, 2000)	Psychiatric diagnosis of substance abuse or dependency. Occurrence of symptoms for alcohol and other drug use disorders	162 psychiatric hospital outpatients.	USA	85(2) 80(2)	78(2) 88(2)	35(2) 73(2)	97(2) 93(2)
SMAST-AID (Brown & Rounds, 1995)	DSM-III-R diagnostic criteria for lifetime abuse of or dependence on drugs.	124 patients from a primary care practice	USA	51(1) 40(2)	92(1) 95(2)	– –	– –
TICS (Brown et al., 2001)	CIDI-SAM	702 primary medical care patients	USA	78.0(1)	76.3(1)	–	–
TICS (Brown, Leonard, Saunders, & Papasouliotis, 1997)	CIDI-SAM	434 primary care patients aged 18 to 59 years	USA	81.1(1)	80.8(1)	59.2(1)	92.6(1)
UNCOPE (Hoffmann et al., 2003)	Diagnostic interview covering DSM-IV criteria	310 prisoners	USA	88(3)	83(3)	–	–
UNCOPE (Campbell, Hoffmann, Hoffmann, & Gillaspy, 2005)	Substance Use Disorder Diagnostic Schedule-IV (SUDDS-IV)	2097 prisoners	USA	85(3)	83(3)	85(3)	83(3)

Two studies in primary care patients in the USA reported comparable sensitivity (78.0% and 81.1%) and specificity (76.3% and 80.8%) for TICS (Brown et al., 1997, 2001). The reported positive and negative predictive values were 59.2% and 92.6% respectively (Brown et al., 1997).

Two studies reported comparable sensitivity (88% and 85%) and specificity (83% in both studies) for UNCOPE (Campbell et al., 2005; Hoffmann et al., 2003). Positive and negative predictive values were 85% and 83% respectively (Campbell et al., 2005).

No eligible studies were identified for the following: DHQ/PDHQ, DUDIT, DUS, NMASSIST, SDS, SIP-AD and SSI-SA.

3.9. Acceptability, feasibility and perceived relevance

Information on acceptability was only available for ASSIST and TICS. The ASSIST was consistent with patients' expectations for a health interview and the questions were easy to answer in a multinational study conducted in 11 countries within drug and alcohol abuse

treatment, psychiatric and general medical settings (WHO ASSIST Working Group, 2002). For TICS, two studies in primary care patients in the USA reported that 76% to 84% of participants were very comfortable with the TICS interview (Brown et al., 1997, 2001). No studies reported on the feasibility of use for any of the instruments.

4. Discussion

All instruments included in the review had 28 or less items, required 10 min or less and did not require specialized training to complete, score and interpret. However, lack of validity data may make their selection for use in general hospital wards difficult. Construct and concurrent validity data was only obtained for the ASSIST, CAGE-AID and SIP AD 15. The reported validity for these three instruments was high. Information on instrument reliability was available for only 6 of the 13 instruments. ASSIST, CAGE-AID, DAST (28, 20 and 10), SIP-AD (10 and 15), TICS and UNCOPE had good to excellent internal consistency. The DAST-28 and DAST-10 also showed optimal test–retest reliability. The test–retest reliability results for ASSIST suggest need for improvement.

Only two studies reported on acceptability and none reported on feasibility, suggesting a need for studies in these two areas. The ASSIST and TICS were reported to be highly accepted by participants, but no studies reported on acceptability by relevant health care workers despite this aspect being important if a screening instrument is to be used in routine practice.

This review provides evidence of lack of extensive testing of instruments in different populations and countries. Although this review is for general hospital wards, only one study (WHO ASSIST Working Group, 2002) included participants from this setting. Compared to primary care, social and criminal justice settings, screening for illicit drug use in hospital settings is still underdeveloped. There is need for studies evaluating screening instruments in different hospital settings. Most of the reviewed studies were conducted in the USA. The ASSIST was the only instrument with some evidence of extensive testing, with one study conducted in 10 countries, including developed and developing countries.

When screening for illicit drug use, sensitivity and specificity can be considered at two levels: 1) discriminating between abstainers/non-problematic users and those with illicit drug use problems and 2) Discriminating between abuse and dependence. However, most studies did not explicitly indicate the level at which they were investigating sensitivity and specificity, making comparisons difficult. Moreover differences in other independent variables such as the recall period (lifetime versus current), populations and reference tests also make direct comparisons difficult.

The sensitivity and specificity scores of the ASSIST, CAGE-AID, DAST-20 and SMAST generally indicate the need for improvement. Those for the DAST-28, DAST-10, TICS and UNCOPE were optimal (~80%). The SMAST-AID questions were derived from the SMAST questions which were selected over 30 years ago and may no longer be as applicable to present society.

There was low reporting of predictive values. Only 9 out of 18 studies (50%) that reported on sensitivity and specificity also reported the predictive values. The reported NPV were generally good to excellent. For CAGE-AID, the PPV were very low. For DAST-28 and DAST-10, the PPV ranges were very wide (23% to 95.7% and 35% to 73% respectively), which may suggest differences in prevalence of illicit drug use in the different populations included in the studies. The PPV for DAST-20 and UNCOPE were good. The PPV for TICS was moderate.

Instruments such as CAGE-AID, DAST, SDS and the SMAST-AID which focus on dependence may be of limited usefulness in general hospital settings if the objective is to identify substance use/abuse in non-dependent individuals. Moreover, CAGE-AID, DAST, SMAST-AID and SSI-SA do not distinguish between active and inactive illicit drug use. The TICS and UNCOPE cannot distinguish between abuse and dependence and this might be problematic where the interventions and/or treatment pathways of the different levels of abuse are different.

There was very little information available for DHQ/PDHQ, DUDIT, DUS and NMASSIST. For example, DUDIT has only been validated in a Swedish drug-using population (Berman, Bergman, Palmstierna, & Schlyter, 2005). Although the NMASSIST is a modification of the ASSIST, there is still need to evaluate its performance. It might perform differently from the ASSIST particularly when used online and for self administration. No study comparing the performance of two or more of the selected instruments was identified.

For some instruments, their structure might have a negative impact on their routine use in general hospital wards. For example, the current structure of the ASSIST with questions across five pages makes it appear long. It could be useful modify such instruments to a one or two paged instrument and evaluate the modified version in general hospital wards.

One major limitation of this review is that no quality assessment was applied for studies included in qualitative synthesis. The studies may have methodological weaknesses such as small sample size. One generic quality assessment tool for diagnostic studies, the QUADAS list, was identified (Whiting, Rutjes, Reitsma, Bossuyt, & Kleijnen, 2003). However it is mainly for classifying overall quality across studies for each quality criterion rather than for use in decisions on inclusion and exclusion of studies in systematic review. Another factor to consider is uncertainty on how these instruments would perform in general hospital settings and in different populations as most studies were conducted outside general hospital settings and in the United States. We might also have missed some studies particularly those published in languages other than English and unpublished studies.

5. Conclusion

The review identified and described 13 instruments that could be useful in general hospital wards. This review provides evidence of lack of extensive evaluation of illicit drug use screening instruments in adult patients not known to have a substance abuse problem in general hospital wards. Currently clinicians or researchers searching for a simple, reliable, general screening instrument for current drug use to guide practice or research in general hospital wards do not have enough comparative evidence to choose between the available measures. There is therefore need for extensive evaluation of the screening instruments in general hospital wards in different populations and countries.

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Contributors

Both authors contributed to the outline of the review. The first author conducted the literature search. Both authors participated in instrument and study selection, data extraction and analysis. The first author wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflict of interest.

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Appendix A. General characteristics of the screening instruments

Instrument	Items	Time required	Completion	Format	Availability
ASSIST	8 items	5–10 min	Interviewer administered	Printed version	Public domain for free
CAGE-AID	4 items	5 min	Self-administered	Printed version	Public domain for free
DAST	28 or 20 or 10 items	5–10 min	Self-administered	Printed version Online version	Public domain for free
DHQ/PDHQ	5 items	5–10 min	Self-administered	Printed version	Public domain for free
DUDIT	11 items	5–10 min	Self-administered	Printed version	Public domain for free
DUS	16 items	5–10 min	Interviewer administered	Printed version	Public domain for Free
NMASSIST	8 items	5–10 min	Interviewer administered Self-administered	Printed version Online	Public domain for free
SMAST-AID	13 items	5–10 min	Self-administered	Printed version	Public domain for free
SDS	5 items	≤5 min	Self-administered	Printed version	Public domain for free
SIP-AD	15 items/10 items	5–10 min	Self-administered	Printed version	Copyright information unavailable
SSI-SA	16 items	10 min	Interviewer administered Self-administered	Printed version	Public domain for free
TICS	2 items	≤5 min	Self-administered	Printed version	Public domain for free
UNCOPE	6 items	5–10 min	Interviewer administered	Printed version	Public domain for free

Appendix B. Type of instrument and distinguishing between different levels of substance abuse

Instrument	Recall period	Type of instrument	Distinguishing between active and inactive use	Distinguishing between abstainers/low risk substance use, abuse and dependent use	Score
ASSIST	Lifetime experience Past 3 months	Enquires about illicit drugs in a disaggregated manner.	Yes	Yes	0–3: no intervention 4–26: brief intervention. 27+: more intensive intervention.
CAGE-AID	Lifetime experience	Conjoint screening instrument	No	No	Cut off score of 1 recommended.
DAST	Lifetime experience	Enquires about illicit drugs in aggregate.	No	No	DAST-28: Cut off = 6. DAST-20: Cut off = 6. DAST-10: Cut off = 2.
DHQ/PDHQ	Lifetime experience Past 6 months	Enquires about illicit drugs in a disaggregated manner.	Yes	Information not obtained	Information not obtained
DUDIT	Lifetime experience Past year	Enquires about illicit drugs in aggregate.	Yes	Yes	Information not obtained
DUS	Past 30 days	Enquires about illicit drugs in a disaggregated manner.	Yes	Information not obtained	Information not obtained
NMASSIST	Lifetime experience Past 3 months	Enquires about illicit drugs in a disaggregated manner.	Yes	Yes	0–3: no intervention 4–26: brief intervention. 27+: more intensive intervention.
SMAST-AID	Lifetime experience.	Conjoint screening instrument	No	No	Cut off score is 2
SIP-AD	Lifetime experience 90 days	Conjoint screening instrument	Yes	Information not obtained	Information not obtained
SDS	Any time period	Enquires about illicit drugs in aggregate.	Yes	No	Suggested cut off score of 4
SSI-SA	Lifetime experience	Conjoint screening instrument	No	Yes	0–1: none/low risk 2–3: minimal risk 4+: moderate/high risk.
TICS	Past year	Conjoint screening instrument	Yes	No	Cut off score is 1
UNCOPE	Lifetime experience Past year	Conjoint questions on illicit drugs and alcohol	Yes	No	Cut off score is 2

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Drug and Alcohol REVIEW

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COMPREHENSIVE REVIEW

A systematic review of substance misuse assessment packages

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Abstract

Issues. *Health-care systems globally are moving away from process measures of performance to payments for outcomes achieved. It follows that there is a need for a selection of proven quality tools that are suitable for undertaking comprehensive assessments and outcomes assessments. This review aimed to identify and evaluate existing comprehensive assessment packages. The work is part of a national program in the UK, Collaborations in Leadership of Applied Health Research and Care.* ***Approach.*** *Systematic searches were carried out across major databases to identify instruments designed to assess substance misuse. For those instruments identified, searches were carried out using the Cochrane Library, Embase, Ovid MEDLINE® and PsychINFO to identify articles reporting psychometric data.* ***Key Findings.*** *From 595 instruments, six met the inclusion criteria: Addiction Severity Index; Chemical Use, Abuse and Dependence Scale; Form 90; Maudsley Addiction Profile; Measurements in the Addictions for Triage and Evaluation; and Substance Abuse Outcomes Module. The most common reasons for exclusion were that instruments were: (i) designed for a specific substance (239); (ii) not designed for use in addiction settings (136); (iii) not providing comprehensive assessment (89); and (iv) not suitable as an outcome measure (20).* ***Implications.*** *The six packages are very different and suited to different uses. No package had adequate evaluation of their properties and so the emphasis should be on refining a small number of tools with very general application rather than creating new ones. An alternative to using 'off-the-shelf' packages is to create bespoke packages from well-validated, single-construct scales.* [Sweetman J, Raistrick D, Mdege ND, Crosby H. A systematic review of substance misuse assessment packages. *Drug Alcohol Rev* 2013;32:347–355]

Key words: alcohol, assessment, dependence, illicit drug, substance misuse.

Introduction

This review was undertaken as part of a program of research, Collaborations in Leadership of Applied Health Research and Care (CLAHRC), and accompanies a review of screening tools and interventions. Nine CLAHRC programs were established to answer specific research questions for the National Health Service in the UK, and all the CLAHRCs are a collaboration between academics, clinicians and commissioners. One CLAHRC has an addictions program within which this review was a prerequisite of a workstream to develop outcomes assessments.

Assessment is fundamental to the work of health-care professionals [1–4]. For addiction services, assessment provides an opportunity for practitioners to understand service user needs and develop appropriate treatment plans [5]. Addiction practitioners and service users can also use the process to agree treatment goals, monitor the progress of treatment and review treatment effectiveness through measuring outcomes [6]. Assessment may vary depending on the setting (e.g. primary care, general hospital wards and mental health services) or on the readiness for treatment. A degree of standardisation of assessment, coupled with standardised outcome reporting, would enable the comparison of services locally, nationally and internationally [7]. In some health-care systems, assessment is linked to treatment pathways and associated funding tariffs [8].

Inconsistent or inappropriate assessment can have a number of negative impacts. Underestimating the level of treatment need may lead to service users not receiv-

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ing any intervention despite needing one or receiving an intervention at an insufficient level of intensity or duration. Alternatively, overestimation of needs can result in too high a level of treatment intensity, with which service users may not comply [9]. In either case, there would be associated cost implications. Service design and delivery are constantly evolving in response to new evidence and quality standards [10–12]. This iterative process reflects the need to regularly reassess the instruments used in practice. This review focuses on instruments that are able to be used across any settings or services where individuals with any substance misuse problems may present. There is a consensus that the important domains to be included in the assessment of substance misuse include substance use and dependence, psychological well-being and social well-being [13,14]. The objective of this review is to determine the range of validated comprehensive assessment packages. The review adheres to the PRISMA Statement on systematic reviews [15,16].

Method

The first step was to identify instruments of interest. Two reviewers independently selected instruments to be included using the eligibility criteria listed in Table 1. Differences of opinion were resolved through consensus or reference to a third reviewer. Instrument authors were contacted to clarify specific points where necessary. The search strategy for instrument identification is listed in Table 2.

The second step was to search for validation articles relating to the assessment tools of interest. Table 2 describes the search strategy. Two reviewers independently screened titles and abstracts to identify potentially relevant articles requiring retrieval. Additionally, free-text searches were conducted and article reference lists screened for additional instruments or validation articles. Data extraction for each of the selected validation articles was performed independently by two reviewers. Information extracted included study identifiers (title, lead author, publication year, journal), instrument of interest, study characteristics (details of the population, setting), validity statistics, reliability, acceptability, feasibility, sensitivity and specificity statistics where these were reported. Reviewers resolved discrepancies in data extraction through discussion. Throughout the paper significant findings represent $P < 0.05$ or better.

Table 1. *Criteria for instrument selection*

Inclusion criteria	Exclusion criteria
Suitable for use with an adult population (18 years or over)	Instruments designed to be used with populations under the age of 18 years
Able to be used for comprehensive assessment and outcome measurement purposes	Those specific to particular drugs
Appropriate for individuals who present for treatment at any stage of change	Those specifically designed for people seeking treatment
A generic tool able to be used in any alcohol or drug service	Those designed specifically for use with dual-diagnosis service users
Measuring current alcohol and/or illicit drug use and other key domains.	Instruments designed to be used in association with a specific method of treatment
Freely available and easily accessible within the public domain	Instruments designed to be used with a non-addiction population
An assessment taking no more than 1 h to complete	Instruments specific to individual-level care planning, such as risk of blood-borne virus tools or neuropsychological assessment tools

Results

Outcomes of searches

The initial search identified 595 instruments: 589 were excluded for reasons outlined in Figure 1. The most common reasons for exclusion were that instruments were: (i) designed for a specific substance (239); (ii) not designed for use in addiction settings (136); (iii) not providing a comprehensive assessment (89); and (iv) not suitable as an outcome measure (20).

The searches for validation articles for the six instruments identified 608 papers, of which 349 were found to be duplicates (identified in more than one database). Two articles identified in free-text searches were excluded, as they were not published in English. Initial article screening excluded 304 articles, mainly due to their not validating an instrument of interest to the review or considering an inappropriate sample, such as participants younger than 18 years, or a specific psychiatric sample. Following this process 45 articles were selected for consideration on the strength of the abstracts. After the full articles were read a further 19 were excluded for the reasons noted above. The remaining 26 instrument evaluation articles were included in this review. Of these 21 were about the Addiction Severity Index (ASI), and there was one article for each of the other five instruments. The imbalance of validation articles has, necessarily, influenced the presentation of results.

Table 2. *Search strategies*

Instruments			Validation articles		
Key words	Limitations	Databases searched	Instrument	Key words	Databases searched
Instrument Tool Interview Questionnaire	Adult	Substance Use Screening & Assessment Instruments Database, part of the University of Washington Alcohol and Drug Abuse Institute library National Institute of Drug Abuse, USA Centre on Alcoholism, Substance Abuse and Addictions	Title Acronym Abbreviation	substance abuse substance misuse substance addiction substance dependence substance-related disorder drug abuse drug misuse drug addiction drug dependence alcohol abuse alcohol misuse alcohol addiction alcohol dependence	Cochrane Library (Issue 6, 2010) Embase (1980 to October 2011) Ovid MEDLINE® (1948 to October 2011) PsycINFO (1806 to October 2011)

Searches were carried out between May 2010 and October 2011. Validation article searches were limited to English language. No date limits were applied.

Brief description of instruments

The Minnesota Substance Abuse Problems Scale is available from the authors; the other scales are all in the public domain and freely available. Except for the Substance Abuse Outcomes Module (SAOM) and some questionnaires embedded in assessment interviews the instruments are all rater-completed packages. The item count does not include recording of personal details or other administrative information. Typically, completion time is not stated, but can be inferred from the item count and general style.

Addiction Severity Index. The ASI has 163 items with seven subscales: physical health, employment, alcohol use, drug use, offending, family and social circumstances, and mental health. The substance use section asks for frequency in the last 30 days and lifetime use and route of 11 drugs or classes of drug and includes items on treatment. The style is mainly to enter numeric or yes/no responses to questions, but no items have stem questions whereby subsequent items might be skipped over. Completion time is stated as approximately 50–60 min. The ASI is the most widely investigated of all the instruments and is available in many languages, including English, Spanish, French, Japanese and Chinese and in ASI-Lite and EuropASI versions.

Chemical Use, Abuse and Dependence Scale. The Chemical Use, Abuse and Dependence Scale (CUAD) is completed in two stages. The first stage is a structured substance use history asking about frequency, quantity, route and duration of use for nine drugs or classes of drug. For each of the most problematic substances (up to four), 17 further questions tap into dependence and related problems. Completion time varies depending on the number of problem substances. The instrument was designed to determine the presence or absence of a Diagnostic and Statistical Manual of Mental Disorders-III-R substance use disorder.

Form 90. Form 90 has 121 items across the domains of health-care utilisation, medication, offending, motor vehicle accidents and employment, and builds a history of alcohol and illicit drug use over the previous 90 days. The substance use section maps a very detailed pattern of use for alcohol and all other substances. The style is to use text prompts for each question, and some of these are stem questions where a negative response takes the interviewer forward to the next section. Various aids, card prompts and an alcohol unit calculator are used. The completion time can vary markedly depending on the complexity of an individual assessment.

Maudsley Addiction Profile. The Maudsley Addiction Profile (MAP) is a brief, structured interview in four sections: substance use, injecting and sexual behaviour, physical and psychological health, and social functioning. The substance use section asks for quantity, frequency and route of seven drugs or classes of drug. There are 26 items and two brief self-completion scales. The orientation is more towards illicit drugs than alcohol. The time frame is generally the last 30 days. The style is to use text prompts for the interviewer and card prompts for the service users. The originators

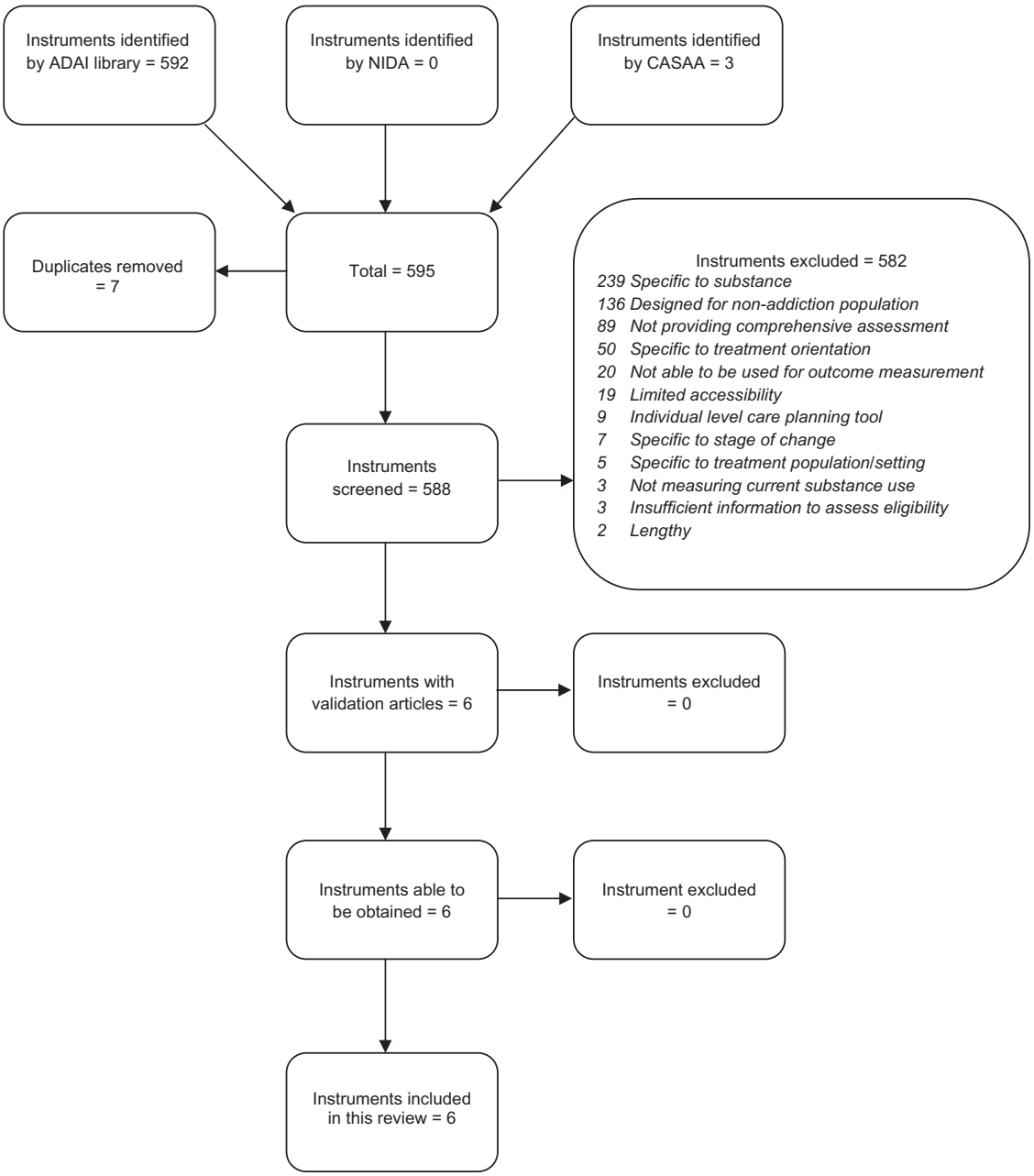

Figure 1. *PRISMA diagram illustrating the selection of instruments for inclusion. ADAI, Alcohol and Drug Abuse Institute; CASAA, Center on Alcoholism, Substance Abuse, and Addictions; NIDA, National Institute on Drug Abuse.*

claim a completion time of approximately 12 min, which is likely to be towards the low end.

Measurements in the Addictions for Triage and Evaluation. The Measurements in the Addictions for Triage and Evaluation (MATE) has seven sections: substance use, mental and physical health, dependence, physical complaints, personality and functioning. The substance use section asks for quantity, frequency and lifetime use of 12 drugs or classes of drug and gambling; the next four sections have 44 items and lead into the International Classification of Functioning from the World Health Organization (WHO) classification system [17], which is a 27-item needs assessment of social functioning. Finally, there are two brief self-completion questionnaires about craving and depression, anxiety and stress. The style is to use comprehensive guides and text prompts for interviewers. Completion time will depend on complexity.

Substance Abuse Outcomes Module. The SAOM has 110 items arranged as a continuous self-completion questionnaire covering general activities and health, friends and family, substance use, medications, dependence, substance-related problems, occupation and housing. The substance use section asks about detailed quantity and frequency of alcohol use and other drug use, specifying 11 drugs or classes of drug for lifetime, 3-month and 28-day time periods. The general style is to enter numeric or yes/no responses to items. The SAOM is designed to be used for follow up and to assess outcomes. It is intended for computer analysis and the manual supplies variable names and scoring algorithms (Table 3).

Reliability of instruments

Test–retest reliability was reported for all the instruments evaluated except MATE. For the ASI, retest reliability for the alcohol and drug subscales was 0.75–0.95 and 0.70–0.84 [18–22], respectively, and was consistently high across different languages, with Chinese [23] having the lowest correlation (0.75 and 0.70). Reliability was also reported to be high for alcohol and drug subscales in a homeless population (0.81 and 0.88) [24]. For the other subscales employment consistently delivered the highest correlations, >0.90 in six studies [18–24], with the lowest correlations being for legal, 0.38 [20] and 0.68 [18]; family, 0.59 [19] and 0.55 [24]; psychiatric, 0.68 [23]; social, 0.63 [21]; and medical, 0.48 [22]. For the CUAD, 7-day retest reliability was 0.95 [25]. For Form 90, lifetime use correlations were all high, but current use was less consistent: 0.02 for inhalant use, 0.29 for hallucinogens and 0.82 for opiates and stimulant use; general functioning measures ranged between 0.60 for paid-for-work and 0.90 for jail days [26]. For the MAP [27], with a retest interval averaging 3.1 days, correlations for substances assessed were 0.94 overall and 0.88 for current users. Correlations for usual route of administration were 0.93 for heroin and 1.0 for methadone, benzodiazepines and cocaine. For the SAOM [28], substance use correlations were all high at >0.80; the lowest correlations were diagnosis (0.56), impulse control (0.53) and polydrug use (0.47). Interrater reliabilities reported for ASI are generally high, ranging from 0.74 to 1.0 [22,23,29,30]; the exception was a Hungarian study reporting only 0.1 correlation on the medical to 0.80 on the social subscales. Interrater reliability for MATE substance use, mental and physical health, dependence, physical complaints and personality sections was 0.35–0.73 and for the functionality section was 0.75–0.92 [31]. We did not find interrater reliability reports for the other instruments.

Validity of instruments

Terminology used by different authors is not necessarily consistent, and rather than attempting to harmonise terms we have used the same nomenclature as in the original articles. Criterion validity for the ASI subscales has generally been low order (0.28–0.44) [18,19], but with significantly higher correlations than the non-criterion subscales, indicating an independence of subscale constructs. In a homeless population criterion validity for alcohol was 0.31 and for drugs 0.54 [24]. Subscale correlations are as follows: alcohol with Severity of Alcohol Dependence Questionnaire (SADQ), 0.63; alcohol with Michigan Alcohol Screening Test (MAST), 0.16; [21] alcohol with liver enzyme γ-glutamyl transferase, 0.58 [32]; alcohol with Structured Clinical Interview for DSM-III-R (SCID), 0.29 [33]; drugs with SCID, 0.47 [33]; psychiatric with Hamilton Depression Rating, 0.74 [21] and 0.58 [30]; psychiatric with Beck Depression Inventory (BDI), 0.51 [34], psychiatric with SCID lifetime, 0.71 [35]; and employment with Hollingshead Scale, 0.56 [30]. Expectations of strong correlations with dependence measures were not met [36].

CUAD [25] total scores correlated with the MAST (0.21) and Drug Abuse Screening Test (0.58), and there was 79% agreement between psychiatrists and the CUAD on the presence of a substance use disorder diagnosis. Validation of Form 90 [26] is limited to urinalysis and self-reported drug use, with findings indicating low to moderate levels of false positives and no false negatives except for opiates. The MAP [27] reported a 90% concordance rate between self-reported substance use and urinalysis for drug users. Additionally, physical and psychological health were compared to self-reported days experiencing medical problems and anxiety and/or depressive thoughts, with resultant correlations averaging 0.72. Relationship conflict measures assessed with the Life Stressors and Social Resources Inventory indicated high-order correlations ($r = 0.74$) [27]. MATE [37] has been validated on the functionality section, where correlations were of different elements and ranged from 0.26 to 0.67 against the WHO disability assessment and –0.59 to –0.71 against the WHO quality of life. Criterion validity for the SAOM [28] found correlations for alcohol and ASI (0.70); alcohol and Alcohol Use Disorders Identification Test (0.81); alcohol and Composite International Diagnostic Interview (CIDI) dependence 0.72; drugs and ASI (0.38); and drugs and CIDI dependence (0.33).

Factor structure of instruments

Only three tools had any examination of their factor structure. For the ASI a seven-factor solution

Table 3. *Psychometric information obtained from validation articles*

Instrument	Validity information	Reliability information	Acceptability and feasibility information	Sensitivity information	Specificity information
Addiction Severity Index (ASI)	Concurrent Convergent Criterion Discriminant Construct	Internal consistency Test–retest Interrater Factor analysis	Acceptability: Ratings for three versions of ASI reported (39). Acceptable in Spanish-speaking sample (41). Some difficulty understanding items (53). Feasibility: Interviews averaged 45 min for ASI (39; 40). ASI-Lite averaged 31 min to complete (54).	Sensitivity 0.83 for medical and 0.90 for psychiatric composite scores (88). Sensitivity for psychiatric diagnosis 89% (48).	Specificity 0.70 for medical and 0.71 for psychiatric composite scores (88). Specificity for psychiatric diagnosis 67% (48).
Chemical Use, Abuse and Dependence Scale (CUAD)	Concurrent	Not reported	Not reported	Not reported	Not reported
Form 90	Criterion	Test–retest	Not reported	Low to moderate levels of false positives (negative urinalysis alongside self-report stating use of substance) (62).	With the exception of opiates, self-report data also showed no false negatives (no reported substance use, urinalysis indicates use) (62).
Maudsley Addiction Profile (MAP)	Concurrent	Test–retest Factor analysis	Acceptability: Items reported to be highly acceptable to most participants (69). Feasibility: Average completion time reported to be 12 min (69).	Not reported	Not reported
Measurements in the Addictions for Triage and Evaluation (MATE)	Construct	Factor analysis Interrater	Acceptability: 15% of records contained missing data, indicating a high level of acceptability (71). Feasibility: Time to complete 45 min—1 h (71).	Not reported	Not reported
Substance Abuse Outcomes Module (SAOM)	Concurrent	Internal consistency Test–retest	Not reported	High levels of sensitivity reported for diagnosis at baseline and follow up, determining remission and recognising important clinical changes (73).	94% specificity reported with regard to determining remission at follow up (73).

consistent with the ASI domains was found [38]. For the MAP and MATE the factor structures found did not match the structure of the original design. Exploratory principal components analysis of MAP found a four-factor structure interpreted as substance use, health risk, health problems and employment domains [27], and factor analysis of MATE needs assessment found two factors interpreted as limitations of basic functioning and limitations in relationships [37].

Internal consistency of composite scores have been reported to be variable, albeit generally satisfactory, for the ASI [20,29,33,35,39,40]; exceptions are employment and family [24], alcohol [38], drugs [22], family and social [32], and legal subscales [23]. Cronbach's α coefficients varied between 0.44 and 0.94 across scales, subscales and composite scores, indicating acceptable to good internal consistency [20–23,29,32,39–41]. Internal consistency held good for self-report and interview, and across different versions [41,42]. Cronbach's α coefficients ranging from 0.58 to 0.90 across domains were reported for the SAOM.

Discussion

From an initial trawl finding 592 instruments, the majority ($n = 375$) of those excluded were instruments concerned with specific substances or not designed to be used with addiction populations. Although many instruments have been published, very few have adequate evaluation of psychometric and user acceptability properties. The ASI has the largest number of studies, with 21 reported here, while the other instruments have only one psychometrics report. The ASI has been translated into a number of languages and, while not all of these have been examined here, it does seem likely from the studies found that not only language but also substance use cultures need translation. The implication is that scales are often not as universal as might have been assumed, and thorough testing is indicated for each new application and each translation. A weakness of all packages is that it is difficult to determine psychometric properties because the instruments typically include subscales and items that are deemed important or of interest, but do not necessarily measure specified constructs. Inevitably, some of these subscales and items work better than others so it is difficult to give the whole package a definitive quality rating. The range of reliability and, more especially, validity scores reported is considerable, albeit understandable when individual items are inspected.

Validation of all instruments, even the ASI, is poor. Criterion measures are often not measuring the same thing as the package items, and rarely is a clinical rating used as the criterion: for example alcohol use validated against SADQ scores or psychiatric well-being against the BDI. Furthermore, the developers of instruments tend not to modify and improve their package in the light of evaluations. Ideally, there would be fewer instruments and a commitment to continuous development in the light of new evidence; moreover, there should be systematic reporting of the psychometric properties of the subscales or sections. A package has the appeal of ease of use and consistency of style and may suit the requirements of some clinical teams, but this review has found scant evidence to support this approach. An alternative is to create a bespoke set of single-construct scales with good psychometrics; the components of a bespoke set of measures can be changed around with relative ease so that the clinical service benefits from some future proofing of data collection and continuous improvement of the measures in use.

A weakness of this review is that it has not been possible to drill down and present the detail of all the evaluation articles. We have reported on the available psychometric data, and readers can follow up articles about instruments of interest. A further problem has been to deal with the imbalance of studies about the instruments included in the review. Paradoxically, the more attention an instrument receives the more its weaknesses show up, and so the ASI appears to have more flaws than the other instruments, but this may not be the case if the weight of evidence was more even. Similarly, with test–retest reliability correlations, Form 90 reports low values for inhalants, but this cannot be compared with other tools that do not ask about inhalants; where the drugs more likely to be used on a regular basis, heroin and cocaine for example, are compared, correlations are all high order across instruments. It is difficult to compare instruments even on the fundamentals of substance use itself because different tools ask about different ranges of substances and different use variables.

All instruments assess substance use in some way. The CUAD, MATE and SAOM measure dependence, and it is perhaps surprising that other instruments do not. The ASI has seven subscales, including one each for alcohol and drugs, so that usual methods of measuring psychometrics can be applied; similarly, MATE scores are summarised into seven modules. The MAP has four sections with clear subsections; the SAOM is not structured in sections, but subscales are created programmatically; the CUAD and Form 90 do not have subscales that can be analysed. In short it is difficult to compare one instrument with another.

Conclusions

Information is available on six instruments that met inclusion criteria for this review. Assessment packages

have limitations in terms of both how well they fit the needs of a particular service and the ease with which psychometrics can be demonstrated; nonetheless, the six scales all have merit and are likely to be suited to different applications. In our opinion the MAP, the CUAD and the ASI are the best candidates for routine clinical use. The MAP is slanted to drug use, but more comprehensive than the CUAD, which is situation-focused with regard to identifying problems. The ASI is more comprehensive than both, but may ask for more information than some agencies need and yet lack detail in specific areas that may be of concern to a particular service. Form 90 is more of a research tool, with detail about utilisation of public services and, therefore, the information required for cost-effectiveness studies. MATE has the feel of an insurance assessment and is comprehensive on needs assessment, which perhaps gives it a niche with care coordinators. Finally, the SAOM is designed as a computerised tool with the possibility of building algorithms to check inconsistencies in data, predict outcomes, automatically feed back outcomes and so forth. All the instruments would benefit from revision in the light of the evaluations referenced in this review.

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Conflict of Interest

The authors have no connection with the tobacco, alcohol, pharmaceutical or gaming industries.

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Review

Interventions for reducing alcohol consumption among general hospital inpatient heavy alcohol users: A systematic review☆

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ABSTRACT

Background: There is growing interest in pro-active detection and provision of interventions for heavy alcohol use in the general hospital inpatient population. We aimed to determine, from the available evidence, the effectiveness of interventions in reducing alcohol consumption among general hospital inpatient heavy alcohol users.

Methods: The following databases were searched for completed and on-going randomised and non-randomised controlled studies published up to November 2012: MEDLINE; C2-SPECTR; CINAHL; The Cochrane Library; Conference Proceedings Citation Index: Science; EMBASE; HMIC; PsycInfo; Public Health Interventions Cost Effectiveness Database (PHICED); and ClinicalTrials.gov. Studies were screened independently by two reviewers. Data extraction was performed by one reviewer and independently checked by a second.

Results: Twenty-two studies which met the inclusion criteria enrolled 5307 participants in total. All interventions were non-pharmacological and alcohol focused. Results from single session brief interventions and self-help literature showed no clear benefit on alcohol consumption outcomes, with indications of benefit from some studies but not others. However, results suggest brief interventions of more than one session could be beneficial on reducing alcohol consumption, especially for non-dependent patients. No active intervention was found superior over another on alcohol consumption and other outcomes.

Conclusions: Brief interventions of more than one session could be beneficial on reducing alcohol consumption among hospital inpatients, especially for non-dependent patients. However, additional evidence is still needed before more definitive conclusions can be reached.

Contents

☆ Supplementary material can be found by accessing the online version of this paper. Please see Appendix A for more information.

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1. Introduction

The misuse of alcohol has a major impact on population health, health service costs and society. Alcohol consumption is the world's third largest risk factor for disease and disability; with 4.5% of burden of disease (World Health Organization, 2011), 2.3 million premature deaths (Cherpitel et al., 2009) and almost 4% of all deaths (World Health Organization, 2011) worldwide attributed to alcohol. For some countries, the total costs attributable to alcohol range from 1.3% to 3.3% of gross domestic product (Rehm et al., 2009).

Most people with alcohol misuse problems do not seek treatment for a variety of reasons including lack of awareness of their problem (Madras et al., 2009; World Health Organization, 2011). Evidence indicates a high prevalence of heavy alcohol use among general hospital populations including those admitted to hospital (Saunders and Lee, 1999; Watson, 2000). Health care professionals across a range of hospital settings will routinely encounter patients with alcohol misuse problems and may be presented with an opportunity to intervene. There is growing interest in pro-active detection and provision of interventions for alcohol misuse problems in general hospital settings (National Institute for Health and Clinical Excellence, 2011; World Health Organization, 2010). When admitted to hospital, heavy alcohol users are accessible to health care professionals and have time for an intervention (Saitz et al., 2007). Qualitative studies have suggested that "awareness of accumulating harms" and "triggering occurrences" are potential catalysts for change among patients with unhealthy alcohol use (Orford et al., 2006, 2008). In their study, Williams et al. (2010) found that having an alcohol attributable illness at hospital admission may catalyse intervention benefits among non-dependent unhealthy alcohol users and those who do not view their drinking as problematic. Thus making the patient aware of any links that may exist between their hospitalisation and alcohol consumption may act as a catalyst for change (Soderstrom et al., 2007; Sommers et al., 2006).

Interventions for alcohol misuse include pharmacotherapies and non-pharmacological approaches. Previous reviews of interventions for patients identified in general hospital inpatient environments with alcohol problems have mainly focused on brief interventions targeted at non-alcohol dependent hazardous and harmful drinkers (Emmen et al., 2004; McQueen et al., 2011). A brief intervention is defined as a single session or up to three sessions involving an individual patient and health care practitioner comprising information and advice, often using counselling type skills to encourage a reduction in alcohol consumption and related problems (McQueen et al., 2011).

A recent review of brief interventions for alcohol problems in general hospital wards concluded they were effective for: reducing alcohol consumption at 6 and 9 months follow-up but not at one year; and preventing deaths at 6 and 12 months (McQueen et al., 2011). This review however has a number of limitations. Several of the meta-analysis were based on very few studies, with only one or two studies in some instances, mainly because of differences between studies in the way the outcomes were measured (McQueen et al., 2011). Moreover, there was no exploration of how intervention characteristics such as intervention format, modality or design could potentially result in outcome and effect size differences. For example interventions involving more than one session/contact can differ in effectiveness from a single session/contact intervention (Kaner et al., 2007; McQueen et al., 2011); potentially due to utilisation of more behaviour change techniques such as providing feedback on performance, or reinforcement of techniques. Although McQueen et al. (2011) suggest that further investigations to determine optimal treatment exposure for heavy alcohol users in general hospitals is warranted, they did not group studies by intervention intensity (e.g., length or number of intervention sessions). For example, brief intervention benefit was reported on 6 months mean alcohol consumption (McQueen et al., 2011) from a meta-analysis based on four studies (Antti-Poika et al., 1988; Heather et al., 1996; Holloway et al., 2007; Mcmanus et al., 2003). However, at study level, out of the four studies only one study evaluating an intervention of multiple sessions showed intervention benefit (Antti-Poika et al., 1988). The remaining three, two which were evaluating interventions of one session, did not.

Intervention effectiveness might differ when an intervention is delivered face-to-face compared to via a computer (Walton et al., 2010). Differences in comparisons (e.g., comparing an active intervention to no treatment, versus comparing two active interventions) may also explain differences in effect size. Reviews that show a collective group of interventions to be effective without exploring the impact of any differences in intervention characteristics could be challenging to the user when determining which configuration, elements, or dose of the intervention to implement for their patients or setting (Glasziou et al., 2010). In our review we explore some of these differences in-order to determine the intervention's active components, and why some interventions are more effective than others (Heather, 1995; Nilsen et al., 2011; Sullivan et al., 2011).

We aimed to identify all types of interventions for heavy alcohol use that have been evaluated for general hospital inpatient populations and determine, from the available evidence, the impact of each of these interventions on alcohol consumption. The secondary outcomes of interest were: alcohol questionnaire scores (i.e., scores from tools or questionnaires used to measure self-reports of alcohol consumption behaviour such as Alcohol Use Disorders Identification Test (AUDIT)); injury; mortality; wellbeing and quality of life; healthcare utilisation; criminal offences; motivation/readiness to

Table 1
Study groupings for the review.

Single session brief intervention with an interventionist versus usual care/no treatment	Brief intervention of 2/3 sessions or contacts versus usual care/no treatment	Self-help literature (e.g., booklets, leaflets) versus usual care/no treatment	Brief intervention versus self-help literature/referral	Comparison between different single session brief interventions with an interventionist	Comparing brief interventions, one of which is 2/3 sessions	Comparing an intervention of 4 or more sessions with another intervention
Chick et al. (1985)	Antti-Poika et al. (1988)	Watson (1999)	Bager and Vilstrup (2010)	Freyer-Adam et al. (2008)	Forsberg et al. (2000)	Kuchipudi et al. (1990)
Elvy et al. (1988)	Gentilello et al. (1999)	Holloway et al. (2007)	Holloway et al. (2007)	Heather et al. (1996)	Mcmanus et al. (2003)	Yersin et al. (1996)
Freyer-Adam et al. (2008)	Liu et al. (2011)		McQueen et al. (2006)	Watson (1999)	Sommers et al. (2006)	
Heather et al. (1996)	Mcmanus et al. (2003)		Schermer et al. (2006)			
Holloway et al. (2007)	Sommers et al. (2006)		Watson (1999)			
Mcmanus et al. (2003)						
Rowland and Maynard (1993)						
Saitz et al. (2007)						
Shourie et al. (2006)						
Tsai et al. (2009)						
Tsai et al. (2011)						
Watson (1999)						
Total: 12	Total: 5	Total: 2	Total: 5	Total: 3	Total: 3	Total: 2

change. Our review adds to the current review evidence in several ways: it is not restricted to brief interventions but extends to any type of intervention delivered to general hospital inpatients; it attempts to explore the impact of different intervention characteristics such as format, modality or design on outcomes.

2. Methods

The systematic review followed the principles recommended by the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green, 2008), and the Centre for Reviews and Dissemination guidance for undertaking systematic reviews (Centre for Reviews and Dissemination, 2009). The reporting procedures followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidance (Moher et al., 2009).

2.1. Search strategy

A systematic search of literature up to November 2012 was undertaken. We searched MEDLINE; C2-SPECTR; CINAHL; The Cochrane Library; Conference Proceedings Citation Index: Science; EMBASE; HMIC; PsycInfo; Public Health Interventions Cost Effectiveness Database (PHICED); and ClinicalTrials.gov. We also scanned the reference lists of included studies. The full search strategies for each of the searched databases are provided as Supplementary material.[1] No date, language or geographic limits were applied.

2.2. Inclusion criteria

We included randomised controlled trials (randomised by individual (RCTs) or cluster (CRCT)) and controlled clinical trials (CCT) recruiting participants aged ≥16 years hospitalised in general hospitals for any reason other than specifically for alcohol misuse treatment, and who were subsequently identified as having an alcohol misuse problem. We included studies that specifically enrolled participants from hospital wards, and inpatient units or departments; as well as studies conducted in other general hospital settings, such as trauma centres or emergency departments, which specified enrolling hospitalised patients only. We excluded studies focussing specifically on dual diagnosis patients (co-morbidity or co-occurrence in the same individual of a substance use disorder and another psychiatric disorder), and pregnant women. We also excluded studies conducted in specialist psychiatric wards/facilities, addiction services or addiction treatment programmes.

Any intervention for alcohol misuse was eligible, except those directed primarily at whole hospital populations without screening for alcohol misuse problems. Any comparator/control group was eligible.

[1] Supplementary material can be found by accessing the online version of this paper. Please see Appendix A for more information.

2.3. Study selection and data extraction strategy

Two reviewers independently screened all studies for inclusion. Data were extracted independently by one reviewer and checked by a second. Differences in selection decisions or data extraction were resolved by discussion. Data extracted included study methods, setting, participant characteristics, intervention characteristics, intervention behavioural change techniques (Abraham and Michie, 2007), the intervention's theoretical basis, comparators, outcomes, outcome measures, and results. Studies were included if they measured any of the following outcomes: alcohol consumption; alcohol questionnaire scores (i.e., scores from tools or questionnaires used to measure self-reports of alcohol consumption behaviour such as Alcohol Use Disorders Identification Test (AUDIT)); injury; mortality; wellbeing and quality of life; healthcare utilisation; criminal offences; motivation/readiness to change.

2.4. Quality assessment strategy

Study quality was independently assessed by two reviewers. Disagreements were resolved by discussion. We used the domain based approach to study quality assessment recommended by the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green, 2008), and Centre for Reviews and Dissemination guidance for undertaking systematic reviews (Centre for Reviews and Dissemination, 2009). Quality assessment criteria were: presence of a power calculation, adjustment for covariates in the analysis, blinding of outcome assessors, explanation of dropouts, follow-up rates, use of intention to treat (ITT) analysis, and adequacy of sequence generation and allocation concealment (Centre for Reviews and Dissemination, 2009). Sequence generation was judged as adequate if it had a random component that ensured participants were assigned to different treatment groups in a study in a truly random manner (Higgins and Green, 2008). On average, trials with inadequate sequence generation exaggerate estimates of intervention effect (Torgerson and Torgerson, 2008). Allocation concealment was judged as adequate if it was clear that it prevented investigators from foreseeing intervention allocations in advance of or during enrolment, and using this information to select which participant receives which treatment (Centre for Reviews and Dissemination, 2009; Torgerson and Torgerson, 2008). Hewitt et al. (2005) and Wood et al. (2008) reported that trials with inadequate allocation concealment had exaggerated intervention effect estimates, suggesting subversion in these trials.

We also recorded adequacy of follow-up (deemed to be a minimum of 12 months (McQueen et al., 2011)) and attempts to maintain intervention fidelity (i.e., inclusion of procedures to ensure that the intervention, as delivered, was consistent with the protocol, such as interventionist training and supervision, and intervention fidelity verification through a review of digital recordings) (Glasziou et al., 2010).

2.5. Analysis/synthesis

Studies were grouped according to whether the intervention evaluated involved personal contact or not; number of sessions (single session/2–3 session/4 or more session interventions); and type of comparator/control group (Table 1).

Considerable methodological heterogeneity existed within study groups mainly in terms of the types of outcomes reported, and how the outcomes were defined and

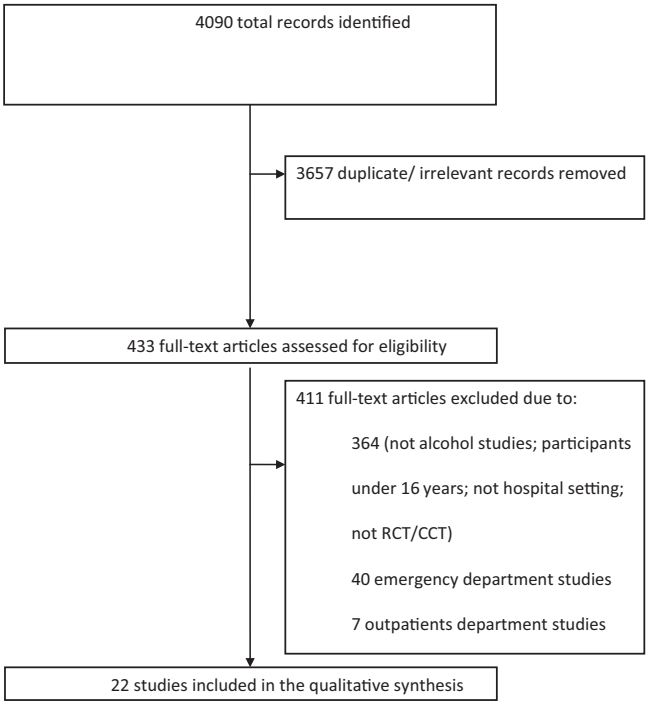

Fig. 1. Flow of articles through the systematic review process.

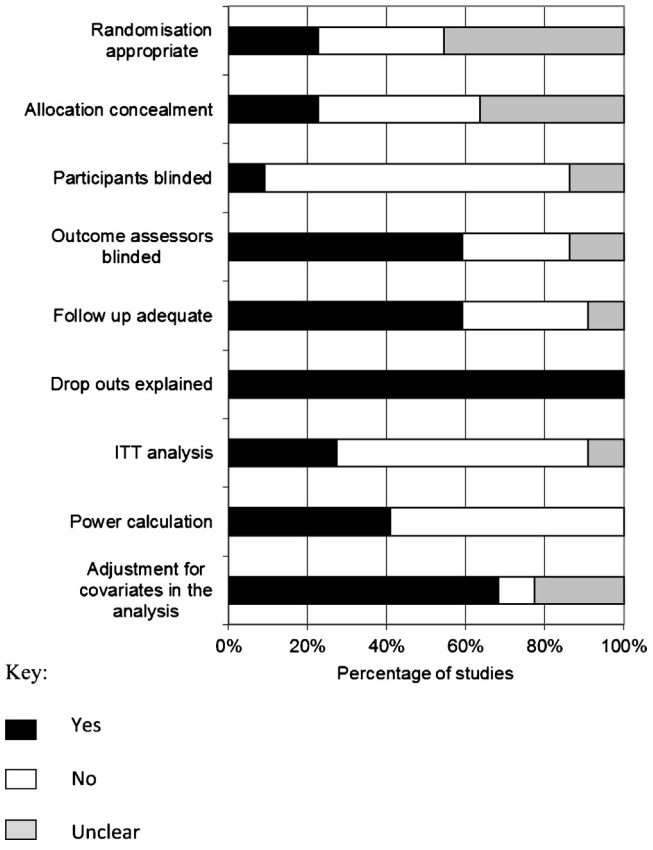

Fig. 2. Overall quality of studies.

measured (for example time points at which outcomes were measured). For alcohol consumption for example, whilst some studies considered mean weekly consumption, others considered reduction in weekly consumption, total consumption in the past week or abstinence. There were also differences in inclusion/exclusion of heavy or dependent drinkers, baseline consumption cut-off points for inclusion, the healthcare professionals delivering the intervention, and inclusion/exclusion by gender. A meta-analysis was therefore considered inappropriate and a narrative synthesis was conducted.

Studies that were judged as of better quality were compared with studies of poorer quality in terms of outcomes.

3. Results

3.1. Literature search

From the 4090 records identified, 3657 were duplicates or irrelevant, resulting in 433 full-text articles being assessed for eligibility (Fig. 1). 411 were excluded (for example studies were not controlled, or not conducted in general hospital inpatient population). A list of studies excluded because they were judged as not having been conducted in general hospital inpatient populations is provided as Supplementary material.[2] Twenty-two studies met the inclusion criteria (Table 1). All were published in English.

3.2. Study characteristics

The 22 eligible studies (14 RCTs, 3 CRCTs, and 5 CCTs) enrolled 5307 participants in total (Table 2). They all evaluated non-pharmacological interventions targeting either drinking behaviour or help-seeking for alcohol problems. Nine studies included motivational interviewing techniques (Bager and Vilstrup, 2010; Freyer-Adam et al., 2008; Gentilello et al., 1999; Heather et al., 1996; Kuchipudi et al., 1990; Liu et al., 2011; McQueen et al., 2006; Saitz et al., 2007; Schermer et al., 2006). Most of the remaining studies did not state clearly which behaviour change techniques were utilised. Similarly, the theoretical basis of interventions was often not specified; two studies indicated the Transtheoretical Model of Behaviour Change (Freyer-Adam et al., 2008; Mcmanus et al., 2003). Details on study settings, study sample characteristics, screening methods, intervention and control condition descriptions, eligibility criteria and outcomes assessed are provided in Table 2.

3.3. Study quality

Fig. 2 shows the overall quality of the studies. Information on individual study quality is provided as Supplementary material.[3] 41% of the included studies reported a power calculation, 23% had adequate sequence generation and 23% had adequate allocation concealment. Although for the evaluated interventions blinding interventionists/participants could be difficult, outcome assessors could potentially be blinded. Outcome assessor blinding occurred in 59% of studies. Fifty-nine percent of studies met the adequate follow-up criteria set as at least 12 months (McQueen et al., 2011). Drop outs tended to be documented but intention-to-treat analysis was used in about 27% of studies. Sixteen of the twenty-two included studies achieved follow-up rates of 70% or more at the end of the follow-up period (Antti-Poika et al., 1988; Bager and Vilstrup, 2010; Chick et al., 1985; Forsberg et al., 2000; Freyer-Adam et al., 2008; Heather et al., 1996; Holloway et al., 2007; Kuchipudi et al., 1990; Liu et al., 2011; Mcmanus et al., 2003; Rowland and Maynard, 1993; Saitz et al., 2007; Schermer et al., 2006; Shourie et al., 2006; Tsai et al., 2009, 2011). Of the remaining six, three achieve follow-up rates of between 60% and 69% (Elvy et al., 1988; McQueen et al., 2006; Watson, 1999), whilst for the other three it was between 50%

[2] Supplementary material can be found by accessing the online version of this paper. Please see Appendix A for more information.

[3] Supplementary material can be found by accessing the online version of this paper. Please see Appendix A for more information.

Table 2
Study characteristics.

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
Antti-Poika et al. (1988)	RCT	Not stated	120	Intervention: Brief intervention of >1 session (duration unspecified): counselled twice by a nurse and one to three times by physician	Alcohol consumption
	6 months		Male only sample	Control: No intervention	
Department of Orthopaedics and Traumatology, Helsinki University hospital	≥7 on MAST		Age range (years): 20–64 (mean 39)		
Finland			Mean MAST score 18.8 Reason for hospital visit: injury	Additional Control Group: assessed at 1 month	
Bager and Vilstrup (2010)	RCT	Not stated	50	Intervention: Brief motivational interviewing intervention of >1 session (10–15 min per contact), plus referral to the primary health service for alcohol abuse: by nurses and social workers Control: Referral to the primary health service for alcohol abuse	Alcohol consumption Mortality Healthcare utilisation
Hepatology and Gastroenterology department, Aarhus University Hospital	2 months		76% male		
			Age range (years): 37–75 (mean 51 (standard deviation (sd) = 7.9))		
Denmark	Drinking on daily basis		Mean daily alcohol intake (units of 10 g alcohol): 15 (sd = 18) Reason for hospital visit: (Mostly) alcohol-related disease		
Chick et al. (1985)	Control trial	Not stated	156	Intervention: 1 session counselling brief intervention (60 min) delivered in the presence of a spouse if possible: by nurse	Alcohol consumption Well-being and quality of life
4 Medical wards at the Edinburgh Royal Infirmary Project	12 months		Male only sample		
UK			Age range (years): 18–65 (mean not stated)	Control: No intervention	
	A structured 10 min interview covering consumption, dependence, problems related to alcohol, recent and distant medical history, and social background		The participants had to have at least some social support Average consumption in the past week (units): 5.2		
	Cut-off ≥2		Reason for hospital visit: not specified		
Elvy et al. (1988)	RCT	Currently in alcoholism treatment	198	Intervention: 1 session brief intervention (duration unspecified) plus attempt at referral: by psychologist	Alcohol consumption Alcohol questionnaire scores (CAST scores) Well-being and quality of life
3 orthopaedic and 2 surgical wards. Christ-church Hospital	12 months	Any whom medical staff wanted to send for treatment	84% male		
New Zealand	≥3 on CAST (Canterbury Alcoholism Screening Test)	Diagnosed alcohol dependent by a physician	Age range (years): not stated (mean 29)		
		Suffering from acute physical complications of alcohol abuse	Average ml ethanol/week: 212 Mean CAST score: 6 Reason for hospital visit: various	Control: No intervention	

Table 2 (*Continued*)

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
Forsberg et al. (2000)	RCT	Anyone not meeting criteria of risk consumption (regularly drinking ≥162 g absolute alcohol (males) and 82 (females) or drinking to intoxication ≥1.05 g of alcohol per body weight (males) or ≥0.90 g (females)	186	Intervention 1: 1 session brief assessment and feedback on patient's risky alcohol consumption (30 min): by surgical staff and psychologists	Alcohol consumption
Emergency surgical ward at Danderyd's hospital in Stockholm	12 months		71% male		
Sweden	Mm-Mast, Cage and The Trauma Scale, Previous alcohol problems and present or previous treatment. Cut-off for alcohol problems was 2 affirmative answers in any of questionnaires		Age range (years): 16–73 (mean 34.5) Mean weekly alcohol consumption 133 g Reason for hospital visit: not specified	Intervention 2: 2 sessions: first session as for 1 then a further alcohol counselling session conducted by a psychologist (session varied between 1 and 2½ h): by surgical staff and psychologists	
Freyer-Adam et al. (2008)	RCT	Alcohol dependence	595	Intervention 1: 1 session brief intervention (mean duration 25 min) by psychologists/social worker	Alcohol consumption Motivation/readiness to change Well-being and quality of life
29 wards from 4 general hospitals in W Pomerania	12 months		94% male		
Germany	Self-administered German adaptation of Audit (cut-off of 8) and the Luebeck Alcohol Dependence and Abuse Screening Test (LAST)(cut-off of 2)		Age range (years): not stated (mean 41 (sd = 12.6)) Mean score for AUDIT 12.2 Mean score for LAST 2.3 25% alcohol abusers 57% at-risk drinkers 18% heavy episodic drinkers Reason for hospital visit: various	Intervention 2: 1 session brief intervention (mean duration 25 min) by physician Control: Usual care	
Gentilello et al. (1999)	RCT	Not stated	762	Intervention: 1 session of motivational interviewing (30 min), plus	Alcohol consumption Injuries Healthcare utilisation
Harborview Medical Centre, University of Washington (Level 1 trauma centre)	12 months		82% male	Follow up letter summarising the session at 1 month: by psychologist	
USA	Positive if 1 of 5 conditions met: BAC ≥100 mg/dl; SMAST score ≥3; BAC of 1–99 mg/dl and SMAST score of 1 or 2; BAC of 1–99 and GGT above normal; or SMAST score of 1 or 2 and GGT above normal		Age range (years): not stated (mean 36) Mean BAC (mg/dl) I: 153 (122); C: 151 (119) SMAST score 0–2 I: 26.7%; C: 27.3% 3–8 I: 53.4%; C: 57.7% 9–13 I: 19.8%; C: 15.1% GGT abnormal I: 29.8%; C: 24.4% Reason for hospital visit: Injury	Control: Usual care	Alcohol questionnaire scores (SMAST scores) Mortality

Table 2 (*Continued*)

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
Heather et al. (1996) Four teaching hospitals in Sydney – range of wards including orthopaedic, surgical, gastrointestinal, cardiac and medical Australia	Controlled trial Mean 32.11 weeks (range 24–60) Self-reported consumption of >28 standard units/week or >11 units (1 unit = 10 g ethanol) in single session on at least 1 occasion per month	Too high dependence (SADD = 30+) or organic condition requiring total abstinence from alcohol or current/previous treatment for alcohol problems	174 Male only sample Age range (years): 17–73 (mean 34.4 (sd = 13.4)) SADD Mean 8.61 (5.09), Range 0–27 Low dependence (0–9): 65% Medium dependence (10–19): 30% High dependence: (5%) Reason for hospital visit: not specified	Intervention 1: 1 session brief intervention based on motivational interviewing (30–40 min) by psychologist, nurse or chief investigator Intervention 2: 1 session skills-based counselling brief intervention (30–40 min) by psychologist, nurse or chief investigator Control: Usual care that may have included advice about drinking from medical or nursing staff	Alcohol consumption
Holloway et al. (2007) Seven general medical, six general surgical, two otolaryngology wards and one dermatology ward of a large teaching hospital in Scotland. UK	CRCT 6 months Self-report of exceeding weekly alcohol limits of 21 units for men, 14 units for women based on a 7 day retrospective drinking diary	Evidence of alcohol dependence in medical records or admitted with conditions considered primarily alcohol-related	215 (36 clusters of 2–16 patients) 85% male Age range (years): not stated (mean 43.7–45.5) Weekly alcohol units (median and IQR): I1: 34 (27.45, 48.5) I2: 32(25, 52.5) C: 38(24, 52.75) Reason for hospital visit: various	Intervention 1: 1 session self-efficacy enhancement brief intervention (20 min): by mental health nurse Intervention 2: Self-help booklet: "That's the limit: a guide to sensible drinking" Control: Usual care	Alcohol consumption Motivation/readiness to change
Kuchipudi et al. (1990) 51 bed acute medical unit, Edward Hines Jr Hospital, Illinois USA	RCT Length of follow-up period unclear Comprehensive Drinker Profile (1984)	Participation in alcoholism treatment in previous 8 weeks	114 Proportions by gender not specified Age range (years): not stated (mean 52) Participants had many years of drinking with very little sobriety Reason for hospital visit: recurrent episode of pancreatic, alcoholic liver disease or peptic ulcer with gastritis	Intervention 1: 4 individual sessions + 1 group discussion per week + monthly follow up visits (duration not stated): by a variety of professionals Intervention 2: Medical + social worker evaluation for aftercare + development of aftercare plan; alcoholism therapy and planning of therapy available + monthly follow up visits (duration not stated): by a variety of professionals	Alcohol consumption Healthcare utilisation

Table 2 (*Continued*)

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
Liu et al. (2011)	RCT	Current speciality treatment for an alcohol use disorder	616	Intervention: 2 session brief intervention (+ optional 3rd) (30 min each) plus self-help brochure: by social worker	Alcohol consumption
Medical and surgical wards in a medical centre in Taipei	12 months		Male only sample		
Taiwan	7-day TLFB for consumption in the most recent seven days of drinking		Age range (years): not stated (mean 41.2)	Control: Usual care	
	Cut off: ≥14 drinks/week		Proportion with: alcohol dependence = 49.6%; heavy drinking = 18.8%; alcohol abuse = 31.6%		
			Reason for hospital visit: not specified		
Mcmanus et al. (2003)	Controlled trial (by time period)	Chronic physical problems (alcohol related only).	170	Intervention 1: 1 session counselling brief intervention (60 min) +written information: by alcohol counsellor	Alcohol consumption
General medical wards, teaching hospital, Manchester, and at the patients' home	6 months	Current or recent contact with an alcohol service	88.8% male		
UK	Daily drinking diary. Excessive drinking: ≥50 units/33 drinks per week (men) or ≥35 units/23 drinks per week (women)		Age range (years): not specified (mean 52.7)	Intervention 2: Brief intervention of 2 sessions (60 min each) +written information: by alcohol counsellor	
			Mean number of units of alcohol per week: 115	Control: No intervention	
			Reason for hospital visit: not specified		
McQueen et al. (2006)	RCT	Already known to community addiction teams or deemed to be alcohol dependent by medical staff	40	Intervention 1: 1 session of motivational counselling (≤40 min): by occupational therapy staff	Alcohol consumption Alcohol questionnaire scores (FAST score)
Medical wards of 2 general hospitals in West of Scotland	3 months		82% male		
UK	≥3 on Fast Alcohol Screening Tool (FAST)		Age range (years): 21–85 (mean 50)	Intervention 2: Alcohol and health leaflet	
			Mean pre Fast Alcohol Screening Tool (FAST) score: 7.07		
			Reason for hospital visit: various		
Rowland and Maynard (1993)	CRCT	Not stated	435	Intervention: 1 session brief intervention comprising of alcohol education (duration unspecified): by nurses and a researcher	Alcohol consumption Alcohol questionnaire scores (CAGE score)
4 general medical and 5 orthopaedic wards at York District Hospital (YDH)	12 months		92% male		
UK	Alcohol Screening Questionnaire (ASQ) positive on consumption ≥36 units per wk (men) and ≥24 units per wk (women) or binge drinking ≥14 units once a month (men) and ≥9 once a month (women) or 2 or more affirmative responses on modified CAGE questionnaire		Age range (years): not stated (mean 38.6)	Control: No intervention (but medical staff were informed of unsafe drinkers and could give advice)	Well-being and quality of life
			ASQ: alcohol consumption at unsafe levels: I: 43%, C: 42%		
			Drinker's diary: mean consumption (units): I: 41, C: 45		
			Alcohol-related admission: I: 20%, C: 18%		
			Reason for hospital visit: various		
Saitz et al. (2007)	RCT	Not stated	341	Intervention: 1 session brief motivational counselling (30 min): by counselling and clinical psychology doctoral students	Alcohol consumption
Inpatient medical unit. Urban teaching hospital	12 months		71% male		Healthcare utilisation

Table 2 (*Continued*)

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
USA	≥8 on AUDIT		Age range (years): not stated (mean 4.5) 67% had AUDIT score ≥12 Median drinks per day C: 3(1–8) I: 4(1–9) >75% had current alcohol dependence Reason for hospital visit: various.	Control: Usual care	Motivation/readiness to change Well-being and quality of life
Schermer et al. (2006) University of New Mexico hospital Trauma Centre USA	RCT Minimum–Maximum = 180–1279 days Admission BAC of ≥80 mg/dL or AUDIT ≥8	Not stated	126 69% male Age range (year): not stated (mean 32.9) Mean BAC for drivers was 163.3 mg/dL and for passengers 129.2 mg/dL Mean AUDIT score 15.1 for drivers and 15.8 for passengers Reason for hospital visit: Motor vehicle crash injury	Intervention 1: 30 min discussion in style of motivational interviewing: by social worker or trauma surgeon Intervention 2: List of phone numbers of alcohol treatment organisations near their homes	Criminal offences
Shourie et al. (2006) Pre-admission clinics at The Royal Prince Alfred Hospital and the Concord General Repatriation Hospital, Sydney Australia	Controlled trial 6 months ≥5 on AUDIT-C They had to be drinking ≥60 g daily (men); ≥40 g daily (women).	Not stated	136 80.1% male Age range (years): not stated (mean 53) Mean AUDIT-C score: 8.26 Mean daily consumption (g/day): 71.4 Current alcohol dependence (DSM-IV): 12.5% Reason for hospital visit: surgery	Intervention: 1 session brief intervention using WHO Drink-less package. Tailored for non-dependent and dependent patients. (Duration unspecified): (interventionist unspecified) Control: Usual care	Alcohol consumption Alcohol questionnaire scores (AUDIT C score) Well-being and quality of life Healthcare utilisation
Sommers et al. (2006) Within 2 level 1 trauma centres in SW Ohio and booster session on phone after discharge USA	RCT 12 months BAC ≥10 mg/dL	Attended an alcohol treatment programme in the past year Evidenced signs and symptoms of alcohol withdrawal. Received advice from their health care provider in the past 3 months to reduce alcohol use. Drank >150 g per day ≥2 on any or all of the 3 alcohol dependence items on AUDIT	187 77% male Age range (years): not stated (mean 29.03 (sd = 7.96))	Intervention 1: Simple Advice (SA) Printed self-help manual + 5 min feedback session on risky drinking + 1 month after discharge telephone booster repeating simple advice Intervention 2: 20 min hospital brief counselling (BC). Non-confrontational manner using FRAMES and reflective listening + self-help manual as for Intervention 1 + booster phone intervention 1 month after discharge (20 min)	Alcohol consumption Well-being and quality of life Criminal offences

Table 2 (*Continued*)

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
			Mean drinks per month: 56.80 (63.69) Mean binges per month: 5.79 (6.98) Mean BAC = 165.18 (65.65) Reason for hospital visit: injury after a motor vehicle crash	Both interventions delivered by nurse clinicians Control: No intervention	
Tsai et al. (2009) 18 surgical and medical units at a medical centre in northern Taiwan Taiwan	CRCT 12 months Chinese version of AUDIT based on previous 6 months	Level 1 (AUDIT score < 8) only recruited in 1st month	389 82% male Age range (years): 19–89 (mean intervention = 48.2; control = 51.1) Level 1 (AUDIT score < 8) I: 38.4%, C: 35.8% Level 2 (AUDIT score 8–15) I: 20.3%, C: 30.7% Level 3 (AUDIT score 16−19) I: 17.4%, C: 16.8% Level 4: (AUDIT score ≥20) I: 23.9%, C: 16.8% Reason for hospital visit: various	Intervention: 1 session brief intervention (15 min): Tailored to AUDIT score Level 1: Alcohol education Level 2: Simple advice Level 3: Simple advice plus brief counselling Level 4: Simple advice plus brief counselling. Referral to diagnosis and treatment Health promotion booklet Delivered by a psychiatry nurse Control: No treatment	Alcohol consumption Alcohol questionnaire scores (AUDIT score)
Tsai et al. (2011) Surgical and medical units at a medical centre in northern Taiwan Taiwan	RCT 6 months Chinese version of AUDIT	Level 1 (AUDIT score < 8)	95 90.5% male Age range (years): Not stated (mean: not stated) Level 2 (AUDIT score 8–15): 35.1% Level 3 (AUDIT score 16−19): 28.4% Level 4 (AUDIT score ≥20): 36.5% Reason for hospital visit: various	Intervention: 1 session brief intervention (15 min) tailored to AUDIT score. Participants were also provided with a handbook that served as a learning tool and reference when researchers provided care and guidance for them Level 2: Education about alcohol consumption plus direct suggestions about individuals' alcohol use Level 3: Short term counselling in addition to intervention for level 2 Level 4: In addition to interventions for level 3 individuals were referred to specialised treatment centres for further treatment Delivered by an experienced psychiatry nurse Control: No special psychosocial intervention except routine nursing care	Alcohol consumption Alcohol questionnaire scores (AUDIT score)
Watson (1999)	Controlled trial	Patients who had previously received treatment for an alcohol problem	150	Intervention 1: Self-help booklet: "That's the limit: a guide to sensible drinking"	Alcohol consumption

Table 2 (*Continued*)

Study and setting	Study design Follow-up period Screening method	Alcohol related exclusion criteria	Sample size Sample characteristics	Intervention and control	Outcomes assessed
General medical, general surgical, orthopaedic and short-stay wards of a large general hospital in the West of Scotland UK	12 months Structured interview schedule (less than 5 mins) tested for reliability and validity. Measured previous week's alcohol consumption and had items relating to biographical data. Erythrocyte mean cell volume (MCV), y-glutamyl transferase (GGT) and aspartate transaminase (AST) also assessed. Cut-off 21 units for men or 14 units for women		74.2% male Age range (years): 18–77 (mean 42.5 (sd = 16.8)) Alcohol consumption in previous week Men: 22–315 units (mean 47.6, median 35) Women: 15–140 units (mean 31.3, median 20) AUDIT Score (whole sample): range = 1–35; mean 14.6(7.3); median 12 Reason for hospital visit: various	Intervention 2: 1 session brief advice (10–15 min): by the researcher Intervention 3: 1 session brief advice (10–15 min) plus booklet: by the researcher Control: No treatment	Well-being and quality of life Healthcare utilisation
Yersin et al. (1996) General medical ward, teaching hospital in Lausanne Switzerland	RCT 12 months ≥5 on MAST (French version)	Patients seeking help spontaneously	52 81% male Age range (years): 33–68 (median 53) Weekly intake of ethanol, median (range): 604 (140–1680) MAST score, median (range): 13 (5–37) MAST score, mean: 16 Mostly alcohol dependent with 86.5% ≥1 alcohol-related disease Mean duration of alcohol consumption: 31years 23% previously undergone specific treatment for alcoholism Reason for hospital visit: various	Intervention 1: >1 session: Psychological and social evaluation. Multidisciplinary meeting to decide on psychological and/or social therapy (duration not stated): by multidisciplinary team Intervention 2: 20–30 min of abstinence counselling: by senior supervisor of ward	Alcohol consumption Well-being and quality of life

and 59% (Gentilello et al., 1999; Sommers et al., 2006; Yersin et al., 1996). Where groups differed at baseline the majority of studies accounted for potential moderating variables in the analysis.

Ten studies did not specify any methods of ensuring intervention fidelity (Antti-Poika et al., 1988; Chick et al., 1985; Elvy et al., 1988; Forsberg et al., 2000; Gentilello et al., 1999; Kuchipudi et al., 1990; Schermer et al., 2006; Shourie et al., 2006; Watson, 1999; Yersin et al., 1996). Of the remaining 12 studies training of interventionists was specified in all 12 (Bager and Vilstrup, 2010; Freyer-Adam et al., 2008; Heather et al., 1996; Holloway et al., 2007; Liu et al., 2011; Mcmanus et al., 2003; McQueen et al., 2006; Rowland and Maynard, 1993; Saitz et al., 2007; Sommers et al., 2006; Tsai et al., 2009, 2011); supervision in five (Freyer-Adam et al., 2008; Liu et al., 2011; Mcmanus et al., 2003; Saitz et al., 2007; Sommers et al., 2006); intervention fidelity verification in four (Freyer-Adam et al., 2008; Heather et al., 1996; Liu et al., 2011; Saitz et al., 2007); and the use of a manual to guide intervention delivery in four studies (Liu et al., 2011; Sommers et al., 2006; Tsai et al., 2009, 2011).

3.4. Intervention effectiveness

Results are presented narratively within the study groups indicated in Table 1. There was no clear difference in the direction of effect (i.e., the presence of intervention benefit versus no intervention benefit) according to any of the quality criteria (for example randomised studies versus non-randomised studies). We therefore did not group studies according to any quality criteria when reporting results. For each group an overall summary of results is presented first, followed by a detailed account of the results with the outcomes of interest specified in Section 2.3 (i.e., alcohol consumption; alcohol questionnaire scores (i.e., scores from tools or questionnaires used to measure self-reports of alcohol consumption behaviour such as Alcohol Use Disorders Identification Test (AUDIT)); injury; mortality; wellbeing and quality of life; healthcare utilisation; criminal offences; motivation/readiness to change) as subheadings where reported. Only the results for 6–12 months follow-up periods are presented in the narratives below. Twelve months is recommended as the adequate minimum

Table 3
Summary of results by study.

Study	Results
Antti-Poika et al. (1988)	Consumption of alcohol decreased in the intervention group but not in the control group (308 g, range 0–1500 g versus 736 g, range 45–3455 g; $p < 0.05$) No statistically significant differences were noted between groups at 6 months in terms of biochemistry results. In the intervention groups serum aspartate transaminase (AST) was decreased ($p < 0.01$) from admission to 1 month. Both serum gamma-glutamyl transpeptidase (GGT) and AST increased ($p < 0.01$) from 1 month to 6 months to the same level as on admission. (Details available in the paper) 22 (45%) of intervention group and 8 (20%) of control group improved ($X^2 = 6.109$, $p < 0.05$) 13 (26%) of intervention group and 12 (30%) of control group were unchanged 14 (29%) of intervention group and 20 (50%) of control group were worse ($X^2 = 4.283$, $p < 0.05$)
Bager and Vilstrup (2010)	17 patients (68%) were abstinent in the motivational interviewing (MI) group and 10 (40%) in the control group ($p = 0.09$) At 12 months post-study, survival and hospital admission rate showed no difference between groups (data not shown in article) 80% of participants in both groups had failed to be in contact with the public alcoholism centres
Chick et al. (1985)	There was no significant difference in the mean weekly alcohol consumption between intervention ($n = 69$) and control group ($n = 64$) No significant difference on the proportion of patients reporting at least 50% reduction in alcohol consumption (44 (64%) in intervention group and 31 (48%) in the control group) ($p = 0.07$) No significant difference between the intervention ($n = 65$) and control groups ($n = 59$) on changes in mean cell volume and GGT There was a significant difference between intervention patients and control on improvement on score of problems related to alcohol (41% versus 14% mean fall in problems score respectively) ($p = 0.03$) There was also a significant improvement in the counselling group on problems related to alcohol ($p < 0.001$); and GGT activity ($p < 0.05$). The control group did not show any significant improvement in these two measures Of the 124 interviewed for whose complete blood tests were available, 34(52%) in the counselling group and 20(34%) of controls were categorised as definitely improved ($p = 0.038$). (Improvement: no alcohol related symptoms or problems over the past year or if recruited on heavy alcohol consumption alone needed to report consumption had fallen by 50%. Improvement needed to be supported by blood tests and/or relatives report) Both groups significantly: reduced their mean weekly intake; and improved on consumption in the past week ($p < 0.001$) Both groups did not show any significant improvement in mean cell volume
Elvy et al. (1988)	*12 months*: The referred group ($n = 61$) improved significantly more than the control group ($n = 86$) in terms of: – time since last drinking (proportion) ($p < 0.05$): <24 h (Control = 48; intervention = 25) 1–4 days (Control = 28; intervention = 38) >5 days (Control = 24; intervention = 38) – desire to drink less (proportion of patient), (Control: 38% from 43%; Intervention: 30% from 61%) ($p < 0.01$) – happiness with the amount drunk (proportion of patients), (Control: 64% from 63%; Intervention: 67% from 43%) ($p < 0.05$) – CAST score (mean values), (Control: 5.8 from 5.6; Intervention: 5.1 from 6.4) ($p < 0.05$) – work problems (mean values), (Control: 5.2 from 5.0; Intervention: 4.8 from 5.5) ($p < 0.01$) – a number of personal happiness scale items: In good spirits (proportion), (Control: 43% from 44%; Intervention: 54% from 33%) ($p < 0.05$) Happiness (proportion), (Control: 55% from 50%; Intervention: 50% from 30%) ($p < 0.05$) Optimistic about future (proportion), (Control: 60% from 49%; Intervention: 59% from 30%) ($p < 0.05$) Happy with sex life(proportion), (Control: 50% from 69%; Intervention: 53% from 32%) ($p < 0.01$) No difference on: – feeling content (proportion) – cost of drinking in the last week (mean) *18 months*: The referred group ($n = 48$) improved significantly more than the control group ($n = 72$) in terms of: – desire to drink less (proportion of patient), (Control: 25% from 43%; Intervention: 21% from 61%) ($p < 0.05$) – happiness with the amount drunk, (proportion of patients), (Control: 73% from 63%; Intervention: 77% from 43%) ($p < 0.05$) – a number of personal happiness scale items: Happy with sex life (proportion), (Control: 63% from 69%; Intervention: 50% from 32%) ($p < 0.05$) Feeling content, (proportion), (Control: 56% from 61%; Intervention: 67% from 41%) ($p < 0.01$) Cost of drinking in the last week (mean), (Control: 14.2 from 17.0; Intervention: 9.7 from 16.2) ($p < 0.05$) No difference on: – time since last drinking – CAST score – work problems – a number of personal happiness scale items: In good spirits Happiness Optimistic about future
Forsberg et al. (2000)	Brief intervention showed a statistically significant higher reduction in peak amount at 6 months compared to extended alcohol counselling ($p = 0.03$) but at 12 months there was no difference. There were no differences in other outcomes by group Significant positive results in terms of reduction in alcohol consumption and readiness to change were reported for the whole sample from baseline to follow up (data not extracted) No differences were noted for brief intervention between delivery by regular surgical staff and psychologists
Freyer-Adam et al. (2008)	Longitudinal analysis showed a significant stronger increase in readiness to change (from 53 to 76 versus 46 to 46) and a less profound drop of readiness to seek help (from 27 to 21 versus from 37 to 16) among those who received the intervention (both intervention groups combined) when compared with control Changes in other measures were not significantly different between groups. Intervention groups drank a mean of 258.16 g of alcohol over the previous week whilst controls drank 274.01 g. 147(56.54%) had an alcohol problem at follow up in the intervention group whilst 84(54.19%) had a problem in the control group All groups decreased their alcohol consumption significantly

Table 3 (*Continued*)

Study	Results
Gentilello et al. (1999)	At 12 months the intervention group decreased weekly consumption by 21.8(3.7) standard drinks whereas the control group decreased their intake by 6.7(5.8) drinks ($p = 0.03$) There was a non-significant difference in reduction in new injuries requiring either emergency department treatment or readmission to the trauma centre between the intervention group and controls after controlling for covariates (HR = 0.53; 95% CI: 0.26–1.07) There was a non-significant difference in reduction in inpatient hospital readmissions for treatment of a new injury (up to 3 years follow up) (HR = 0.52; 95% CI: 0.21–1.29) Death rate was 2.7% in the intervention group and 2.3% in controls (difference not statistically significant) There was no intervention benefit in patients with a negative SMAST score (0–2) who entered the study on the basis of elevated BAC (data not shown). There was no benefit in patients with very high SMAST scores (9–13 associated with severe dependence). Patients with intermediate scores (3–8) in the intervention group reduced drinking by 21.6 (4.2) drinks per week compared with an increase of 2.3 (8.3) drinks per week in the controls ($p < 0.01$). Both intervention and controls in the intermediate category decreased alcohol consumption. The intervention group continued to decrease intake whilst the controls increased back to baseline Injury type (intentional versus unintentional) did not affect response to the intervention (data not extracted). Other secondary outcomes not extracted
Heather et al. (1996)	Patients who received an intervention reduced mean weekly consumption more than those who did not (31.4(22.9) versus 30.7(18.4)) Differences between brief motivational interviewing (BMI) and skills based counselling (SBC) were not statistically significant (27.6(20.6) versus 35.5(24.7)) There was no statistically significant difference in changes in alcohol consumption according to stage of change and type of counselling received (data not extracted) When analysis was confined to patients 'not ready to change', patients who received BMI reduced mean consumption more than those who received SBC (27.5(20.8) versus 37.6(23.6))
Holloway et al. (2007)	There was a greater reduction in self-reported weekly alcohol consumption in both intervention groups compared to usual care control group: Self-efficacy versus usual care: – 10.1 (−16.1, −4.1), ($p = 0.001$) Self-help booklet versus usual care: – 10.0 (−16.0, −3.9), ($p = 0.001$) There was no evidence that self-efficacy enhancement was superior to the self-help booklet ($p = 0.96$) Similar finding for change in maximum units consumed in 1 day were noted: Self-efficacy versus usual care: – 1.8 (−3.9, −0.3), ($p = 0.016$) Self-help booklet versus usual care: – 3.1 (−5.1, −1.0), ($p = 0.016$) For no of drinking days there was no difference between interventions and control and between intervention groups: Self-efficacy versus usual care: – 0.4 (−0.8, 0.1), ($p = 0.19$) Self-help booklet versus usual care: – 0.3 (−0.8, 0.1), ($p = 0.19$) Both the self-efficacy intervention and the self-help booklet improved self-efficacy scores more than usual care: Self-efficacy versus usual care: 12.4 (7.7, 17.2), ($p < 0.001$) Self-help booklet versus usual care: 6.4 (1.6, 11.1), ($p < 0.001$) Self-efficacy intervention had a greater effect on efficacy score than self-help booklet ($p = 0.011$) There was no evidence of interaction between intervention and clinical area ($p > 0.05$, data not shown)
Kuchipudi et al. (1990)	Number of participants undertaking alcoholism treatment were not significantly different between treatment groups Completed 28 days inpatient programme (Intervention (I) = 5; Control (C) = 6) Kept at least one outpatient appointment ($I = 7$, $C = 3$) Number of participants sober was not significantly different between treatment groups. (Intervention = 19 verified, 2 unverified; Control = 16 verified, 4 unverified)
Liu et al. (2011)	*12 months: n = 616 (ITT)* Using TLFB there was a significant difference on weekly alcohol consumption ($p < 0.05$), drinking days in previous week ($p < 0.001$) and heavy drinking episodes in previous week ($p < 0.01$), in favour of intervention overall, as well as in dependent patients ($n = 305$) ($p < 0.05$; $p < 0.01$; $p < 0.05$, respectively) Significant group × time interactions were found for number of drinking days, indicating sustained benefits in the intervention while control participants gradually drank on more days ($p = 0.04$ overall; and $p = 0.03$ for dependent drinkers) The results were similar using the QDS. Significant difference on alcohol consumption in previous 3 months ($p < 0.05$), drinking days in previous 3 months ($p < 0.001$) and heavy drinking episodes in previous 3 months ($p < 0.001$), in favour of intervention overall, as well as in dependent patients ($p < 0.05$; $p < 0.01$; $p < 0.05$ respectively)
Mcmanus et al. (2003)	Six months (133 participants, 78% of baseline) There was a statistically significant reduction in alcohol consumption for the two groups who received counselling between baseline and 6 months. No significant differences were observed between phase 2 and phase 3 groups, suggesting no additional benefit from receiving two sessions instead of one. No significant improvement was observed in the control group Alcohol consumption for each phase, median units per week (IQR) Phase 2: Baseline: 78(54–171) Six months: 29(15–49) $p < 0.001$ Phase 3: Baseline: 70(55–109) Six months: 22(3–46)

Table 3 (*Continued*)

Study	Results
	$p < 0.001$ Phase 1: Baseline: 68.45(52–105) Six months: 64(46–109) $p = 0.648$
McQueen et al. (2006)	Mean post FAST score (range) Intervention = 5.3(1–16); Control = 6(4–14) Mean change FAST score Intervention = −1.77; Control = −1.07 Alcohol consumption Reduced: Intervention = 9; Control = 7 Stayed same: Intervention = 2; Control = 1 Increased: Intervention = 2; Control = 6 Comparisons between FAST scores in the intervention and control groups, and individual change in scores over time revealed no statistically significant changes ($p = 0.16$)
Rowland and Maynard (1993)	There were no significant differences between treatment groups for dependency, harm and self-perception scores (data not extracted) There was a significant reduction in alcohol-related health problems between groups Increase: Intervention = 22(17.2%); Control = 31(15.1%) Decrease: Intervention = 40(31.3%); Control = 44(21.5%) Same: Intervention = 66(51.6%); Control = 130(63.4%) ($p = 0.02$) (Based on 214 patients with complete data) Mean consumption of units of alcohol before study: Intervention = 40.86; Control = 44.27 Mean reduction of units consumed after the study: Intervention = 9.6; Control = 7.25(NS) (Based on 278 patients with complete data) Regular consumption: Increase: Intervention = 12(11%); Control = 10(5.9%) Decrease: Intervention = 25(22.9%); Control = 47(27.8%) Same: Intervention = 72(66.1%); Control = 112(66.3%) (Based on 285 patients with complete data) Quantity/variability Increase: Intervention = 19(9.3%); Control = 8(4.7%) Decrease: Intervention = 17(15.9%); Control = 48(28.4%) Same: Intervention = 80(74.8%); Control = 113(66.9%) (Based on 208 patients with complete data, inc 36 treatment patients) Modified CAGE score: Increase: Intervention = 3(2.8%); Control = 8(4.7%) Decrease: Intervention = 16(15.1%); Control = 23(13.4%) Same: Intervention = 17(82.1%); Control = 141(82%) There were no differences in knowledge about alcohol at follow up between groups (data not shown) Numbers were too small to analyse differences between groups in relation to problems at work Analyses were also conducted on patients who recalled receiving advice (data not extracted)
Saitz et al. (2007)	*Three months* There were no differences between the intervention and control groups on proportion of patients who received alcohol assistance: Among dependent patients ($n = 204$), 49% in the intervention and 44% in control groups received alcohol assistance (adjusted OR 1.2 [95% CI 0.6–2.5]; intervention control difference 5% [95% CI −8% to 19%]; $p = 0.55$) Among patients with AUDIT scores of 12 or greater ($n = 183$), 48% in the intervention and 43% in control groups received alcohol assistance (adjusted OR 1.3 [95% CI, 0.6–2.7]; intervention control difference 6% [95% CI, −9% to 20%]; $p = 0.55$) The types of assistance did not significantly differ among the groups *12 months ($n = 287$)* There was no significant difference between the groups on: – decrease in number of drinks per day (mean adjusted group difference −1.5 (95% CI, −3.7 to 0.6)[$p = 0.169$]), although this decreased in both groups – decrease in heavy drinking episodes, (mean adjusted group difference −1.7 (95% CI, −4.4 to 0.9) [$p = 0.193$]) The increase in number of days abstinent favoured the control group (mean adjusted group difference −2.9 (95% CI, −5.7 to −0.1) [$p = 0.042$]) At 12 months, there was no difference between the groups on: readiness to change, alcohol problems, physical or mental health related quality of life, emergency department visits, or days hospitalized
Schermer et al. (2006)	14 of 64(21.9%) control patients and 7 of 62(11.3%) intervention patients had an arrest of driving under the influence (DUI) In multivariate regression brief intervention was the strongest protective factor for DUI (OR = 0.32; 95% CI: 0.11, 0.96). Prior no of DUIs and age were also associated with DUI arrest but AUDIT screening score was not
Shourie et al. (2006)	*Within five days following surgery* Significantly more complications overall (any complication) occurred in the intervention group ((20(44.4%)) than in the control (23(25.3%)) ($X^2 = 5.118$; $p = 0.024$) Significantly more major postoperative complications occurred in the intervention group than in the control ($X^2 = 7.16$; $p = 0.007$). The difference disappeared when adjusted for gender No statistically significant difference between groups on: Minor complications–intervention ($X^2 = 0.661$; $p = 0.42$) Patients requiring repeat surgery ($X^2 = 1.985$; $p = 0.16$) Length of hospital stay ($t = 0.643$; $p = 0.52$) Tachycardia during surgery ($X^2 = 0.336$; $p = 0.57$)

Table 3 (*Continued*)

Study	Results
	Administration of benzodiazepines ($X^2 = 0.274$; $p = 0.60$) Age was a significant predictor of post-operative complications after controlling for gender, major surgery, and smoking status ($t = 2.060$; $p = 0.026$) Age ($p = 0.02$) and diagnosis of cancer ($p = 0.045$) were significant predictors of length of hospital stay, after controlling for gender, baseline consumption, and smoking status *Six months follow-up* Average daily consumption fell for the whole sample by 63% (from 70 g/day to 26 g/day) ($t = 25.6$; $p < 0.0001$) No difference between groups on: Average daily consumption ($t = 2.8$; $p = 0.9$). Intervention = 28.7 g/day; control = 23.7 g/day Mean AUDIT-C score ($t = -1.57$, $p = 0.12$). Intervention = 6.7; control = 7.4 Current alcohol dependence (DSM-IV) ($X^2 = 0.005$, $p = 0.95$). Intervention = 12.2%; control = 10.2% Mortality ($X^2 = 0.30$, $p = 0.59$). 1.3% control; 2.4% intervention) Number of visits to general practitioner ($p = 0.56$). Median 4 for both groups Days unable to work following surgery (mean = 0 for both groups) ($p = 0.39$) Hospital admissions (median = 0 in both groups) ($p = 0.17$) Ability to do physical activity ($p = 0.84$)
Sommers et al. (2006)	No differences were noted between treatment conditions for the main analyses relating to alcohol consumption (reduction in drinks and binges) However a significant interaction between treatment condition and driver/passenger status revealed that drivers consumed similar levels of drinks across treatment conditions whereas passenger consumption varied across the treatment conditions: Mean consumption Simple Advice (SA): Driver 40.75(48.30); Passenger 55.99(62.01) Brief counselling (BC): Driver 42.45(44.04); Passenger 17.49 (18.07) Control (C): Driver 31.27(35.32); Passenger 75.47(90.86) There was a significant interaction between treatment condition and driver/passenger status for binge drinking. Drivers had similar levels of binging across treatment conditions whereas passenger binges varied across the treatment conditions: Mean binges SA: Driver 1.51(1.86); Passenger 2.90(1.97) BC: Driver 1.83(1.72); Passenger 0.79(1.05) C: Driver 1.16(1.69); Passenger 2.98(2.13) There were no differences between treatment groups in driving events and health status changes (data not reported by treatment group). However only the BC group demonstrated significant changes over time in the proportion reporting $\geq$1 day of limited physical activity because of illness ($p = 0.003$) At 3, 6 and 12 months all participants decreased numbers of drinks and binges (data not extracted as not broken down by treatment group)
Tsai et al. (2009)	At 6 months AUDIT scores decreased significantly from baseline in both groups. (Intervention (I): Pre-test mean 11.6(9.9), Post-test mean 4.4(7.3); Control (C): Pre-test mean 10.8(8.5), Post-test mean 5.0(7.8). However there were no differences between groups ($F = 1.32$, $df = 1$, $p = 0.25$) At 12 months AUDIT scores decreased significantly from baseline in both groups. (I: Pre-test mean 11.6(9.9), Post-test mean 3.1(5.8); C: Pre-test mean 10.8(8.5), Post-test mean 4.7(6.3). There was a significant difference between groups ($F = 6.44$, $df = 1$, p = 0.01) favouring the intervention Further analysis found statistically significant mean changes between groups for symptoms of dependence at 6 months ($t = 2.80$, $p = 0.01$), 12 months scores of alcohol dependence ($t = 2.71$, $p = 0.01$) and 12 months total AUDIT scores ($t = 2.22$, $p = 0.03$) (data in full below) *Six months follow up* (AUDIT scale mean (SD) % improved) Quantity I: 3.2(4.5) 57.1 C: 3.1(4.3) 54.4 Symptoms of dependence I: 1.3(2.8) 72.2 C: 0.5(1.7) 50.0 Related problems I: 2.6(3.9) 61.9 C: 2.2(3.9) 53.7 Total I: 7.1(9.7) 61.2 C: 5.8(8.8) 53.7 *12 months follow up* (AUDIT scale mean (SD) % improved) Quantity I: 3.9(4.4) 69.6 C: 3.0(3.9) 52.6 Symptoms of dependence I: 1.5(2.5) 83.3 C: 0.8(1.7) 80.0 Related problems I: 3.1(3.6) 73.8 C: 2.4(4.2) 58.5 Total I: 8.5(9.2) 73.3 C: 6.1(8.3) 56.5

Table 3 (*Continued*)

Study	Results
	Differences between groups were noted on a small no of individual AUDIT questions (data not extracted) At the 12 months follow up (but not the 6 months) more participants in the control group stayed at the same drinking level or worsened compared to participants in the experimental group. ($X^2 = 7.14$, $p < 0.05$) (data shown below) *Six months follow up* (Drinking status *n*(%)) Improved I: 73(52.9) C: 54(39.4) No change I: 62(44.9) C: 77(56.2) Worse I: 3(2.2) C: 6(4.4) *12 months follow up* (Drinking status *n*(%)) Improved I: 76(55.1) C: 62 (45.3) No change I: 61(44.2) C: 67(48.9) Worse I: 1(0.7) C: 8(5.8) Compared with participants at level 4, those at level 1 improved the least in their AUDIT scores, followed by participants at level 2 and 3 (data not available)
Tsai et al. (2011)	*6 months follow-up* SCORES Total AUDIT Score (mean(sd)) $I = 6.47(7.97)$; $C = 10.88(7.75)$ ($Z = -2.14$, $p = 0.033$) Amount of alcohol consumption (mean(sd)) $I = 3.56(4.27)$; $C = 6.00(4.70)$ ($p = 0.053$) Drinking habits and dependence (mean(sd)) $I = 0.62(1.94)$; $C = 1.10(1.95)$ ($p = 0.160$) Alcohol-related problems (mean(sd)) $I = 2.29(2.82)$; $C = 3.78(3.42)$ ($p = 0.075$) IMPROVEMENT SCORES Total AUDIT Score (mean(sd)[%]) $I = 12.47(9.42)[65.63]$; $C = 6.05(9.72)[35.73]$ ($Z = 3.21$, $p = 0.001$) Amount of alcohol consumption (mean(sd)[%]) $I = 6.38(4.84)[64.19]$; $C = 3.28(4.86)[35.34]$ ($Z = 2.62$, $p = 0.009$) Drinking habits and dependence (mean(sd)[%]) $I = 2.53(3.84)[80.32]$; $C = 0.58(1.84)[34.52]$ ($Z = 2.62$, $p < 0.001$) Alcohol-related problems (mean(sd)[%]) $I = 3.44(3.60)[59.93]$; $C = 2.15(4.02)[0.056]$ ($p = 0.056$)
Watson (1999)	No one group reported a significantly greater reduction in alcohol consumption than any of the others Booklet: Baseline 45.7(57.6); Follow-up 33.7(27.4) Advice: Baseline 41.0(21.0); Follow-up 28.9(29.8) Advice and booklet: Baseline 44.6(30.8); Follow-up 24.0(17.1) Control: Baseline 45.2(42.9); Follow-up 30.5(30.0) Entire sample: Baseline 44.3(41.1); Follow-up 30.0(26.9) GGT and AST values decreased significantly across the sample but no group differences were found. MCV values showed no effect of time or group (data not extracted) There was a statistically significant effect for time across all groups for alcohol-related problems ($p < 0.001$). However no one group reported a significantly greater reduction than any of the others (data not extracted) No significant differences were found between groups in terms of health rating, no of appointments with GP and hospital attendances (data not shown in full) There was a statistically significant effect for time across all groups for alcohol consumption based on self-report ($p < 0.001$)
Yersin et al. (1996)	Results suggest that a single session to firmly counsel abstinence or a multiaxial evaluation aimed at individualising therapeutic proposals is associated with a favourable impact on alcohol consumption, related consequences and outcomes 1 year later Number abstinent Multidisciplinary Individualised Programme (MIP): 7 Abstinence counselling (ABC): 5 Referral (REF): 5 Mean duration of abstinence in weeks MIP: 37 ABC: 12 REF: 17 Alcohol intake, g (difference between baseline and follow-up) MIP: 567 ABC: 811 REF: 428

follow-up period (McQueen et al., 2011). Results from follow-up periods of at least 6 months but less than 12 months are also important to show the shorter term outcomes. Table 3 provides a summary of results from each study for all follow-up periods for which results were reported.

3.4.1. Single session brief intervention with an interventionist versus usual care/nointervention. Twelve studies compared a single session brief intervention to usual care or no intervention (see Table 1). The results showed no clear intervention benefits on alcohol consumption, well-being and quality of life, and alcohol questionnaire scores (such as AUDIT scores); with indications of benefit from some studies but not others. Results suggested no intervention benefit on healthcare utilisation or laboratory markers (for example gamma-glutamyl transpeptidase (GGT)). However, these interventions could potentially increase motivation/readiness to change.

3.4.1.1. Alcohol consumption. Twelve month follow-up: No statistically significant differences between the intervention and control were demonstrated at 12 months follow-up for the following (Table 3): mean weekly alcohol consumption (Chick et al., 1985; Watson, 1999); reduction in alcohol consumption (Watson, 1999); proportion of patients reporting at least 50% reduction in alcohol consumption (Chick et al., 1985); reduction in amount of alcohol consumed in the past week (Freyer-Adam et al., 2008; Rowland and Maynard, 1993); decrease in the number of drinks per day in the past 30 days (Saitz et al., 2007); average daily consumption (Freyer-Adam et al., 2008); and the quantity/frequency subscale of the AUDIT questionnaire at 12 months follow-up (Tsai et al., 2009).

Studies also found no statistically significant difference between groups on proportion of patients who had ceased binge drinking in the year since discharge from hospital (Rowland and Maynard, 1993); number of heavy drinking episodes, decrease in heavy drinking episodes in the past 30 days, and proportion of patients drinking risky amounts (Saitz et al., 2007); and reduction in symptoms of dependence (Tsai et al., 2009). Two studies reported no statistically significant difference between intervention and control groups on changes in gamma-glutamyl transpeptidase (GGT) (Chick et al., 1985; Watson, 1999), mean cell volume (MCV) (Chick et al., 1985; Watson, 1999), and aspartate transaminase (AST) (Watson, 1999).

Statistically significant differences between groups favouring the intervention groups at 12 months were reported for the following: time since last drinking (Elvy et al., 1988); and alcohol dependence scores (Tsai et al., 2009). In the study by Tsai et al. (2009) more participants in the control group stayed at the same drinking level or worsened compared to the intervention group. However, another study reported no statistically significant difference between groups on dependence at 12 months (Rowland and Maynard, 1993). In the study by Saitz et al. (2007) the increase in number of days abstinent in the past 30 days favoured the control group.

Follow-up of at least 6 months but less than 12 months: Studies showed statistically significant differences between groups favouring the intervention groups on the following: reduction in alcohol consumption at 6 months (Holloway et al., 2007; Mcmanus et al., 2003; Tsai et al., 2011), as well as at mean follow-up of 32.11 weeks (Heather et al., 1996); improvement in drinking habits (Tsai et al., 2011), and reduction in symptoms of dependence at 6 months (Tsai et al., 2009, 2011).

Studies showed no statistically significant differences between the intervention and control on mean weekly alcohol consumption at 6 months (Holloway et al., 2007) and at mean follow-up of 32.11 weeks (Heather et al., 1996). Studies also showed no statistically significant differences between the intervention and control on the following at 6 months follow-up: number of drinking days and change in maximum number of units consumed in one day in the past week (Holloway et al., 2007); average daily consumption (Shourie et al., 2006); the quantity/frequency subscale of the AUDIT questionnaire (Tsai et al., 2009, 2011); drinking habits and dependence measured on the AUDIT questionnaire (Tsai et al., 2011); and proportion of participants with current alcohol dependence (Shourie et al., 2006).

3.4.1.2. Alcohol questionnaire scores. AUDIT and AUDIT-C: Tsai et al. (2009) reported a significant difference between groups on AUDIT scores at 12 months favouring the intervention group ($F = 6.44$, $df = 1$, $p = 0.01$). Tsai et al. (2011) reported a significant difference between groups on AUDIT scores ($Z = -2.14$, $p = 0.033$), and improvement in AUDIT scores ($Z = 3.21$, $p = 0.001$) at 6 months favouring the intervention group. However two other studies reported no statistically significant difference between groups for AUDIT scores (Tsai et al., 2009) and mean AUDIT-C scores (Shourie et al., 2006) at 6 months.

Canterbury Alcoholism Screening Test (*CAST*): Elvy et al. (1988) reported that improvement on CAST scores favoured the intervention group at 12 months (control: 5.8 from 5.6; intervention: 5.1 from 6.4, $p < 0.05$).

3.4.1.3. Well-being and quality of life. Twelve months follow-up: Whilst Chick et al. (1985) reported a statistically significant difference favouring the intervention group on reduction in alcohol related problems at 12 months (mean reduction: intervention 41%; control 14%, $p = 0.03$), a number of studies reported no statistically significant difference between groups (Freyer-Adam et al., 2008; Saitz et al., 2007; Tsai et al., 2009; Watson, 1999). Chick et al. (1985) also found a significantly higher proportion of patients in the intervention group reporting complete freedom from alcohol related symptoms/problems over the past year at 12 months (intervention: 52%; control 34%, $p = 0.038$). Rowland and Maynard (1993) found a statistically significant difference in reduction in alcohol-related health problems favouring the intervention group at 12 months ($p = 0.02$). However, a number of studies reported no statistically significant differences between groups on physical and mental health related quality of life (Saitz et al., 2007), health ratings (Freyer-Adam et al., 2008; Watson, 1999), and patients' self-perception (Rowland and Maynard, 1993) at 12 months.

Six months follow-up: Three studies reported no statistically significant difference between groups at 6 months on alcohol related problems (Tsai et al., 2011); reduction in alcohol related problems (Tsai et al., 2009, 2011); and ability to undertake physical activity and days unable to work following surgery (Shourie et al., 2006).

3.4.1.4. Healthcare utilisation and mortality. Studies reported no statistically significant difference between groups on the following at 12 months follow-up: emergency department visits (Saitz et al., 2007); hospital attendances (Watson, 1999); length of hospital stay (Saitz et al., 2007); and GP visits (Watson, 1999).

Shourie et al. (2006) reported no statistically significant difference between groups at 6 months on hospital admissions, GP visits and mortality.

3.4.1.5. Motivation/readiness to change. The increase in readiness to change score was significantly stronger for the intervention group compared to the control in one study (intervention: 53–76; control: no change, using the Readiness to Change Questionnaire) (Freyer-Adam et al., 2008) but not in another (Saitz et al., 2007) at 12 months follow-up. Freyer-Adam et al. (2008) also reported a less profound drop of readiness to seek help, using the Treatment Readiness Tool, among those who received the intervention (from 27 to 21) than the control (from 37 to 16). Other studies found intervention benefits on improvement in: the desire to drink less at 12 months

(Elvy et al., 1988) and self-efficacy scores at 6 months follow-up (Holloway et al., 2007).

3.4.2. Two to three sessions/contacts with an interventionist versus usual care/no intervention. Five studies evaluated brief interventions delivered in 2–3 sessions/contacts with an interventionist versus usual care/no intervention (see Table 1). Results from these studies suggest these interventions could be beneficial in reducing alcohol consumption. However there was no clear intervention benefit for alcohol dependent patients. For these five studies, no benefits were demonstrated on other outcomes for both dependent and non-dependent patients.

3.4.2.1. Alcohol consumption. Twelve months follow-up: Statistically significant differences between groups favouring the intervention group were reported for: decrease in mean weekly consumption (by 21.8 in intervention; and 6.7 in control, $p = 0.03$) (Gentilello et al., 1999); and weekly alcohol consumption, alcohol consumption in previous 3 months, as well as drinking days and heavy drinking episodes in the previous week/3 months (Liu et al., 2011). Liu et al. (2011) also reported a significant group by time interaction for number of drinking days, indicating sustained benefits in the intervention while control participants gradually drank on more days.

Sommers et al. (2006) reported no statistically significant difference between groups on number of standard drinks consumed and number of binges in the previous month after 12 months follow-up, with a decrease being observed for all participants. Whilst one study reported no intervention benefit for alcohol consumption among patients with very low alcohol consumption and those with severe dependence (Gentilello et al., 1999) another reported a benefit even for alcohol dependent patients ($p < 0.05$) (Liu et al., 2011).

Six month follow-up: Statistically significant differences between groups favouring the intervention group were reported for decrease in mean weekly consumption after 6 months (Antti-Poika et al., 1988; Mcmanus et al., 2003). Antti-Poika et al. (1988) reported no statistically significant differences between groups at 6 months on biochemistry results.

3.4.2.2. Injuries and healthcare utilisation. Gentilello et al. (1999) reported no statistically significant differences between groups on: injuries requiring either emergency department treatment or trauma-centre readmission at 12 months; and inpatient hospital readmission for a new injury after up to three years follow-up.

3.4.2.3. Well-being and quality of life, and mortality. Sommers et al. (2006) reported no statistically significant difference between groups on health status changes. Gentilello et al. (1999) showed a statistically insignificant difference between groups on death rates at 12 months.

3.4.2.4. Criminal offences. Sommers et al. (2006) found no difference between groups on change in driving offences one year after motor vehicle crash.

3.4.3. Self-help literature (e.g., booklets, leaflets) versus usual care/no intervention. Two studies evaluated the effectiveness of a booklet containing information on alcohol consumption (see Table 1). The results showed no clear intervention benefit on alcohol consumption or on any other outcomes.

3.4.3.1. Alcohol consumption. Twelve months follow-up: No statistically significant differences between groups were reported on mean units of alcohol consumed per week and reduction in alcohol consumption (Watson, 1999). Watson (1999) also reported no statistically significant difference between groups on changes in GGT, MCV, and AST at 12 months.

Six months follow-up: Holloway et al. (2007) found intervention benefits on reduction in mean weekly consumption (−10.0 [95% CI −16.0, −3.9], $p = 0.001$) and maximum number of units consumed in one day in the past week (−3.1 [95% CI −5.1, −1.0], $p = 0.016$) at 6 months. However, there was no significant difference between groups on mean units of alcohol consumed per week and number of drinking days in the past week (Holloway et al., 2007).

3.4.3.2. Well-being and quality of life, and healthcare utilisation. Watson (1999) reported no statistically significant differences between groups on alcohol related problems, health ratings, hospital attendances, and GP visits at 12 months.

3.4.3.3. Motivation/readiness to change. Holloway et al. (2007) reported significantly higher improvement in self-efficacy scores in the intervention than the control group at 6 months.

3.4.4. Brief intervention versus self-help literature (e.g., booklets, leaflets)/referral. Five studies compared a brief intervention with or without self-help literature/referral against self-help literature/referral alone (Table 1). The results suggest no benefit of one intervention over another on alcohol consumption and other outcomes. However patients could benefit more from brief interventions than self-help literature on self-efficacy and drinking under the influence arrests.

3.4.4.1. Alcohol consumption. Twelve months follow-up: One study found no statistically significant differences after 12 months follow-up on: reduction in mean weekly consumption; and changes in GGT, AST and MCV values (Watson, 1999).

Six months follow-up: One study found no statistically significant differences at 6 month follow-up on: reduction in mean weekly consumption, maximum units consumed in one day and number of drinking days in the past week (Holloway et al., 2007).

3.4.4.2. Well-being and quality of life, healthcare utilisation, and mortality. Watson (1999) reported no statistically significant difference between interventions on reduction in alcohol related problems, health ratings, number of appointments with GP and hospital attendances at 12 months. Another study found no statistically significant differences between groups on hospital admission and survival rates 12 months post-study (Bager and Vilstrup, 2010).

3.4.4.3. Criminal offences. Schermer et al. (2006) reported statistically significantly lower driving under the influence arrests within three years of hospital discharge in the brief intervention group than the control (OR = 0.32 [95% CI 0.11, 0.96]).

3.4.4.4. Motivation/readiness to change. Holloway et al. (2007) reported a greater effect on efficacy scores for the self-efficacy intervention than the self-help booklet ($p = 0.011$).

3.4.5. Comparisons between two different single session brief interventions with an interventionist. Overall, the results suggest no benefit of one single session brief intervention over another single session brief intervention on alcohol consumption as well as other outcomes (Freyer-Adam et al., 2008; Heather et al., 1996; Watson, 1999).

3.4.5.1. Alcohol consumption. Twelve months follow-up: Studies reported no statistically significant difference between groups on: reduction in mean weekly consumption (Watson, 1999); mean alcohol intake over the previous week (Freyer-Adam et al., 2008);

and changes in GGT, AST and MCV values at 12 months (Watson, 1999).

Follow-up of 6 months to less than 12 months: One study reported no statistically significant difference between groups on: reduction in mean weekly consumption after a mean follow-up of 32.11 weeks (Heather et al., 1996).

3.4.5.2. Well-being and quality of life, and healthcare utilisation. Studies reported no statistically significant difference between groups on alcohol related problems (Freyer-Adam et al., 2008); and reduction in alcohol related problems, health ratings, number of appointments with GP and hospital attendances (Watson, 1999) at 12 months.

3.4.6. Comparison between two different brief interventions where at least one is two or three sessions with an interventions. Results from the three studies in this group (Table 1) suggest no benefit of a two session brief intervention over a one session brief intervention, or another two session brief intervention of shorter session duration, on alcohol consumption outcomes.

3.4.6.1. Alcohol consumption. Twelve months follow-up: Studies noted no statistically significant difference between the interventions under comparison on: reduction in number of drinks consumed and number of binges at 12 months (Sommers et al., 2006); and frequency of alcohol consumption, average daily amount, sober days, frequency of intoxication, and weekly consumption (Forsberg et al., 2000). Forsberg et al. (2000) reported no statistically significant difference between groups on peak amount of alcohol consumed ($p = 0.23$).

Six months follow-up: Studies noted no statistically significant difference between the interventions under comparison on: reduction in alcohol consumption (Mcmanus et al., 2003); reduction in number of drinks consumed and number of binges (Sommers et al., 2006); and frequency of alcohol consumption, average daily amount, sober days, frequency of intoxication, and weekly consumption (Forsberg et al., 2000) at 6 months. However, Forsberg et al. (2000) reported a statistically significant difference between groups on peak amount of alcohol consumed favouring a two session over a one session intervention at 6 months follow-up ($p = 0.03$).

3.4.6.2. Well-being and quality of life. Sommers et al. (2006) noted no significant difference between the two active treatments on health status change at 6 and 12 months.

3.4.6.3. Criminal offences. Sommers et al. (2006) reported no significant difference between the two active treatments on driving offences at 6 and 12 months.

3.4.7. Interventions of four or more sessions with an interventionist. Kuchipudi et al. (1990) compared an intervention of four sessions with various interventionists, plus a group discussion, medical evaluation and aftercare planning, to a control arm comprising of medical evaluation and aftercare planning alone. There were no statistically significant differences between the two interventions on number of participants undertaking alcoholism treatment, and number of participants sober (Kuchipudi et al., 1990).

Yersin et al. (1996) compared an individualised management proposal by a multidisciplinary team against a single session of abstinence counselling. They however did not compare the effectiveness of the two interventions.

4. Discussion

This review did not find a clear intervention benefit from single session brief interventions and self-help literature (e.g., booklets, leaflets) on alcohol consumption outcomes, with indications of benefit from some studies but not others. However, studies found intervention benefits from single session brief interventions on motivation/readiness to change. Results suggest that brief interventions of more than one session are more effective than usual care/no intervention on reducing alcohol consumption, especially for non-dependent patients. It is possible that brief interventions of more than one session work by first increasing the patients' motivation/readiness to change during the first session, and then effecting reduction in alcohol consumption in the follow-up contact sessions. Brief interventions of more than one session therefore merit further investigation. Comparisons between any two active interventions did not show superiority of one intervention over another on any outcome. Research on interventions for alcohol misuse in general hospital wards have mostly been on brief interventions, especially single session brief interventions. We identified seven on-going studies on interventions for alcohol problems through the search of databases and information from authors and experts in the field. Details of these on-going studies is provided as Supplementary material.[4]

Whilst the methodological quality of the included studies was mixed, there was no clear difference in the direction of effect (i.e., the presence of intervention benefit versus no intervention benefit) according to any of the quality criteria (for example randomised studies versus non-randomised studies). There was also variability of quality within studies with most studies judged as adequate in only some of the quality criteria; even when restricted to criteria with research evidence showing an impact on effect size (adequate randomisation, allocation concealment, and blinding of outcome assessors) (Hewitt et al., 2005; Higgins and Green, 2008). Two studies (Liu et al., 2011; Saitz et al., 2007) that were judged as adequate on randomisation, allocation concealment, and blinding of outcome assessors did not differ from the other studies in their group in terms of the overall direction of effect.

Much of the current literature speculates that interventions for alcohol problems for hospital populations could reduce healthcare utilisation, including alcohol related hospital admissions, and result in cost savings (Bray et al., 2011). However, our review showed no evidence of superiority of one intervention over usual care/no treatment/another active intervention on healthcare utilisation and mortality. A recent systematic review by Bray et al. (2011) also suggested screening and brief interventions for alcohol problems have little or no effect on inpatient or outpatient healthcare utilisation. It is however important to note that most of studies included in our present review focused on short-term outcomes (mostly 12 months or less). There could be a time-lag between reduction in alcohol consumption and reduction in healthcare utilisation including alcohol related hospital admissions, as well as mortality. There is therefore a need for longer term follow-up of study participants. Our review found no differences between groups on well-being and quality of life, as well as alcohol questionnaire scores (i.e., scores from tools or questionnaires used to measure self-reports of alcohol consumption behaviour such as the AUDIT). Out of the two studies that reported on criminal offences (Schermer et al., 2006; Sommers et al., 2006) only one study comparing a brief intervention to provision of a list of phone numbers of alcohol treatment organisations reported significantly lower driving under the influence arrests for the brief intervention (Schermer et al., 2006).

[4] Supplementary material can be found by accessing the online version of this paper. Please see Appendix A for more information.

The inability to statistically synthesis the data was mainly due to the different measures used to assess alcohol consumption. This will remain a challenge unless consensus is reached regarding the preferred means of assessing alcohol consumption (McQueen et al., 2011). Researchers should also report the behaviour change techniques utilised within interventions to facilitate replication; as well as adhere to the CONSORT Statement for reporting of trials or the relevant extension (Campbell et al., 2012; Piaggio et al., 2006; Schulz et al., 2010). The following measures to improve and assess fidelity are recommended: designing the intervention using a recognised theoretical framework; use of treatment manuals and standardised guidelines for intervention delivery; interventionist training and supervision; verification through interventionist observations or recorded intervention sessions, interventionists self-report through evaluation forms/checklists completed after consultations; interviews with intervention recipients; providing support material for trial participants that promotes adherence; and monitoring and testing study participants' acquisition of treatment skills (Bellg et al., 2004; Glasziou et al., 2010; Shadish, 2002; Spillane et al., 2007). Glasziou et al. (2010) also recommends that studies report any drift away from fidelity during the trial. We recommend that, in their study reports, authors should also clearly provide information on: how participants were identified including the procedures undertaken and any tools used, which health professionals were involved, and the setting from which patients were identified; the setting within which interventions were delivered and which health professionals delivered the interventions; number of intervention sessions and length of each session; and whether there was any exclusion criteria related to alcohol consumption. This information is essential for exploring the impact of different intervention characteristics. It is also useful to policy makers and healthcare providers when implementing interventions.

A number of studies found a significant improvement in all study groups for some outcomes including: alcohol consumption (Chick et al., 1985; Forsberg et al., 2000; Freyer-Adam et al., 2008; Heather et al., 1996; Mcmanus et al., 2003; Sommers et al., 2006; Watson, 1999); AUDIT scores (Tsai et al., 2009); and well-being (Watson, 1999). In some instances this was the case even for no intervention (Chick et al., 1985; Mcmanus et al., 2003; Sommers et al., 2006; Tsai et al., 2009; Watson, 1999) and usual care groups (Freyer-Adam et al., 2008; Heather et al., 1996). This highlights the possibility of: self-reporting of behaviour through completion of screening/assessment questionnaires leading to reduction in alcohol consumption (screening/assessment reactivity) (Bien et al., 1993; Clifford and Maisto, 2000; McCambridge, 2009; McCambridge and Day, 2007; McCambridge and Kypri, 2011; Walters et al., 2009); change in behaviour in response to being observed (the Hawthorne effect) (McCambridge and Kypri, 2011); or regression to the mean (Torgerson and Torgerson, 2008). These issues warrant further investigation (McQueen et al., 2011).

Our conclusions on the effectiveness of brief interventions differ from those from the review by McQueen et al. (2011) mainly because of differences in the way that studied were grouped. They concluded brief interventions in general hospital wards were effective in reducing alcohol consumption at 6 and 9 months follow-up but not at one year (McQueen et al., 2011). In contrast our review where studies were grouped according to number of intervention sessions found intervention benefit on alcohol consumption from multiple session brief interventions, but no clear benefit from one session brief interventions. Our review has strength in this regard as it highlights that a one session brief intervention might not be adequate to effect a reduction in alcohol consumption in alcohol misusing hospital inpatients. Questions still remain however on the required optimal treatment exposure.

A systematic review of interventions targeting alcohol problems in emergency departments found that they did not reduce alcohol consumption but reduced alcohol-related injuries (Havard et al., 2008). However these conclusions were based on meta-analyses with significant heterogeneity between studies (Havard et al., 2008). Another review which focused on interventions for alcohol problems among patients presenting to emergency departments with injuries noted improvements in both intervention and control groups in most of the included studies but differences were not always statistically significant between treatment groups (Nilsen et al., 2008). Similar to our current review, Nilsen et al. (2008) also noted that the heterogeneity of the studies made it difficult to draw firm conclusions on effectiveness. Other previous reviews not restricted to general hospital inpatients have concluded that: bibliotherapy is effective compared to control in reducing at-risk and harmful drinking (Apodaca and Miller, 2003); interventions for problem drinking could reduce injuries and their antecedents (e.g., falls and motor vehicle crashes) (Dinh-Zarr et al., 2004); and brief interventions appear to reduce mortality (Cuijpers et al., 2004). These findings are inconsistent with our findings mainly because, whilst our review focused on interventions for general hospital inpatients, these reviews included studies from various healthcare settings, with very few studies in general hospital inpatient populations [2 out of 9 (Apodaca and Miller, 2003); 2 out of 22 (Dinh-Zarr et al., 2004); and 7 out of 32 (Cuijpers et al., 2004)].

In conclusion, brief interventions of more than one session could be beneficial in reducing alcohol consumption among hospital inpatients, especially for non-dependent patients. However, the conclusions are based on a narrative synthesis as it was not possible to conduct a quantitative analysis. There is need for additional evidence before more robust conclusions can be made. There is also a need for research evidence on other non-brief interventions for alcohol problems among general hospital inpatients.

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Contributors

Debra Fayter and Noreen D. Mdege were involved in all stages of the project from design, writing of the protocol, through study selection, data extraction, quality assessment, analysis and synthesis. Jude Watson contributed to design and study selection. Lisa Stirk designed and conducted the searches for the review. Amanda Sowden and Christine Godfrey shared responsibility for the overall management of the project and contributed to the design. Noreen D. Mdege wrote the first draft of the manuscript, and all authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflict of interest.

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Appendix A. Supplementary data

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Drug and Alcohol REVIEW

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COMPREHENSIVE REVIEW

Interventions for alcohol and drug problems in outpatient settings: A systematic review

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Abstract

Issues. *Research evidence indicates a high prevalence of substance abuse among patients presenting in general hospital settings. Such misuse of alcohol and illicit drugs has a major impact on population health and on costs to health services and to society at large. This review aimed to identify the interventions for alcohol or illicit drug misuse problems that have been evaluated for hospital outpatient populations.* ***Approach.*** *Thirteen electronic databases including MEDLINE, EMBASE and PsycInfo were searched for published and unpublished studies in any language up to August 2011. Reference lists of included studies and reviews were also hand-searched. We included randomised and controlled clinical trials of any intervention for adult participants identified as having alcohol and/or drug problems presenting to hospital outpatient settings other than addiction or psychiatric units. Participants could be attending hospital for any reason other than treatment for substance abuse. A narrative synthesis was conducted.* ***Key Findings.*** *There is some evidence to suggest that interventions based on motivational techniques might be effective in treatment of alcohol misuse in oral–maxillofacial clinics but not in general outpatient departments. The evidence is insufficient to allow any conclusions to be derived on the effectiveness of interventions in the treatment of drug misuse and combined alcohol–drug misuse in outpatient settings.* ***Conclusions.*** *Further research is needed to investigate interventions for alcohol and drug misuse in outpatient settings. Additionally, problems remain in terms of study quality. Procedures to ensure the rigour of a study were often poorly reported.* [Watson JM, Fayter D, Mdege N, Stirk L, Sowden AJ, Godfrey C. Interventions for alcohol and drug problems in outpatient settings: A systematic review. *Drug Alcohol Rev* 2013;32:356–367]

Key words: alcohol problem, drug problem, outpatient, treatment.

Background

Alcohol consumption is reported as the world's third largest risk factor for disease and disability, with almost 4% of all deaths worldwide attributed to alcohol [1]. In addition, the misuse of illicit drugs accounts for the loss of 11.6 million disability-adjusted life years annually worldwide, which is 0.8% of the total burden of disease [2].

Although an increasing awareness of recommended safe drinking limits has developed in England, it is estimated that over 24% of the adult population are hazardous drinkers [3], and alcohol-related hospital admissions have risen by 69% from 2002 to 2007/2008, now standing at 863 300 [4]. Likewise, around four million people use illicit drugs each year in the UK, and a total of 42 170 admissions with a primary or secondary diagnosis of drug misuse were noted in 2008/2009 [5].

Health-care professionals across a range of hospital settings will regularly encounter patients with substance misuse problems and may have an opportunity to inter-

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vene. If a condition is potentially related to misuse of alcohol and/or illicit drugs, some patients may, on discussion, realise the association between their substance misuse and their ill-health, potentially providing what is known as a 'teachable moment' [6].

Treating substance misuse can result in substantial cost savings, with recent estimates suggesting that for every £1 spent on treatment for drug problems, at least £9.50 can be saved in criminal justice and health costs [7]. In 2008, the Department of Health estimated that the costs to the health service because of alcohol misuse were in the region of £2.7 billion per year [8]. There is growing interest and need for early detection of patients with such substance misuse problems [9].

A number of systematic reviews already exist in the field of drug and alcohol misuse [10–13]. However, none focus solely on outpatient settings and often consider a single type of intervention (e.g. brief intervention). In this review, we were interested in the effectiveness of any intervention offered in hospital outpatient settings to patients who might not know they have an alcohol or drug misuse problem and/or might not seek help.

Methods

This review was undertaken according to the principles recommended in the Centre for Reviews and Dissemination guidance [14]. This includes the production of a detailed protocol, which is available at: http://www.york.ac.uk/healthsciences/trials-unit/arias/links/.

Search strategy

The following electronic databases were searched for controlled trials (randomised and non-randomised) published up to August 2011: MEDLINE; C2-SPECTR; CINAHL; Cochrane Central Register of Controlled Trials; Cochrane Database of Systematic Reviews; Conference Proceedings Citation Index - Science; DARE; EMBASE; HMIC; HTA Database; NHS Economic Evaluations Database; PsycInfo; and Public Health Interventions Cost Effectiveness Database. Full search strategies for each database searched are provided in Appendix S1.

The reference lists of included papers were assessed for additional relevant studies, and ongoing studies were identified from ClinicalTrials.gov (via website at: http://www.clinicaltrials.gov/). Where necessary, authors of ongoing or unpublished studies were contacted for further information so as to assess eligibility for the review.

Identification of included studies

Two reviewers independently screened all titles and abstracts. The full manuscripts of potentially relevant studies were retrieved and assessed for relevance independently by two reviewers according to the inclusion criteria. Discrepancies were resolved by discussion or by referral to the project team when necessary.

Inclusion criteria

We included studies recruiting participants aged 16 or above, identified as having an alcohol and/or drug problem (as per each study's inclusion criteria) presenting to an acute hospital outpatient setting for any reason other than specifically for alcohol or illicit drug misuse treatment. All levels of severity of alcohol abuse were eligible including severe dependence. We included randomised controlled trials (RCT) (individual or cluster) and controlled clinical trials (CCTs). Any type of intervention was eligible for inclusion and could have one or more components, pharmacological and non-pharmacological, be delivered to individuals or groups face to face or using the telephone or other media. Comparator interventions could include no treatment (assessment only without referral), waiting list control, 'usual care' or other active treatments. Studies where referral to specialist services was the purpose were included. Outcomes could include: a measure of alcohol consumption (e.g. quantity/frequency, percentage of time abstinent and alcohol questionnaire scores); a measure of drug use (e.g. number of days used and drug questionnaire scores); biochemical measures of alcohol use; injury; mortality rates; quality of life measures; numbers seeking specialist treatment for alcohol/drug misuse; criminal offences (e.g. driving while intoxicated and assault) and motivation/readiness to change. Published and unpublished studies from any country and reported in any language were eligible for inclusion.

Interventions directed primarily at whole hospital populations without screening for alcohol or drug problems and those screening patients solely to ascertain prevalence of substance misuse problems were not eligible. We also excluded: studies focusing specifically on participants with a dual diagnosis and abuse of prescription medications and studies set in specialist psychiatric wards/facilities, addiction services or addiction treatment programmes. Studies focusing specifically on pregnant women were also excluded as we considered them to be a separate group and one that has been adequately reviewed elsewhere [15,16].

Data extraction

Following piloting of a selection of studies to ensure consistency, data were extracted independently by one reviewer and checked by a second reviewer. Discrepancies were resolved by discussion, with involvement of a

third reviewer when necessary. Data extracted included study methods, setting, participant characteristics, intervention, comparators, outcomes, outcome measures and results.

Quality assessment

Quality was assessed by one reviewer and independently checked by a second reviewer. Disagreements were resolved by consensus, and a third reviewer consulted if necessary. Items assessed included: presence of a power calculation, adequacy of randomisation and allocation concealment, appropriate adjustment for covariates, blinding of outcome assessors, adequacy of follow up (deemed to be a minimum of 12 months) and explanation of dropouts and use of intention to treat analysis. Details of attempts to maintain intervention fidelity were recorded (e.g. adequacy of training for those delivering the intervention, use of checklists, audio or video taping patient interviews, direct observation, etc.).

Methods of analysis

Significant methodological heterogeneity existed among the studies, predominately regarding the outcomes reported, how they were defined and measured. Various measures include: number of drinking days in the past 30 days; alcohol consumption in the past 3 months; mean drinks per drinking day; and change in alcohol consumption at 12 months. There were also differences in baseline consumption levels for eligibility, the health-care professionals delivering the intervention and inclusion/exclusion by gender. Given the diversity of the studies included in this review, it was considered that a meta-analysis was inappropriate. A narrative synthesis was conducted and evidence summaries created incorporating an evaluation of the quality of the evidence. This review has been reported in accordance with the PRISMA statement [17].

Results

The search identified 3699 potentially relevant references (Figure 1), which were screened, and 396 were retrieved for detailed evaluation. Of these, 334 were excluded due to not being related to drug or alcohol problems, not in a general hospital setting, or not an RCT or controlled clinical trial. A further 55 were excluded for being conducted in emergency ($n = 34$) and inpatient settings ($n = 21$).

Seven were conducted in outpatient settings and are presented in this paper.

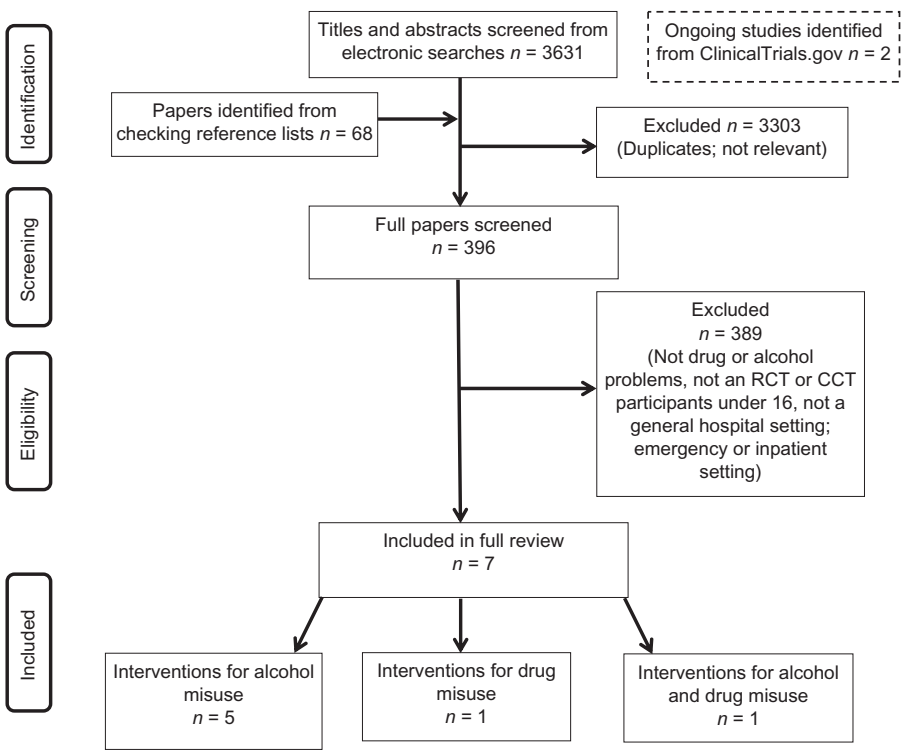

Figure 1. *Flow chart showing the number of potentially relevant references identified during the searches and the number included in the review.*

Description of included studies (Table 1)

Five studies investigated the effectiveness of interventions for excessive alcohol use [18–22]; one investigated interventions for drug misuse [23]; and one for both excessive alcohol and illicit drug use [24]. Three were conducted in the USA [20,23,24], two in the UK) [18,19], one in the Netherlands [21] and one in Sweden [22].

Interventions for alcohol misuse

Five RCTs including a total of 1058 adult participants were included in the review [18–22]. Study interventions were compared with usual care (which may have included advice on alcohol) [19,21]; provision of a standard alcohol information leaflet [18]; assessment interview only [20]; and, in one study, no contact for 12 months [22]. Results are presented in a narrative synthesis. It was hoped to divide the studies according to the behavioural change techniques used in the interventions, following the framework proposed by Abraham and Michie [25]. However, this was hampered due to poor reporting of intervention content and behaviour change techniques.

Effectiveness of the evaluated interventions for alcohol misuse

Alcohol consumption. One of the two studies conducted in oral and maxillofacial outpatient clinics found no statistically significant treatment differences at 3 months (based on 103 of 195 participants randomised) regarding changes in number of drinking days or number of standard drinks per drinking day [18]. However, at 12, months there was a statistically significant difference between the treatment groups in favour of the motivational intervention in terms of change in drinking days ($P = 0.007$) and heavy drinking days ($P = 0.03$). This was not the case for the number of standard drinks per drinking days ($P = 0.2$) [18]. In the second study, there was a significantly greater reduction in the percentage of hazardous drinkers in the motivational intervention group compared with the control group [19]. Although the number of days abstinent did not vary significantly between groups, at 12 months, only 27% of the intervention group were drinking above the guidelines of 21 units per week [decrease from 45/75 (60%) to 16/60]; in the control group, 51% were drinking above the guidelines [decrease from 41/76 (54%) to 31/61] [19]. There was also a significant interaction effect for time and treatment for this outcome favouring the motivational intervention ($F = 3.60$, $P < 0.029$), with significant differences between the treatment groups at both 3 and 12 months [19]. This pattern was repeated for alcohol consumption in a typical week with a significant main effect for time ($F = 4.59$, $P < 0.011$) and significant interaction for time and treatment ($F = 3.30$, $P < 0.039$) [19].

Within the studies conducted in various outpatient clinics, the all-female study comparing assessment interview plus brief intervention versus assessment interview only found no significant differences between treatment groups for all drinking outcomes at 12 months [20]. The mean difference in change in drinks per drinking day (adjusted) was –0.06 (–0.3, 0.18) $P = 0.63$; mean difference in change in percentage drinking days (adjusted) was 3.0 (–0.1, 6.0) $P = 0.07$; mean difference in change in number of binge episodes (adjusted) was –2.2 (–4.9, 0.54) $P = 0.11$; and mean difference in change in number of weeks exceeding sensible drinking limits (adjusted) was 0.27 (–1.2, 0.65) $P = 0.57$. Similarly, the study set in a general internal medicine outpatient clinic reported, at a mean follow-up of 28 weeks, a reduction in alcohol consumption over time but no significant differences between the Dutch Motivational Drinkers Check-up (Doorlichting, Voorlichting Alcoholgebruik; DVA) and the control, routine hospital care [DVA change 0.81 (2.0); control change 0.84 (2.61) units per day, $P = 0.46$] [21]. There were no differences in percentage change of carbohydrate-deficient transferrin (appears in serum after high alcohol intake, where some of the transferrin molecules appear to lack two to four of their terminal tri-saccharides: hence the name carbohydrate-deficient transferrin [26]) [DVA change 0.052 (0.32); control change 0.051 (0.88), $P = 0.69$] [21].

Conversely, the study conducted in five different outpatient clinics comparing assessment and frequent follow-ups and feedback versus no contact [22] found a significant reduction in the mean amount of alcohol consumed per week from 179 g (± 106 SD) to 117 g (± 101 SD) ($P < 0.005$) in the intervention group at 12 months but did not report changes in the control group. In the intervention group, gamma glutamyl transfease (a well-established biomarker of excessive alcohol consumption and liver dysfunction [27]) values were also significantly reduced from baseline but did not differ significantly from those of the controls.

Alcohol questionnaire scores. Assessing hazardous drinking using the Alcohol Use Disorders Identification Test questionnaire (AUDIT), Smith *et al.* [19] found that in the intervention group, the percentage of hazardous drinkers dropped from 95% at baseline to 58% at 12-month follow-up. The corresponding figures in the control group were 96% and 81%. The same authors found a main effect of time ($F = 98.32$. $P < 0.001$) but no effect of intervention in terms of Brief Alcohol Problem Questionnaire scores [19].

Table 1. *Summary of the studies conducted in outpatient settings included in the review*

Authors (year)	Alcohol or drug misuse?	Country, screening setting	Participants: number randomised (% male); mean age; baseline data	Intervention and control	Outcomes assessed
Goodall *et al.* (2008) [18]	Alcohol	UK Three oral and maxillofacial outpatient clinics	*n* = 195 (91% male); Median age = 38 for women; 28 for men; AUDIT score 8–40 (median 15); 72% had been assaulted	Intervention: Brief Intervention (motivational) delivered by research nurse: no further detail given Control: Standard alcohol information leaflet	At 3 and 12 months: Number of drinking days in the past 30 days Number of abstinent days in the past 30 days Number of heavy drinking days. Number of standard drinks/drinking day.
Smith *et al.* (2003) [19]	Alcohol	UK Oral and maxillofacial surgery department outpatient clinic	*n* = 151 (100% male); Mean age = 24; AUDIT > 95.4% scored over 8; BAPQ—55.7% scored between 2 and 6; ADD-SF—72.2% classed as low-level dependence, 21.2% medium-level, 2.7% high-level; 80% of injuries were assault related	Intervention: Motivational Interviewing: duration and intensity unknown, delivered by two senior general nurses Control: Usual care	At 3 and 12 months: AUDIT Brief Alcohol Problems Questionnaire (BAPQ) (five items) Short-Form Alcohol Dependence Data (ADD-SF) 90I drink diary section—alcohol consumption in past 3 months Details of life events
Chang *et al.* (2011) [20]	Alcohol	USA Outpatient clinics at a women's hospital	*n* = 511 (0% male); mean age = 45.1; mean drink per drinking day = 2.2; mean percentage drinking days = 23; mean number of binge episodes = 7.35; mean weeks > standard daily limits = 3.8	Intervention: An assessment interview and Brief Intervention (30 mins) delivered by physician and interviews at 3, 6 & 12 months Control: An assessment interview with a single 12-month interview to obtain follow-up data	At 3, 6 and 12 months for Brief Intervention group and at 12 months for control group: Mean drinks per drinking day Percentage drinking days Number of binge episodes (four or more drinks per occasion) Number of weeks exceeding National Institute on Alcohol Abuse and Alcoholism (NIAAA) standard daily limits.
Emmen *et al.* (2005) [21]	Alcohol	The Netherlands General internal medicine outpatient clinic	*n* = 123 (76% male); 37% probable or certain alcohol-related medical diagnosis; mean age = 50.0 in intervention group; 47.9 in control group	Intervention: Brief Motivational Intervention and assessment (90 min) and feedback (60 min) session 1–2 weeks later Control: Usual care	Follow-up at 23–36 weeks (mean 28 weeks; SD = 2.39, range 23–36): Self-reported change in alcohol consumption as units/day Change in carbohydrate-deficient transferrin from baseline Change in readiness to change drinking behaviour Reductions from above to below health limits

Persson & Magnusson (1989) [22]	Alcohol	Sweden Five different outpatient clinics	*n* = 78 (78% male); 58 (74%) definite problem drinking; 20 (26%) probable problem drinking; mean age not stated	Intervention: Physical examination and clinical assessment. Monthly follow-up for 12 months by health professionals where alcohol consumption and laboratory values were discussed and feedback was given. Control: No initial contact and no discussion about alcohol	At 12 months: Change in alcohol consumption Sickness benefits Visits to outpatient clinics. Hospital admissions Laboratory parameters
Bernstein *et al.* (2005) [23]	Drugs	USA Three outpatient clinics (Urgent care, Women's Clinic, Homeless Clinic)	*n* = 1175 (70.6% male); 46% were homeless; 83% not currently working; mean age = 37.8 in intervention group; 38.1 in control group	Intervention: Motivational Interview (10 to 45 min- average 20 min) tailored to individual, active referrals and written hand-out and delivered by peers (experienced substance abuse outreach workers in recovery). Booster phone call 10 days later (5–10 mins) Control: Written hand-out only	At 6 months: Abstinence from cocaine and/or heroin as measured by radioimmunoassay of hair (also reduction in use) Contacts with substance abuse treatment system Addiction Severity Index
Gilbert *et al.* (2008) [24]	Alcohol and drugs	USA Five outpatient HIV clinics	*n* = 476 (79% male); mean age = 44.1; 182 (39%) reported risky drinking; 200 (42%) reported illicit drug use	Intervention: Tailored risk-reduction counselling from a 'Video Doctor' programme, printed worksheet and discussion with health professional. Booster session after 3 months Control: Usual care	At 3 and 6 months: Cessation versus any ongoing risky behaviour (illicit drug use; risky drinking; unprotected anal or vaginal sex)

Health-care utilisation. Persson and Magnusson did not find a significant difference between groups in terms of health-care consultations, and due to the small number, were unable to analyse admissions to hospital wards [22].

Motivation/readiness to change. Emmen *et al.* found that although in total, 32% of those patients who were drinking above health limits at follow up did change to a high motivational stage, no statistically significant differences between the two groups were found (intervention group 39.3%, control group 25.0%, $P = 0.091$) [21].

Interventions for drug misuse

We identified only one study evaluating interventions for drug misuse in an outpatient setting [23] where motivational interviewing plus a hand-out and a following booster session was compared with a control (hand-out only). Participants were mostly male (70.6%), and those undergoing treatment for drug abuse were excluded [23].

Effectiveness of the evaluated intervention for drug misuse

Abstinence. Participants who had received the motivational interview, hand-out and booster telephone call were more likely than the controls to be abstinent at 6 months from cocaine [22.3% vs. 16.9%, odds ratio (OR) 1.51; 95% confidence interval (CI) 1.01, 2.24, $P = 0.045$] and from opiates (40.2% vs. 30.6%, OR 1.57; 95% CI 1.00, 2.47, $P = 0.050$) [23]. Abstinence from both drugs did not differ between groups (17.4% vs. 12.8%, OR 1.51; 95% CI 0.98, 2.26, $P = 0.052$) [23].

Reduction in drug levels and self-reported contact with treatment services. Although levels of cocaine and heroin measured in hair samples were significantly lower at follow-up for the whole study sample, the differences between groups on levels of cocaine merely bordered on significance, and there was no significant difference for heroin. No differences were seen between groups regarding contact with substance abuse treatment services at 6 months (39% in intervention group, 37% in the control group). For the majority, however, this consisted of detoxification only. In all Addiction Severity Index subscale scores, both the intervention and control groups improved. On the drug subscale, there was a 49% reduction in the intervention group and a 46% reduction in the control group ($P = 0.06$), and on the medical subscale, a 56% reduction in the intervention group and 50% reduction in the control group ($P = 0.055$) [23].

Interventions for alcohol and drug misuse

Only one study investigating the effectiveness of interventions for both excessive alcohol and illicit drug use in outpatient settings was identified [24]. The study evaluated a *Positive Choice* 'Video Doctor' intervention; a laptop-based interactive programme with risk-reduction messages based on the principles of Motivational Interviewing [24]. This was followed up by a booster session 3 months after the first session. An 'Educational Worksheet' was given to the patient with questions for self-reflection, harm reduction tips and local resources. A 'Cueing Sheet' allowed the health professional to indicate whether a discussion had taken place on the various areas. The intervention was tailored to participant's gender, risk profile and readiness to change. The control group did not use the 'Video Doctor' nor receive the Educational Worksheet and Cueing Sheet. Instead, after the risk assessment, they received usual care [24].

There was no exclusion criterion for very heavy/dependent drinkers, or dependent drug users and none specified for those who had previously received or were currently receiving treatment for excessive alcohol and/or illicit drug use [24]. Information was not reported on the proportion of participants who fell into these categories.

Effectiveness of the evaluated intervention for alcohol and drug misuse

The authors reported that the intervention group was statistically significantly less likely than the usual care group to report any ongoing drug use at 3 months (67% vs. 82%, relative risk (RR) 0.81, 95% CI: 0.689, 0.957, $P = 0.014$) and at 6 months (56% vs. 86%, RR 0.65, 95% CI: 0.540, 0.785, $P < 0.001$) [24]. There was, however, no statistically significant different between the groups at both those time points on: reduction in total days of any drug use in the previous month and cessation of risky drinking [24].

Study quality and fidelity (Table 2)

Of the two alcohol trials set in oral and maxillofacial outpatient settings, the study by Smith *et al.* [19] appeared to be of better quality than that of Goodall *et al.* [18]. Although dropouts did occur in both trials, Smith *et al.* [19] clearly reported dropout reasons (19%), whereas Goodall *et al.* did not (31%) [18]. Goodall *et al.* also failed to make it clear as to whether they had used intention-to-treat analysis.

Of the three alcohol trials set in general outpatient settings [20–22], only one provided a power calculation to determine sample size [21]. None clearly explained

Table 2. *Interventions in outpatient settings: an overview of study quality*

Study	Power calculation	Randomisation adequate	Allocation concealment adequate	Adjusted for baseline characteristics	Participants blinded	Outcome assessors blinded	Follow up adequate (≥12 months)	Dropouts explained	Intention to Treat analysis used
Goodall *et al.* (2008) [18]	✗	?	✗	✓	✗	✓	✓	✗	?
Smith *et al.* (2003) [19]	✓	✓	✓	?	?	✓	✓	✓	✓
Chang *et al.* (2011) [20]	✗	✓	✗	✓	✗	?	✓	✓	✓
Emmen *et al.* (2005) [21]	✓	?	?	✓	✗	✗	✗	✓	✓
Persson & Magnusson (1989) [22]	✗	?	?	✓	?	✗	✓	✗	✗
Bernstein *et al.* (2005) [23]	✓	✓	✗	✓	✓	✓	✗	✓	✗
Gilbert *et al.* (2008) [24]	✓	✓	✓	✓	✓	✓	✗	✓	✓

✓ = yes. ✗ = no. ? = unclear.

the methods of randomisation or allocation concealment, nor were any outcome assessors blinded [20–22]. Emmen *et al.* [21] did not conduct adequate follow-up (≥12 months), although intention-to-treat analysis was used and reasons for dropout was explained. Dropout was reported by Chang *et al.* [20] as 4% and 9% in the trial by Emmen *et al.* [21].

In the drug study conducted by Bernstein *et al.*, allocation concealment was not adequately reported [23]. The study only had a 6-month follow-up (dropout of 18%) and did not use an intention-to-treat analysis [23]. When reporting their alcohol and drugs study, Gilbert *et al.* provided the most information [24], although follow-up was only for 6 months and loss to follow-up at the end of the study was 17.6% [24].

With regard to fidelity, Smith *et al.* described the training given to the interventionists and how they had maintained intervention fidelity through supervision and review of audio-taped intervention sessions [19]. Goodall *et al.* reported only training of interventionists [18]. Both Chang *et al.* and Emmen *et al.* reported methods used to ensure intervention fidelity (including training staff and reviewing interventions using observations or checklists) [20,21]. Persson and Magnusson did not report any such measures of intervention fidelity [22].

In the trial conducted by Bernstein *et al.*, extensive attempts were made to ensure the integrity and fidelity of the interventions delivered [23]. These included role-plays, supervised patient interviews and form completion demonstrating completion of key elements of the intervention. In the study by Gilbert *et al.*, the intervention used a computerised 'Video Doctor', which standardised messages, which the authors report may have helped increase fidelity to the principles of Motivational Interviewing [24].

Discussion

The objective of this review was to identify the interventions for alcohol or illicit drug misuse problems evaluated for hospital outpatient populations and determine, from the available evidence, which of these interventions can be effectively delivered for these populations.

Interventions for alcohol misuse

The results from this review suggest that interventions based on motivational techniques may be effective among patients with alcohol problems identified in oral–maxillofacial clinics. However, the optimum nature and duration of the intervention in this population group is unclear and would be worthy of further

research. Nor is it clear if women would respond equally to the intervention as the samples comprised mainly of men.

The three other trials [20–22], conducted in diverse settings, did not generally find positive effects of brief interventions to decrease alcohol consumption and related outcomes. Chang *et al.* suggest their findings were due to reactivity to the assessment that lasted an hour; regression to the mean; and presence of medical conditions that may motivate changes in drinking in both groups [20]. Similarly, the study by Emmen *et al.* also included a lifestyle assessment that was received by both groups [21].

Nonetheless, these findings cannot be taken as definitive as most of the trials had weaknesses, including issues with randomisation and inadequate follow-up periods. Importantly, most of the studies failed to provide adequate detail about the intervention content, duration, intensity and delivery. Such lack of clarity raises issues when trying to compare interventions. There is a need for further good quality studies with adequate follow-up and full reporting of intervention content. The authors of the included studies also identified issues that need to be taken into account in the planning of future research. These are: reactivity to the assessment, the possible exclusion of those with severe alcohol dependence and ensuring that controls do not receive part of the intervention. The evidence is, therefore, currently insufficient to state whether or not interventions to reduce alcohol consumption and related outcomes are helpful in general outpatient settings.

The transferability of findings from other health-care settings, including inpatient and emergency settings with their different systems, into an outpatient setting is not clear, but it may be interesting to compare our findings with that of primary care where both settings provide a similar type of time-limited consultation situation. A review conducted by Kaner *et al.* [28] considered studies evaluating the effectiveness of brief interventions delivered in primary care settings, published up to early 2007. Their meta-analysis of 22 RCTs found that intervention participants had lower alcohol consumption than control participants after follow-up of 1 year. However, the benefits for women were unclear, and the authors recommended further research to establish the most effective components of brief interventions.

We are aware of two ongoing trials evaluating interventions for alcohol misuse in outpatient settings that have not yet reported results [29,30]. One of these is an intensive three-arm family-based intervention study for young people [30], comparing a Multidimensional Family Therapy [an outpatient family-based treatment for troubled youths of 3 months duration with an average of two sessions (60–90 min) per week with additional extra-familial work and phone contacts as needed], Family Motivational Interviewing (two home sessions within 72 h of the incident, and link with group treatment lasting 3 months) and standard care (two 90-min group sessions per week for 3 months). The other is in HIV-positive women [29], looking to compare a brief counselling intervention including two sessions that review drinking patterns and behaviour change strategies, plus two telephone calls to reinforce session content versus standard care. There is a clear need for trials of interventions for alcohol misuse in outpatient settings.

Interventions for drug misuse

The evidence for interventions to reduce drug misuse in hospital outpatient settings is limited to one trial [23], and currently, the evidence is insufficient to allow any conclusions to be derived about effectiveness. The suggestion that motivational interviewing with a booster call might be more effective than written advice for adults in outpatient settings would be strengthened by a trial with longer follow-up (12 months or more) analysed on an intention-to-treat basis. Further research is necessary. There appears to be no ongoing research investigating interventions for drug misuse in outpatient settings.

Interventions for both alcohol and drug misuse

The evidence on interventions to address both alcohol and drug problems in outpatient settings is limited to one trial [24], which showed an impact on ongoing drug use but not on cessation of risky drinking. More studies evaluating this intervention are needed, and therefore it is not yet possible to draw conclusions on the effectiveness of interventions for both alcohol and drug use in this setting with adults or young people. Further research is needed to consider the effectiveness of combined interventions for alcohol and drug misuse across in outpatient settings, particularly as we did not identify any ongoing research investigating interventions for both alcohol and drug misuse in this setting.

Interventions for drugs alone and drugs in addition to alcohol appear to be very under-researched areas, and there is a need for much more practical groundwork in terms of identifying likely areas where approaching these groups may be feasible and research achievable.

Poor reporting of methodology, including randomisation and allocation concealment procedures, is a common problem across the clinical trial literature [31]. Follow-up was too short (<12 months) in three studies reviewed here [21,23,24], making it difficult to

determine long-term effects. The lack of detail and clarity regarding the actual content of interventions, duration, delivery mode and personnel delivering the treatment was challenging. Additionally, it was often unclear on what theoretical framework the interventions were based or the behavioural techniques actually used. Related to this is the reporting of intervention fidelity, crucial for complex interventions. Adherence to an intervention delivery protocol can influence effectiveness [32–36]. Ensuring fidelity can reduce the risk of erroneous conclusions such as concluding that the intervention is ineffective, when in fact it was not implemented correctly [37,38]. Across this review, reporting was mixed.

In addition, where studies appeared to have used the same type of intervention (e.g. motivational interviewing), the interpretation of that intervention can be very different. Even where core principles are used, differences may occur in the delivery of the intervention (timing, duration, intensity and interventionist), although often it was difficult to tell differences and similarities due to lack of reported detail.

The range of outcomes investigated in the included studies demonstrates the variety of measures for alcohol consumption currently utilised, and it would be beneficial to reach consensus on the most useful measures. Additionally, various authors have highlighted the issue of assessment reactivity [39,40], a feature that should not be ignored and given due consideration in study design and analysis. In outpatient settings, where most are not actively seeking treatment for their alcohol consumption, and additional health problems may be contributing to their reason for attendance, identification and recruitment of research participants may be a likely problem and one where screening and assessment can play an important part.

Future studies should bear in mind the quality issues highlighted in the review of the current evidence. In addition, the theoretical framework on which the interventions are based, as well as the behaviour change mechanisms underpinning them, should be reported. Attention is also required regarding who should deliver the intervention, mode of delivery, level of patient contact and intervention intensity. It would be of interest in future to investigate the effect on outcomes other than alcohol or drug consumption (e.g. injury rates and criminal offences). Studies exploring how particular subgroups respond differently to the intervention (e.g. women and dependent drinkers) would be worth attention, as would the impact of interventions on social health inequalities. Practitioners may want to give some consideration to particular initiatives aimed at areas where there are high levels of specific alcohol problems (e.g. injuries). Researching implementation schemes that deliver interventions in such areas and that are geared towards local needs may prove highly interesting. In addition, with none of the included studies incorporating a cost-effectiveness analysis, more thought needs to be given to this aspect of alcohol/drug misuse prevention interventions in outpatient settings.

Strengths and weakness of this review

This review was conducted according to national guidance [14]. Searches included electronic and print sources and of grey literature. As interventions for alcohol and drug misuse are an active area of primary research, authors of ongoing and unpublished studies were contacted, and details of these are included. Study selection, data extraction and quality assessment were conducted by more than one reviewer with disagreements resolved by consensus or referral to the project team. Therefore, our results should have a low risk of bias. Despite our best efforts, it is possible that studies have been missed particularly those reported in languages other than English.

Conclusions

Further research is needed to investigate interventions for alcohol and drug misuse in outpatient settings. The type of intervention(s) needed to reduce consumption of alcohol and/or drugs for different groups of patients in diverse hospital settings is still to be determined.

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Other contributions

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1 Full search strategies on Alcohol Abuse and Alcoholism.

Drug and Alcohol REVIEW

APSAD

Drug and Alcohol Review (July 2013), 32, 368–380
DOI: 10.1111/dar.12036

COMPREHENSIVE REVIEW

Predictors of study setting (primary care vs. hospital setting) among studies of the effectiveness of brief interventions among heavy alcohol users: A systematic review

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Abstract

Issues. *The aim of this study is to compare studies by their setting in order to identify design differences between studies on brief interventions (BI) for heavy alcohol use conducted in primary care and those in hospital settings.* ***Approach.*** *Potential studies were extracted from 16 reviews and from systematically searching literature up to October 2011. We assessed whether the following factors were statistically significant predictors of study setting: exclusion of very heavy/dependent drinkers; mean age of study sample; gender composition of study samples; sample size; total intervention delivery time; number of sessions; interventionist (physician vs. non-physician); various study design and intervention fidelity aspects; accounting for screening/assessment reactivity; and control condition utilised.* ***Key Findings.*** *Seventy-six studies (30 in primary care and 46 in hospital settings) met the inclusion criteria. The following factors were statistically significant predictors of study setting: number of sessions {odds ratio [OR] = 0.281 [95% confidence interval (CI) 0.081, 0.979;* P = *0.046]}, exclusion of very heavy/dependent drinkers [OR = 0.052 (95% CI 0.004, 0.716,* P = *0.027)] and gender composition of study samples [OR = 1.063 (95% CI 1.005, 1.125;* P = *0.033)].* ***Implications.*** *Researchers developing hospital setting BIs for excessive alcohol consumption should take into account methodological issues that could explain differences in the consistency of findings between hospital setting studies and primary care setting studies where BIs have been more consistently found effective in reducing alcohol use.* ***Conclusion.*** *The observed study design differences between hospital and primary care settings might partly explain the disparity in the consistency of findings on effectiveness of BIs between these settings.* [Mdege ND, Watson J. Predictors of study setting (primary care vs. hospital setting) among studies of the effectiveness of brief interventions among heavy alcohol users: A systematic review. *Drug Alcohol Rev* 2013;32:368–380]

Key words: brief intervention, primary care, hospital, effectiveness, systematic review.

Introduction

Opportunistic screening and brief interventions (BI) have been more consistently found effective in reducing alcohol use in patients with excessive alcohol consumption in primary care settings than in hospital settings. As a result, systematic reviews have concluded that BIs are effective in reducing alcohol use in patients with excessive alcohol consumption in primary care settings [1–3], whereas most systematic reviews of studies conducted in hospital settings have reported inconclusive findings [4–6]. BIs have therefore been advocated as part of population alcohol strategies in primary care settings [7]. On the other hand, it is unclear whether they should be encouraged in hospital settings even though these settings provide an opportunity to engage with heavy drinkers [8], especially those who might not be well represented in primary care settings such as men [9,10]. Some differences in the consistency of outcomes between these settings in general could indeed be due to the contextual differences in the locations from which patients are identified, interventions

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are delivered, as well as variations in patient populations, intervention characteristics and study research methods [6]. Some of these issues are discussed below.

Intervention characteristics

The term 'brief intervention' has been used to describe a heterogeneous family of interventions of varying intensity, duration, mode of delivery (e.g. computer based, face to face), as well as personnel delivering the intervention [11,12]. These factors can influence the effectiveness of an intervention. For example, effectiveness may differ between multiple and single session interventions [5]. BIs can be delivered by different professionals, including nurses, physicians, psychologists or substance abuse specialists. Huibers *et al.* suggest that physician delivered interventions in primary care setting could work better than non-physician-delivered interventions because of an already established relationship between physician and patient and familiarity with physician's office rather than visiting an unknown non-physician primary care worker [13]. A recent review of non-physician-delivered BIs reported a modest intervention effect, with a pooled effect size smaller than that observed for other clinician-based interventions in primary care settings [but within the 95% confidence intervals (CI) (1.7 vs. 2.7 (95% CI 1.6-3.9) fewer standard drinks per week)] [14].

Screening/assessment reactivity

Identifying eligible patients for BIs often involves the self-reporting of alcohol consumption behaviour through completion of screening or assessment questionnaires, which may in itself lead to self-reflection and reduction in alcohol consumption [15,16]. This phenomenon, often referred to as reactivity, has been highlighted as one possible explanation in studies where all participants complete such screening/assessment questionnaires, and the whole sample reduces their alcohol consumption with no significant difference observed between groups [5]. A recent systematic review of studies specifically designed to test reactivity however only found equivocal evidence of small effects on some outcomes, such as Alcohol Use Disorders Identification Test (AUDIT) score and total weekly drinking but not others such as quantity per drinking day [16]. A recent study by Hester *et al.* among college students provides strong experimental evidence of the possibility of screening/assessment reactivity, in addition to typical spontaneous comments such as 'I never realised how much I was drinking' or 'I never added it all up before' made by participants in the control group after their assessments [17]. Although randomisation may protect the true intervention effect if reactivity is similar between groups, it is possible for screening and assessment to interact with an intervention, either strengthening or weakening its effects [18,19].

Some studies minimise the impact of screening/assessment reactivity by masking the alcohol focus through 'camouflaging' the alcohol questions within a broader health survey, or blinding participants to the study hypothesis [20,21]. However, because most of the interventions are alcohol focused, with time, participants may deduce that the study is about alcohol. Some studies have used trial designs with at least three arms to assess both intervention effectiveness and the impact of screening/assessment [16].

Intervention fidelity

Adherence to intervention delivery protocol can influence effectiveness [22–24]. Ensuring fidelity can reduce the risk of erroneous conclusions such as concluding that the intervention is ineffective, when in fact it was not implemented correctly [25,26]. However, the dynamic, individualised and flexible nature of most psychotherapies (such as BIs), usually seen as a strength, also makes them difficult to evaluate in the context of a clinical trial [27]. This is due to problems of developing, identifying, documenting and reproducing such complex interventions [28]. Some trial designs, particularly effectiveness trials, do recognise that in 'real world settings', the treatment will be implemented less robustly, and therefore may leave implementation to vary according to contingencies of practice [29]. Despite this, there are usually still core components that need to be adhered to, and therefore methods of capturing and presenting the dynamics of the intervention should be included [30].

Procedures used to promote intervention fidelity include use of treatment manuals and standardised guidelines for intervention delivery, interventionist training and supervision. In addition, verification of intervention fidelity, consisting of procedures used to assess and measure adherence to intervention delivery protocol, can be conducted through: interventionist observations, assessment of recorded intervention sessions, interventionists self-report through evaluation forms completed after consultations, interviews with intervention recipients, as well as monitoring and testing study participants' acquisition of treatment skills [24,26,29].

Sequence generation, allocation concealment, blinding and incomplete data

Other methodological issues specific to trials may lead to incorrect conclusions if not considered during study design. These include: ensuring adequate random sequence generation; allocation sequence concealment to minimise selective enrolment; keeping participants,

personnel and outcome assessor blinded to the intervention received; and using statistical techniques, such as intention to treat analysis to minimise risk of bias due to incomplete data [31,32]. Adequate sequence generation has a random component that ensures participants are assigned to different study treatment groups in a truly random manner [33]. Adequate allocation concealment prevents investigators from foreseeing intervention allocations in advance of or during enrolment and thereby 'selecting' which participant receives which treatment [31,32]. Both, if inadequate, can lead to exaggeration of estimates of intervention effect [32]. For BIs, although blinding of participant or personnel delivering the intervention may not be feasible, blinding of outcome assessors is possible. Incomplete outcome data may result from some participants being omitted from the analysis despite the outcome data being available, or attrition where outcome data for some participants is not available, for example, if they were lost to follow-up [33]. This may result in bias if participants excluded in one arm are systematically different from those who are included in the analysis in that arm [32].

Patient characteristics

Differences in patient populations between studies can result in disparity in findings. For studies on BIs, including or excluding patients by level of alcohol consumption, gender or age can potentially influence the intervention's effectiveness [5,34]. Although the effectiveness of BIs for alcohol-dependent patients remains unknown, many studies looking at BIs target non-dependent patients, particularly in primary care settings, based on the conjecture that dependent patients would benefit from more intensive specialist treatment [35]. Some studies however have not excluded patients with very heavy alcohol consumption or dependence [36–39]. One such study reported no BI benefits [40], whereas another reported BI benefits [41], among dependent drinkers. Although currently available evidence is inconclusive on gender effects, in some cases where data is available by gender, the effectiveness of BIs is clear in men but not in women [3,5]. A number of studies have explored the impact of age on the effects of BIs on alcohol consumption, with some reporting a significant impact [42], whereas others did not [20,43–46].

Study design differences may exist between studies conducted in primary care and those in hospital settings because of differences in operational realities and patient population [47]. For example, more studies in hospital than primary care settings might have explored if BIs can be effectively delivered by non-physicians. When compared with physicians in primary care, because of less control over patient volume and flow, physicians in hospital settings may have more constrains regarding time to address the patient's drinking if not their main reason for the hospital visit [47]. In addition, differences in staff and skills mix may exist between primary care and hospital settings. In the UK, for example, there are specialist alcohol workers within many general hospital settings, unlike primary care settings where general practitioners and practice nurses are expected to deliver alcohol interventions [48,49]. Physicians in hospital settings therefore infrequently provide interventions for alcohol problems, making it more relevant to explore if BIs can be effectively delivered by non-physicians in this setting [14]. The established relationship between patient and physician in the primary care setting could make continued engagement with patients easier when compared with the hospital setting [13], particularly after patient discharge from hospital. Thus, more studies conducted in primary care could have evaluated BIs comprising of more than one session with longer follow-up periods, compared with the hospital setting where one-session BIs and shorter follow-up periods may be more common. Hospital populations generally have more severe medical conditions and diseases than primary care [4]. For alcohol problems, this could mean studies in hospital settings deal with populations with higher proportions of very heavy/dependent drinkers than primary care studies.

The aim of this review is to compare studies by their setting in order to identify study design differences between studies on BIs for heavy alcohol use conducted in primary care settings and those in hospital settings.

Methods

Search strategy

We identified potential studies from reviews of studies on BIs for alcohol problems in primary care [1–3,14,35,50–53]; hospital settings, that is inpatient medical care, trauma centres, hospital outpatients and emergency departments [4,5,54,55]; and others that were not specific to any particular setting [56–58]. The electronic databases CINAHL; The Cochrane Library (including: Cochrane Database of Systematic Reviews; Database of Abstracts of Reviews of Effects; Cochrane Central Register of Controlled Trials; Health Technology Assessment database); C2-SPECTR; EMBASE; MEDLINE; and PsycINFO were also searched for studies published until October 2011. The search string used for MEDLINE is shown in Appendix 1. This was adapted accordingly for use in each database.

Study selection criteria

We defined a brief intervention as comprising of one to four sessions of engagement with a patient and the provision of information/advice designed to reduce

risky alcohol consumption or alcohol-related problems or to provide referral to additional care [34,35]. We included controlled clinical trials and randomised controlled trials that were comparing patients with unhealthy alcohol use (as identified by screening) receiving BIs, with patients receiving no intervention, usual care or other active treatments. Studies were eligible if set in: hospital inpatient, outpatient, accident and emergency department; trauma centre; or primary care settings. Studies recruiting adult participants aged 18 years and above, presenting to acute hospital settings for any reason other than specifically for alcohol misuse treatment, were included. We only included studies published in English because we did not have the capability or resources for translating studies reported in other languages into English.

Excluded studies were: focusing specifically on participants with dual diagnosis (comorbidity or the co-occurrence in the same individual of a psychoactive substance use disorder and another psychiatric disorder) and those conducted in specialist psychiatric facilities, addiction services or addiction treatment programmes.

Study selection and data extraction strategy

Two reviewers independently screened all studies for inclusion using the inclusion/exclusion criteria. Data extraction was independently done by two reviewers. Differences in selection decisions or data extraction were resolved by discussion. Data extracted included study methods, setting, participant characteristics, intervention, comparators, outcomes, outcome measures and results.

Data analysis

We were interested in differences between hospital setting studies and primary care studies in the following factors: exclusion of very heavy/dependent drinkers; mean age of study sample; gender composition of study sample (measured as proportion of males); total time taken delivering the intervention to each participant (intervention duration); number of sessions; personnel delivering the intervention (physician vs. non-physician); adequate sequence generation, allocation concealment, blinding of outcome assessor and dealing with incomplete data; length of follow-up period; sample size; use of a manual during intervention delivery, training interventionists, supervision of interventionists and verification of intervention fidelity; accounting for screening/assessment reactivity in the study design; and the control condition utilised (usual care/no intervention vs. a comparison between two active interventions).

However, we anticipated the possibility of identifying a small number of studies that would make the 18 covariates too many compared with the number of observations. This could lead to a very large variation in the estimates of the regression parameters, and some parameters would not be estimated. Data analysis was done using STATA version 12 (StataCorp LP, College Station, Texas, USA). Data were entered, cleaned and checked for obvious errors, logical errors, outliers and missing data documented, and descriptive statistics computed. Separate regression models were fitted to the data for each of the factors of interest described above, with the factor of interest as the independent variable and the study setting (hospital settings = 1 and primary care settings = 0) as a dependent variable [59]. For these separate regression models, we used two-sided significance tests at the 25% significance level to select statistically significant independent variables to include in a multiple logistic meta-regression model. The multiple meta-regression model was fitted in STATA 12, and two-sided significance tests at the 5% significance level were used. After model fitting, diagnostics for checking fit and outlying observations was done. The correlation matrix of the independent variables included in the multiple meta-regression model was also inspected. Interpretation of the analytical results followed from the fitted models.

For personnel delivering the intervention, where part of the intervention was delivered by a physician and the other by a non-physician, we classified the study under physician delivery only if the major component(s) of the interventions was delivered by the physician; otherwise, it was classified under non-physician delivery. Personnel delivering the intervention was divided into physician versus non-physician due to the existence of literature suggesting the effectiveness of an intervention when delivered by a physician may differ from when it is delivered by a non-physician [13,14].

The primary analysis considered the hospital setting as a single group when in reality the emergency department for example is likely to be different from inpatient wards/units. A secondary analysis was therefore performed exploring differences between studies conducted among general hospital inpatient and those conducted in the emergency department. This secondary analysis utilised the same analysis strategy as the primary analysis but used two-sided significance tests at the 20% significance level to select statistically significant independent variables from the separate regression models to include in a multiple logistic meta-regression model. This was because using the 25% significance level yielded too many covariates for the multiple logistic meta-regression model compared with the number of observations.

A sensitivity analysis was conducted for both the primary and secondary analysis. For the primary analy-

sis, two-sided significance tests at the 30%, 20% and 10% significance levels were used to select statistically significant independent variables from the separate regression models to include in multiple logistic meta-regression. For the secondary analysis, only the 10% significance level was used.

Results

Literature search and study selection

Figure 1 shows the flow of articles through the review process. Of a total of 3705 records identified, 1244 were duplicates and 2288 were irrelevant, resulting in 173 full-text articles that were assessed for eligibility. Ninety-seven articles were ineligible (23 qualitative studies; 17 reviews; 15 not evaluating BIs; 10 surveys; seven in specialist settings; seven not primary research; five recruited from multiple settings and results not analysed by setting; five not controlled studies or randomised controlled trials; four recruiting adolescents; three recruited from community settings; one recruited psychiatric patients. Seventy-six studies (30 studies in primary care and 46 in hospital settings) met the inclusion criteria. Of those conducted in hospital settings, 23 were in the emergency department, 18 for hospital inpatients and five in hospital outpatients. None of the assessed 173 full-text articles were excluded on the

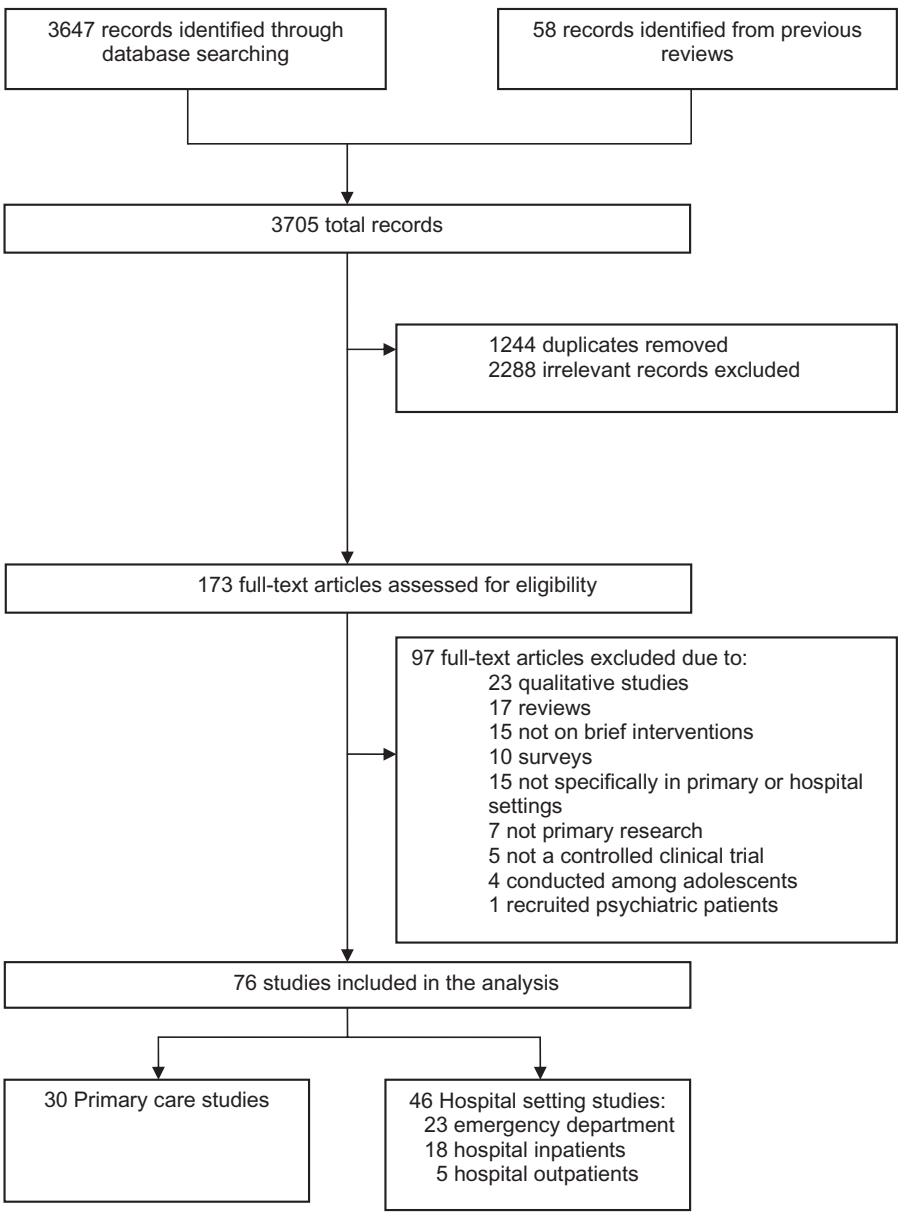

Figure 1 *Flow of articles through the systematic review process.*

Table 1. *Descriptive statistics and results from the univariate regression models for the 18 potential predictors (characteristics) of study setting as independent variables*

Characteristic	Primary care	Hospital settings	Odds ratios[a] (95% CI)	*P*-value
Age, mean (SD)	41.61 (9.35) *n* = 25	37.69 (8.93) *n* = 35	0.95 (0.89, 1.01)	0.113
Mean proportion of male participants, mean (SD)	62.93% (26.89) *n* = 29	76.58% (17.34) *n* = 44	1.03 (1.00, 1.06)	0.020
Sample size: mean (SD)	323.20 (266.91) *n* = 30	374.59 (327.39) *n* = 46	1.00 (0.999, 1.002)	0.471
Exclusion of dependent/heavy drinkers, n/N (%).	21/30 (70%)	10/46 (22%)	0.12 (0.04, 0.34)	<0.001
Intervention duration, mean (SD)	37.87 (31.66) *n* = 23	38.60 (30.23) *n* = 35	1.00 (0.98, 1.02)	0.928
Number of sessions, median (range)	2 (1–4) *n* = 30	1 (1–4) *n* = 44	0.39 (0.21, 0.70)	0.002
Interventionist, proportion with physicians as interventionists (%)	17/30 (57%)	2/46 (4%)	0.035 (0.007, 0.171)	<0.001
Adequate sequence generation, proportion (%)	Yes: 16/30(53%) No/unclear: 14/30 (47%)	Yes: 19/46 (41%) No/unclear: 27/46 (59%)	0.62 (0.24, 1.56)	0.305
Adequate allocation concealment, proportion (%)	Yes: 5/30 (17%) No/unclear: 25/30 (83%)	Yes: 11/46 (24%) No/unclear: 35/46 (76%)	1.57 (0.49, 5.09)	0.451
Dealing with incomplete data	Yes: 14/30 (47%) No/unclear: 16/30 (53%)	Yes: 15/46 (33%) No/unclear: 31/46 (67%)	0.55 (0.21, 1.42)	0.220
Blinding outcome assessors, proportion (%)	Yes: 16/30 (53%) No/unclear: 14/30 (47%)	Yes: 28/46 (61%) No/unclear: 18/46 (39%)	1.36 (0.54, 3.45)	0.516
Length of follow-up period, mean (SD) in months	13.15 (7.32) *n* = 30	9.29 (4.90) *n* = 46	0.88 (0.79, 0.98)	0.023
Use of manual for intervention delivery, proportion (%)	Yes: 15/30 (50%) No: 15/30(50%)	Yes: 17/46(37%) No: 29/46(63%)	0.59 (0.23, 1.49)	0.262
Training of interventionists, proportion (%)	Yes: 23/30 (77%) No: 7/30(23%)	Yes: 34/46 (74%) No: 12/46(26%)	0.86 (0.30, 2.52)	0.786
Supervision of interventionists, proportion (%)	Yes: 4/30 (13%) No: 26/30(87%)	Yes: 22/46 (48%) No: 24/46(52%)	5.96 (1.79, 19.81)	0.004
Verification of intervention fidelity, proportion (%)	Yes: 9/30 (30%) No: 21/30 (70%)	Yes: 23/46 (50%) No: 23/46 (50%)	2.33 (0.88, 6.16)	0.087
Considering reactivity in study design	Yes: 23/30 (77%) No: 7/30 (23%)	Yes: 14/46 (30%) No: 32/46(70%)	0.13 (0.05, 0.38)	<0.001
Control condition, proportion with active control (%)	9/30 (30%)	12/46 (26%)	0.82 (0.30, 2.29)	0.709

[a]For categorical variables = the odds of a study judged as 'yes' to that characteristic being conducted in a hospital setting rather than a primary care setting; for continuous variables = the change in the odds of a study being conducted in a hospital setting rather than a primary care setting for each unit increase in the value of the variable. CI, confidence interval.

basis of language. A list of the included studies is provided as Supporting Information Table S1 for online publication.

Comparing primary care studies to hospital setting studies

The univariate logistic meta-regression with the 18 independent variables revealed 10 statistically significant predictors (at 25% significance level) of whether a study was conducted in hospital settings or in primary care settings: personnel delivering the intervention (physician vs. non-physician); number of sessions; accounting for screening/assessment reactivity in the study design; supervision of interventionists; verification of intervention fidelity; length of follow-up period; exclusion of very heavy/dependent drinkers; gender composition of study sample (measured as proportion of males); mean age of study sample; and dealing with incomplete data (Table 1).

On analysis of the correlation matrix from the 10 independent variables, only one of the observed relationships was strong and statistically significant: verification of intervention fidelity and supervision of interventionists ($r = 0.62$; $P < 0.0001$). Verification of intervention fidelity was included in the next analysis stage as it is considered as the gold standard of evidence of intervention fidelity [60], whereas supervision of interventionists, which is only one of the elements for

Table 2. *Results from multiple logistic meta-regression model with the potential predictors of study setting (those that were significant at 25% significance level from the univariate regression models) as independent variables (characteristic)*

Characteristic	Odds ratio[a]	95% CI	*P*-value
Personnel delivering the intervention (physician vs. non-physician)	0.103	0.007, 1.511	0.097
Exclusion of very heavy/dependent drinkers, yes versus no	0.052	0.004, 0.716	0.027
Number of sessions	0.281	0.081, 0.979	0.046
Accounting for screen/assessment reactivity, yes versus no	0.174	0.017, 1.782	0.141
Verification of intervention fidelity, yes versus no	12.935	0.804, 207.900	0.071
Length of follow-up period	0.831	0.677, 1.020	0.077
Gender composition of study samples (proportion of males)	1.063	1.005, 1.125	0.033
Mean age of sample	0.950	0.840, 1.074	0.416
Dealing with incomplete data	2.644	0.169, 41.341	0.488

[a]For dichotomised variables = the odds of a study judged as 'yes' to that characteristic being conducted in a hospital setting rather than a primary care setting; for continuous variables = the change in the odds of a study being conducted in a hospital setting rather than a primary care setting for each unit increase in the value of the variable. CI, confidence interval.

ensuring intervention fidelity, was dropped. Thus, nine independent variables were included in multiple logistic meta-regression.

Of the nine independent variables included in the multiple logistic meta-regression, three were statistically significant at 5% significance level: number of sessions [odds ratio (OR) = 0.281 (95% CI 0.081, 0.979; $P = 0.046$)]; exclusion of very heavy/dependent drinkers [OR = 0.052 (95% CI 0.004, 0.716, $P = 0.027$)] and gender composition of study sample (measured as proportion of males) [OR = 1.063 (95% CI 1.005, 1.125; $P = 0.033$)] (Table 2). The smaller the number of sessions, the higher the likelihood of the study having been conducted in hospital settings than in primary care settings. Only 10/46 (22%) of studies conducted in hospital settings excluded dependent or very heavy drinkers compared with 21/30 (70%) of studies conducted in primary care settings. Studies with a higher proportion of male participants were more likely to have been conducted in hospital settings than in primary care settings.

Sensitivity analysis: primary care versus hospital setting studies

Number of sessions, exclusion of very heavy/dependent drinkers and gender composition of study sample (measured as proportion of males) were statistically significant predictors when the 10%, 20% or 30% significance levels were used to select covariates to include in the multiple logistic meta-regression. In addition, when using the 10% significance level, personnel delivering the intervention (physician vs. non-physician) also became statistically significant [OR = 0.057 (95% CI 0.006, 0.579; $P = 0.015$)]. When using the 30% significance level verification of intervention fidelity also became statistically significant [OR = 26.06 (95% CI 1.298, 0.523.069; $P = 0.033$)].

Comparing general hospital inpatients studies with emergency department studies

From univariate logistic meta-regression, statistically significant predictors (at 20% significance level) were: supervision of interventionists, verification of intervention fidelity, length of follow-up period, use of a manual during intervention delivery, training interventionists, gender composition of study sample (measured as proportion of males), mean age of study sample, sample size, adequate randomisation sequence generation and control condition utilised (usual care/no intervention vs. a comparison between two active interventions). However, none of these variables were statistically significant predictors of study setting in the multiple logistic meta-regression model. In addition, utilising the 10% significance level to select covariates resulted in no statistically significant independent variables from the multiple logistic meta-regression model.

Discussion

The observed statistically significant predictors of whether the study was conducted in primary care or hospital settings from the multiple logistic meta-regression model were: number of sessions, exclusion of heavy/dependent drinkers and gender composition of study sample. The predictive value of the number of sessions was moderate, with an increase of one session resulting in a 72% decrease in the odds of a study being conducted in a hospital rather than in primary care setting, when all the other covariates are fixed. This is the same for excluding very heavy/dependent drinkers

where the odds of a study that excluded such drinkers having been conducted in a hospital as opposed to primary care setting is 95% lower than of a study that did not. The predictive strength of gender composition was however very weak, with a 6.3% increase in the odds of a study being conducted in the hospital rather than primary care for each percentage increase in the proportion of males. The associated confidence intervals for these estimates were however very wide, potentially as a result of a small number of studies used in the analysis.

Studies comprising of fewer intervention sessions were more likely to have been conducted in hospital settings than in primary care settings. Recent debates within the brief intervention field have focused on the need to determine the optimal treatment exposure that is most likely to have an impact on alcohol consumption [5]. Kaner *et al.* suggest that intervention intensity (length/number of sessions) can influence the effectiveness of BIs for alcohol problems [34]. Research in other areas such as smoking cessation has also suggested a dose–response relationship between intensity of counselling (length or number of treatment sessions) and cessation success [61–63]. More studies in primary care than those in the hospital setting could have potentially benefited from additional treatment sessions. Although number of sessions was a statistically significant predictor of setting, total time taken delivering the intervention to each participant (intervention duration) was not. This could mean that more studies in primary care, where continued patient engagement is relatively easier, utilised BIs with higher numbers of sessions of shorter duration, whereas more in hospital settings utilised longer sessions with fewer number of sessions.

A number of studies in hospital settings enrolled a large proportion of very heavy/dependent drinkers as a result of not excluding this population from the study [39,64–69]. For example, Saitz *et al.* reported that more than 75% of the study sample was alcohol dependent [64], and this was approximately 50% for Liu *et al.* [66]. There is not enough evidence to either support or refute the effectiveness of BIs among very heavy/dependent drinkers. Although some researchers have reported they are effective in reducing alcohol consumption among heavy/dependent drinkers [41,66], others have found them ineffective [40]. The severity of drinking and alcohol problems may explain the more inconsistent results on BIs effectiveness in hospital settings when compared with primary care settings where the results have been more consistent. The cut-off point for exclusion of very heavy/dependent drinkers differed from study to study, and for the review we applied each study's classification. For example, Anderson and Scott excluded those consuming more than 1050 g of alcohol per week [44]; Fleming *et al.* excluded those drinking more than 50 drinks per week [70,71], whereas others excluded those with an AUDIT score of 15 and above [72,73].

Studies with a higher proportion of male participants were more likely to have been conducted in hospital settings than primary care settings. Two reviews reported that in some cases where data is available by gender, the effectiveness of BIs is clear in men but not in women [3,5]. From this, the expected impact of having higher proportions of males in hospital setting studies would have been to increase the intervention effect size. However, where hospital setting studies have reported outcomes by gender, some concluded that gender had no impact on intervention effects [69,74–76], whereas others did show an impact, favouring females [42,77]. One reported a significant treatment effect for women receiving a brief motivational intervention with a booster but not for men [77]. Another reported that women aged $\leq$22 years receiving some advice were the most likely to decrease their heavy drinking episodes [42]. In the study by Monti *et al.*, men showed statistically significantly higher scores on alcohol consumption and alcohol problems than women after 12 months of follow-up [75]. For some studies conducted in primary care, gender did not account for difference in alcohol consumption [70,71,78]. Fleming *et al.* however reported a greater reduction in consumption by women in the intervention group than men in the same group [70]. Rubio *et al.* reported a greater intervention effect for women, whereas Richmond *et al.* reported the opposite [79,80]. Senft *et al.* reported a gender effect favouring men at 6 months but not at 12 months [81]. Two other studies also reported similar findings, although it was unclear which gender benefited more from the intervention [38,82]. In light of this, it could be useful to explore the impact of gender on the effectiveness of BIs. If a gender impact exists, it could also be useful to explore whether it varies by setting.

Although in theory, the various components for ensuring and measuring intervention fidelity potentially have an impact on intervention effect size, research exploring whether this is indeed the case is limited; indicating more is needed. Monitoring the quality of the delivery of psychological interventions is central to clinical governance of routine clinical practice, supervision and psychotherapy research, and therefore should not be considered elective [60,83]. Some exemplars for monitoring and evaluation of intervention fidelity exist [84–86]. However, practical guidelines for such evaluations are lacking [58,84]; thus, practice may vary widely [84]. Santacroce *et al.* consider the gold standard of evidence of intervention fidelity as consisting of a randomly selected sample of recorded sessions stratified in terms of interventionists, condition and site

assessed by trained raters to ensure ongoing reliability [60]. It is also useful to explore whether including process data in the main analysis of intervention effectiveness has an impact on the intervention effect size. Currently, although some studies might measure intervention fidelity and report their findings, often these data are reported separate from the main effectiveness results.

Other important issues that were not examined in this review include: mode of intervention delivery, theory behind the intervention and behaviour change techniques (BCTs) included in the intervention. For the mode of intervention delivery, there was not enough variation to make comparisons. All studies in primary care, the interventions were delivered face to face as were 45/50 studies conducted in hospital settings. The theory behind the intervention was not always reported, with eight studies reporting using the Transtheoretical Model of Behaviour Change, two studies reporting using more than one theory and 35 studies reporting using Motivational Interviewing. BCTs were also not always reported, and the terminology used was inconsistent across studies. Michie *et al*. have proposed a consistent terminology for specifying BCTs utilised in interventions for reduce excessive alcohol consumption [87]. However, to our knowledge, this taxonomy is yet to be validated. Another issue not explored due to poor reporting was the differences in proportions of participants in the intervention group who actually received the intervention. There could also be a difference between primary care and hospital setting studies because of general environmental factors such as: pressure of work; practical and logistical difficulties in conducting screening and BIs in hospital settings as compared with primary care settings; and the ability to continue engaging with the patient particularly if there is a delay between randomisation and delivery of the brief intervention, for example a patient may be discharged from hospital before the intervention is delivered, and it could be difficult to re-engage with them for the study.

The present review focused on comparing studies by their setting in order to identify study design differences between BI studies conducted in primary care settings and those in hospital settings. Future work exploring the extent to which each of the potential moderators identified here may actually explain the variation in effect size through meta-regression techniques would be a valuable contribution to the literature. Calculation of the effect sizes would also provide quantitative information on the aggregate efficacy of treatments conducted in primary care versus hospital settings.

Studies focusing specifically on participants with dual diagnosis (comorbidity or the co-occurrence in an individual of a psychoactive substance use disorder and another psychiatric disorder) were excluded from this review. However, dual diagnosis is common among patients with alcohol use problems [88,89]. Although some studies take efforts to exclude dual diagnosis patients, some do not, which might result in many participants having a co-occurring psychiatric disorder. For example, in the study by Saitz *et al*., more than 70% of patients had current generalised anxiety disorders, more than 70% had current substantial depressive symptoms and approximately 40% had current substantial posttraumatic stress disorder symptoms [64]. In the study by Liu *et al*., approximately 19% of participants had a diagnosis of at least one of the following in the previous year: current depressive disorder, dysthymic disorder, generalised anxiety disorder and insomnia [66].

We considered emergency department, hospital outpatient departments and inpatient wards/units together as a single group, when in reality these settings are likely to be different. However, our secondary analysis showed no statistically significant predictors of setting when studies conducted in the emergency department were compared with those conducted in inpatient wards/units. Although we performed an extensive search, checked reference lists of systematic reviews, searched of a number of electronic databases using broad and rigorous literature search strategies, it is still possible that studies were missed, particularly those reported in languages other than English. Limiting the language to English could affect precision as analysis would have been based on fewer studies if any non-English studies were missed [90]. It would also limit inference of the results to studies published in English [91].

Conclusion

In conclusion, differences exist between studies conducted in primary care and those conducted in hospital settings on number of sessions, exclusion of heavy/dependent drinkers and gender composition of the study samples. These differences might partly explain the difference in the consistency of findings on the effectiveness of brief interventions on reducing alcohol consumption between the two settings.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1 List of included studies.

Appendix 1: search strategy for MEDLINE (OVID SP)

1946–present

1. exp Alcohol-Related Disorders/
2. exp Drinking Behavior/
3. (alcoholic$ or alcoholism).ti,ab.
4. (alcohol$ adj (abuse$ or misuse$ or use$ or problem$ or depend$ or addict$ or disorder$)).ti,ab.
5. Alcoholics/
6. substance-related disorders/
7. or/1–6
8. exp Hospitals/
9. exp Hospital Units/
10. exp Emergency Service, Hospital/
11. Inpatients/or Outpatients/
12. (hospital$ or inpatient$ or outpatient$ or outpatient$ or acute care or ward$).ti,ab.
13. (emergency department$ or emergency room$ or (accident adj2 emergency) or trauma center$).ti,ab.
14. family pract$/or exp Primary Health Care/
15. general pract$.ti,ab.
16. primary care/
17. community health services/or exp Community Health Services/
18. Community Care.ti,ab.
19. family medicine/
20. family phys$.ti,ab.
21. or/8–20

22. 'Referral and Consultation'/
23. counseling/or directive counseling/
24. (refer$ or counsel$ or talk$).ti,ab.
25. brief intervention$.ti,ab.
26. Patient Education as Topic/
27. (educat$ or advice or advise or advisor$ or therapy or therapist$ or rehabilitat$).ti,ab.
28. alcohol liaison nurs$.ti,ab.
29. alcohol specialist nurs$.ti,ab.
30. alcohol health worker$.ti,ab.
31. or/22–30
32. randomized controlled trial.pt.
33. controlled clinical trial.pt.
34. (randomized or randomised or rct$).ti,ab.
35. placebo$.ti,ab.
36. (crossover$ or cross over$ or cross-over$ or (doubl$ adj blind$) or (singl$ adj blind$)).ti,ab.
37. randomly.ti,ab.
38. trial$.ti,ab.
39. clinical trials as topic.sh.
40. or/32–39
41. 7 and 21 and 31 and 40

Appendix 2 *Criteria for making judgements on study design characteristics*

Study design characteristic	Yes	No
Exclusion of very heavy/ dependent drinkers	Study had criteria which excluded very heavy/dependent drinkers from participating in the study	No criteria excluding very heavy/dependent drinkers from participating in the study
Adequate sequence generation	Sequence generation has a random component that ensured participants were assigned to different treatment groups in a study in a truly random manner	Sequence generation procedure not reported/ clearly does not have a random component
Blinding of outcome assessor	Outcome assessor reported as blind to intervention allocation	Outcome assessor reported as 'not blinded'/no mention of blinding of outcome assessor in the study report
Adequate dealing with incomplete data	Included methods of minimising bias from incomplete data in the analysis	No measures to minimising bias from incomplete data
Use of manual during intervention delivery	Study reported that interventionists were guided by a manual; logarithm; checklist or other written material during intervention delivery	No report of any manual; logarithm; checklist or other written material being used during intervention delivery. Study specifying that no such written material were used to guide intervention delivery
Training of interventionists	Study reported that interventionists were trained on the study intervention protocol.	No report of training of interventionists on the study intervention protocol. Study specifying that interventionists received no training on the study intervention protocol.
Supervision of interventionists	Study reported interventionists were supervised	No report of supervision of interventionists. Study specifying that there was no supervision of interventionists
Verification of intervention fidelity	Study reported including any procedures for assessing and measuring adherence to intervention delivery protocol	No procedures for assessing and measuring adherence to intervention delivery protocol reported
Accounting for screening/ assessment reactivity in the study design	Study reporting including any procedure or design to minimise the impact of screening/assessment reactivity	No procedure or design to minimise the impact of screening/assessment reactivity reported

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Medical specialists' views on the impact of reducing alcohol consumption on prognosis of, and risk of, hospital admission due to specific medical conditions: results from a Delphi survey

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Keywords
alcohol consumption, Delphi survey, medical conditions, medical specialists

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Abstract

Rationale, aims and objectives To find consensus, or lack thereof, on the impact of reducing alcohol consumption on prognosis and the risk of hospital admissions for a number of alcohol-attributable disorders.

Methods A modified two-round Delphi survey utilizing web-based questionnaires to collect quantitative and qualitative data was used. Alcohol treatment experts from cardiology, emergency medicine, gastroenterology and oncology in the United Kingdom were invited to participate. The main outcomes were median impact ratings (on a scale of 1–9) and consensus (unanimous, strong, moderate, weak or no consensus).

Results Of 192 experts invited to participate, 59 completed first questionnaires. The overall retention rate to the second questionnaires was about 51% (30/59). There was strong support that reducing alcohol consumption could result in improvement in prognosis for gastroenterology and emergency medicine patients; but uncertainty on the benefits for cardiology and oncology patients. Overall, the responses from the expert panel did not reflect the assumption that reducing alcohol consumption would result in benefits on hospital admissions for any of the specialties. The specialists viewed the severity of disorders as important when considering the impact of reducing alcohol consumption.

Conclusions The highest impact of treatment for problem drinking in hospitals is considered to be for alcohol-related disorders associated with gastroenterology and emergency medicine. At policy level, if targeted screening for alcohol problems by presenting disease or condition is the strategy of choice, it would be logical to implement screening and easily accessible interventions or addiction specialists within these areas where alcohol treatment is considered as having a high impact.

Introduction

The misuse of alcohol remains a major challenge to population health, health services costs and society [1]. Most research studies on interventions for alcohol misuse have involved identifying eligible patients through universal screening (screening all patients) [2–4]. However, universal screening may be impractical, both in routine practice and within research studies, for various reasons. Time constraints are frequently cited [5–7], as are concerns that universal screening might not benefit sufficient numbers of people to warrant the extra workload required and result in a high rate of disappointment for practitioners [8]. The widespread scepticism on the treatment benefits of screening and interventions for alcohol problems also contributes to low implementation [9,10]. In addition, uncertainty around the efficiency and acceptability of screening still exists [7,11], particularly on the universal screening strategy. There are suggestions that targeted screening (screening specific high-risk patient groups) will be more acceptable to both health care professionals and patients [2,11,12]. Comparative evidence of the effectiveness, cost-effectiveness and acceptability of targeted versus universal screening is however still limited. Targeting can be by age

[13–15], gender [16], medical condition [6] or new registrations [17,18], for example.

Although the majority of people with alcohol problems do not seek treatment specifically for these problems [1,19,20], they may seek treatment for other conditions which may or may not be related to alcohol [1]. These contacts with the health care service are opportunities to engage with them [21]. Qualitative studies have pointed to awareness of accumulating harms and triggering occurrences as potential catalysts for change among patients with unhealthy alcohol use [22,23]. A recent study has also suggested that having an alcohol-attributable illness at hospital admission may catalyse intervention benefits among non-dependent unhealthy alcohol users and those who do not view their drinking as problematic [24]. A patient's presenting condition could therefore provide a means of targeting those with a high likelihood of alcohol-related problems who will potentially have the largest expected health gain from interventions aimed at reducing alcohol consumption. The Paddington Alcohol Test, for example, targets 10 conditions that are attributable to alcohol for patients attending emergency departments [6]. However, excessive alcohol consumption also impacts on other acute and chronic diseases besides those mostly encountered in emergency departments [25]. Evidence on how to target screening and interventions for alcohol use by presenting disease condition is limited, hence practice may vary widely. Some researchers suggest that enquiring about medical conditions associated with alcohol use as a pre-screening procedure is acceptable to patients and health care professionals [3].

The aim of this study was to find consensus, or lack thereof, on the impact of reducing alcohol consumption on prognosis and the risk of hospital admissions for a number of alcohol-attributable diseases or conditions through a Delphi survey [26]. The study brings together a wider range of direct knowledge and experience from medical specialists regarding which patients, based on their presenting medical problems, would potentially have the largest expected health gains from interventions aimed at reducing alcohol consumption [26]. The National Institute of Health and Clinical Excellence (NICE) in the United Kingdom and other professional and guideline development bodies in other countries have used formal consensus development methods in guideline development to synthesise individual judgements in a structured, transparent and replicable way, particularly where research evidence does not exist [26–29].

Methods

The Delphi survey

The Delphi method is a formal, systematic and structured communication technique for consensus development, priority setting or collective decision making which relies on a panel of experts [30,31]. The method is particularly used where research evidence does not exist, or is impossible to obtain economically within the time frame it is required [26–29]. The main premise of the method is that group opinions are more valid and reliable than individual opinions (i.e. several people are less likely to arrive at a wrong answer than a single individual) [31,32]. A Delphi survey involves two or more rounds of questionnaires completed by the experts, with a facilitator providing anonymized feedback from previous rounds before the questionnaires for the next round are completed [26,30,31]. The idea is that with each round the range of answers will decrease and the group will converge towards the 'correct' answer, thus increasing concurrent validity of the findings [26]. The stop criterion is usually predefined. For example, it could be the number of rounds, achievement of consensus or stability of results [31].

The participating experts usually remain anonymous even after the survey is completed in order to prevent them from influencing each other's responses [26]. However, to achieve the recommended response rates of above 70% for each round [33], it is usually necessary for the facilitator or researcher to know the identity of respondents in order to follow up with non-responders [32]. In such cases where true anonymity is not possible, 'quasi-anonymity' is pursued where the respondents are known to the facilitator or researcher [32].

The Delphi survey presented in this article was implemented in four stages: (1) identification and selection of key issues to focus on for the survey; (2) panel selection and recruitment; (3) conducting the two-round survey using web-based questionnaires; and (4) data analysis. These will be described below.

Identification and selection of key issues

The key focus issues to explore in the Delphi survey were determined through an iterative process involving scoping of existing literature, and discussions over four project management team meetings. Literature scoping was used to identify any existing theoretical and evidence-based strategies for targeting alcohol treatment by presenting medical condition. The discussion meetings were then used to set priorities and build consensus on which key issues to focus on for the Delphi survey. We aimed to capture the views of clinicians, health care providers (in this case the United Kingdom's National Health Service) and researchers. These meetings were therefore attended by 12 individuals consisting of three clinicians (one emergency medicine consultant, one addiction psychiatry consultant and one liaison psychiatry consultant), one psychologist, three commissioning managers for alcohol services, and five researchers specializing on alcohol consumption and drug use research. The meeting attendees were not part of the survey panel.

Two key issues that were agreed upon through consensus were: What would be the impact of reducing alcohol consumption on: (1) prognosis (or the course of the disease or condition); and (2) risk of hospital admission?

Panel selection and recruitment

Practitioners within four medical specialties (cardiology, emergency medicine, gastroenterology and oncology), who were also experts on the treatment of alcohol-related disorders, were identified from a variety of sources: (i) NICE guideline working groups; (ii) specialty societies; (iii) hospitals; and (iv) universities. An email was sent to all those identified in this way inviting them to participate in the study, and providing them with an explanation of what the study involved and its aims. The letter also contained a link to the relevant online survey questionnaire, which was created using SurveyMonkey (Europe Sarl, Luxembourg). We also asked these individuals to identify any other experts we could contact for this study.

The survey procedure

The survey was predefined as a two-round survey using web-based questionnaires, with a 'quasi-anonymity' strategy where the survey facilitator or researcher knew the identities of the respondents to facilitate follow-up of non-responders.

Diseases and conditions attributable to alcohol were identified from Jones *et al*. [25]. Jones and colleagues listed 47 alcohol-attributable conditions, 13 of which are, by definition, wholly attributable and 34 are partially attributable to alcohol consumption [25]. We utilized this list of alcohol-attributable conditions because, unlike other studies [34,35], it only reports on conditions where, at the time the Delphi survey was conducted, there was sufficient evidence in the available epidemiological literature of a causal relationship between alcohol consumption and the disease or condition.

The diseases or conditions attributable to alcohol were grouped into the following specialties: cardiology, emergency medicine, gastroenterology and oncology. The clinicians involved in the project management team meetings recommended that some of the conditions be omitted (such as pedestrian traffic accidents, water transport accidents, air/space transport accidents, drowning, alcohol-induced pseudo-Cushing's syndrome and alcoholic polyneuropathy) as they were not common among patients seen by specialists. This resulted in the list in Appendix 1.

We designed four questionnaires for each of the two rounds (each specialty had one questionnaire from each round focusing on diseases or conditions relevant to that specific specialty). The questionnaires were piloted with a number of health professionals and necessary changes in the wording and length made. There are a number of reasons why health care professionals (including medical specialists) might refuse to participate in surveys. The most important reason for non-response is lack of time [36]. One of the most successful strategies to increase response rates is therefore ensuring the survey questionnaire completion time is as short as possible, while collecting all the important information [36]. The feedback from the piloting phase suggested that a completion time of more than 10 minutes would discourage questionnaire completion. We therefore aimed for a questionnaire completion time of less than 10 minutes. The questionnaires were sent out in two rounds as described below.

First round

The first round questionnaire had two main questions asking the specialists separately to rate, for each of the listed diseases or conditions, how much reducing alcohol consumption would: (1) improve prognosis; and (2) reduce the risk of hospital admissions. A rating scale of 1–9 was adapted [37,38] where: 1 = not at all; 9 = definitely a significant improvement (for prognosis)/reduction (for risk of hospital admissions). Respondents were also asked if there were any other important issues that should be considered in determining how best to target alcohol treatment by presenting disease or condition. Data were also collected on respondent's gender, age and years of experience in their respective specialty.

Potential respondents in the United Kingdom within the four specialties (i.e. cardiology, emergency medicine, gastroenterology and oncology) were emailed their own unique link to the relevant questionnaire. We sent two reminders to non-responders: the first one 3 weeks after the initial email; and the second one 3 weeks after the first reminder with a 3-week deadline.

Second round

The second round began shortly after the analysis of responses from the first round. Three members of the project management team consisting of two consultants (one in emergency medicine and the other in addiction psychiatry) and a researcher in addiction met to decide items for inclusion in the second questionnaires.

One theme that was common across all four disciplines as important to consider was how severity of disease or condition could influence the impact of reduction in alcohol consumption on prognosis or risk of hospital admission. Thus, for the second questionnaire, we asked respondents whether, for each disease or condition, reduction in alcohol consumption would improve prognosis or reduce the risk of hospital admission for mild, moderate or severe disease or condition (with answer choices yes/no for each disease or condition severity).

To shorten the questionnaire and encourage a high retention rate, the second questionnaire only included diseases or conditions where there was either no consensus, weak consensus or moderate consensus from the first questionnaire. We assumed that severity of disease did not matter much for those diseases or conditions where there had been unanimous (100%) or strong (≥80%) agreement on the impact rating. The second questionnaire was only sent to those who had responded to the first questionnaire, and included a summary of the results from the first questionnaire. Reminders were scheduled as for the first round.

Data analysis

Quantitative data analysis

The impact levels for the first questionnaire were adapted from Musila and colleagues [38] as well as the research and development approach [37]. We considered median ratings of 1–3 as indicating no or very low, 4–6 as indicating medium, and 7–9 as indicating high improvement in prognosis or reduction in risk of hospital admissions. If the median fell in the middle of the border (i.e. 3.5 or 6.5), then it was considered in the higher range. For example, if median was 6.5, then it was considered in the 7–9 range. We established five levels of consensus that are: unanimous (100% of experts have ratings in one of the three ranges, i.e. 1–3; 4–6; 7–9); strong (<100 and ≥80 of experts); moderate (<80 and ≥70 of experts); weak consensus (<70 and ≥60 of experts); none (<60 of experts).

For the second questionnaire, we considered at least 80% 'Yes' responses as indicating agreement that reducing alcohol consumption would lead to improvement in prognosis or reduction in the risk of hospital admissions for the disease or condition at that level of severity. When mapped onto the consensus levels of the first round, at least 80% 'Yes' responses would be within the strong (if <100 and ≥80% 'Yes' responses) or unanimous (if 100% 'Yes' responses) consensus levels.

We determined the overall as well as speciality-specific response rates as the proportion of potential respondents sent a questionnaire that actually completed it (including partial completion).

Analysis of open text responses

Two researchers independently went through the open text responses extracting and listing the issues to consider in determining how best to target alcohol treatment that were suggested by each respondent. The two researchers discussed their findings, resolving any differences through discussion and referring back to the open text responses when necessary. This process resulted in one combined list per specialty. Thematic analysis was then performed for each of the resulting lists to identify any emerging themes [39]. These themes, after being agreed upon by the two researchers through discussion, were used as a coding framework for each of the issues to consider, with statements belonging to the same theme being grouped together. The final stages involved identifying common themes across the four specialties, as well as those that were unique to each of the four specialties.

Results

Participant recruitment and response rates

Table 1 summarizes the overall and the specialty-specific response rates for the first and second round questionnaires, as well as the participant characteristics. A total of 192 participants were invited for the Delphi survey (154 identified directly from the different sources described under 'Panel selection and recruitment' and 38 from the snowballing process). Fifty-nine out of the 192 invited specialists (31%) completed first-round questionnaires. Second-round questionnaires were responded to by 30 of the 59 (51%) who had responded to the first-round questionnaires.

The Delphi survey results

The results from the Delphi survey are summarized below. Tables 2 and 3 contain detailed results on the impact of reducing alcohol consumption on prognosis/course of illness (Table 2) and the risk of hospital admission (Table 3). The detailed results from the second-round questionnaires are provided as online-only Supporting Information material.

Impact of reducing alcohol consumption on prognosis/course of illness

Overall, the findings from this study reflect strong support among the experts that reducing alcohol consumption could result in improvement in prognosis for gastroenterology and emergency medicine patients. For these two specialties there was a large proportion of conditions for which consensus was reached with the median rating suggesting at least medium impact of reducing alcohol consumption on prognosis/course of illness (i.e. 6 out of 10 for gastroenterology and 8 out of 14 for emergency medicine). When considering only those conditions where there was at least moderate consensus for medium or high impact, it was 6 out of 10 conditions for gastroenterology, and 5 out of 14 for emergency medicine.

On the other hand, there were high levels of uncertainty of the benefits of reducing alcohol consumption on prognosis/course of illness for the majority of conditions within the remaining two specialties: cardiology and oncology. For cardiology, although some consensus for medium or high impact was reached for four conditions, it was weak for all except alcoholic cardiomyopathy where it was unanimous. For oncology, consensus was reached only for two out of seven conditions, with moderate consensus that reducing alcohol consumption would result in high levels of improvement on prognosis for both.

Impact of reducing alcohol consumption on the risk of hospital admissions

Overall, the responses from the experts who participated in this study did not reflect the assumption that reducing alcohol consumption would result in benefits on hospital admissions for any

Table 1 Response rates and respondent's characteristics

	First questionnaire				Second questionnaire
	Response rates (%)	Age in years: mean (SD) *min-max*	Gender: number (proportion) of male respondents (%)	Years of experience: mean (SD) min-max	Retention rates (%)
All	59/192 (30.7)	46.9 (8.9) 31–68	47 (79.7)	17.7 (8.8) 1–40	30/59 (50.8)
Cardiology	14/48 (29.2)	47.5 (7.4) 37–59	12 (85.7)	18.4 (7.8) 6–30	6/14 (42.9)
Emergency medicine	17/32 (53.1)	41.9 (7.9) 31–62	14 (82.4)	14.9 (8.8) 1–35	8/17 (47.1)
Gastroenterology	17/51 (33.3)	52.3 (10.0) 36–68	14 (82.4)	20.2 (10.5) 3–40	11/17 (64.7)
Oncology	11/61 (18.0)	46.1 (6.7) 37–57	7 (63.6)	17.5 (6.8) 8–28	5/11 (45.5)

SD, standard deviation.

Table 2 Impact of reducing alcohol consumption on prognosis/course of illness

Condition	Number of respondents	Prognosis improvement rating distribution (%)			Median rating	Impact level	Consensus
		1–3	4–6	7–9			
Cardiology							
Alcoholic cardiomyopathy	14	0	0	100	9	High	Unanimous
Hypertensive diseases	14	7.1	28.6	64.3	7	High	Weak
Ischaemic heart disease	14	28.6	64.3	7.1	5	Medium	Weak
Cardiac arrhythmia	14	7.1	50.0	42.9	6	Medium	None
Heart failure	14	7.1	24.6	64.3	7	High	Weak
Haemorrhagic stroke	14	21.4	42.9	35.7	6	Medium	None
Ischaemic stroke	14	28.6	42.8	28.6	5.5	Medium	None
Emergency medicine							
Methanol poisoning	15	80.0	13.3	6.7	2	None/very low	Moderate
Ethanol poisoning/toxic effects of alcohol	16	0	12.5	87.5	9	High	Strong
Road traffic accidents – non-pedestrian	16	0	37.5	62.5	7	High	Weak
Fall injuries	16	0	25.0	75.0	7	High	Moderate
Work/machine injuries	16	18.8	62.5	18.7	5	Medium	Weak
Firearm injuries	16	43.8	37.5	18.7	4	Medium	None
Fire injuries	16	12.5	62.5	25.0	6	Medium	Weak
Accidental excessive cold	15	13.3	53.4	33.3	5	Medium	None
Intentional self-harm/event of undetermined intent	16	0	12.5	87.5	8	High	Strong
Assault	16	0	6.3	93.7	9	High	Strong
Inhalation of gastric contents/ inhalation and ingestion of food causing obstruction of respiratory tract	16	31.2	43.8	25.0	5	Medium	None
Epilepsy and status epilepticus	16	25.0	56.3	18.7	5	Medium	None
Mental and behavioural disorders due to use of alcohol	16	0	25.0	75.0	8	High	Strong
Spontaneous abortion	14	46.7	46.7	6.6	4	Medium	None
Gastroenterology							
Alcoholic gastritis	17	11.7	11.8	76.5	9	High	Moderate
Alcoholic liver disease	17	0	5.9	94.1	9	High	Strong
Oesophageal varices	17	0	11.8	88.2	8	High	Strong
Gastro-oesophageal laceration-haemorrhage syndrome	17	5.9	41.2	52.9	7	High	None
Cholelithiasis	17	88.2	11.8	0	1	No/very low	Strong
Acute and chronic pancreatitis	17	0	11.8	88.2	8	High	Strong
Unspecified liver disease	17	5.8	47.1	47.1	6	Medium	None
Diabetes mellitus (type II)	17	41.2	47.0	11.8	4	Medium	None
Alcoholic myopathy	17	5.9	17.6	76.5	8	High	Moderate
Degeneration of nervous system due to alcohol	17	11.8	0	88.2	9	High	Strong
Oncology							
Malignant neoplasm of colon	10	40.0	30.0	30.0	4.5	Medium	None
Malignant neoplasm of rectum	10	50.0	30.0	20.0	3.5	Medium	None
Malignant neoplasm of liver and intrahepatic bile ducts	10	10.0	40.0	50.0	6.5	High	None
Malignant neoplasm of lip cavity and pharynx	10	0	30.0	70.0	7.5	High	Moderate
Malignant neoplasm of larynx	10	10.0	40.0	50.0	6.5	High	None
Malignant neoplasm of breast	10	50.0	20.0	30.0	3.5	Medium	None
Malignant neoplasm of oesophagus	10	10.0	20.0	70.0	7.5	High	Moderate

Table 3 Impact of reducing alcohol consumption on risk of hospital admission

Condition	Number of respondents	Risk reduction rating distribution (%)			Median rating	Impact level	Consensus
		1–3	4–6	7–9			
Cardiology							
Alcoholic cardiomyopathy	13	7.7	0	92.3	8	High	Strong
Hypertensive diseases	13	38.5	23.0	38.5	6	Medium	None
Ischaemic heart disease	13	46.1	30.8	23.1	4	Medium	None
Cardiac arrhythmia	13	23.1	38.5	38.4	5	Medium	None
Heart failure	13	23.1	38.5	38.4	6	Medium	None
Haemorrhagic stroke	13	30.8	53.8	15.4	5	Medium	None
Ischaemic stroke	13	38.5	46.1	15.4	4	Medium	None
Emergency medicine							
Methanol poisoning	14	64.3	21.4	14.3	2	None/very low	Weak
Ethanol poisoning/toxic effects of alcohol	15	13.3	0	86.7	8	High	Strong
Road traffic accidents – non-pedestrian	15	6.6	26.7	66.7	7	High	Weak
Fall injuries	15	20.0	20.0	60.0	7	High	Weak
Work/machine injuries	14	35.7	35.7	28.6	4	Medium	None
Firearm injuries	15	40.0	33.3	26.7	4	Medium	None
Fire injuries	15	20.0	33.3	46.7	6	Medium	None
Accidental excessive cold	15	6.6	26.7	66.7	7	High	Weak
Intentional self-harm/event of undetermined intent	15	0	20.0	80.0	8	High	Strong
Assault	15	0	20.0	80.0	8	High	Strong
Inhalation of gastric contents/inhalation and ingestion of food causing obstruction of respiratory tract	15	33.3	26.7	40.0	6	Medium	None
Epilepsy and status epilepticus	15	40.0	33.3	26.7	4	Medium	None
Mental and behavioural disorders due to use of alcohol	15	6.7	33.3	60.0	7	High	Weak
Spontaneous abortion	14	64.3	28.6	7.1	2.5	None/very low	Weak
Gastroenterology							
Alcoholic gastritis	17	17.7	23.5	58.8	7	High	None
Alcoholic liver disease	17	0	5.9	94.1	9	High	Strong
Oesophageal varices	17	0	11.8	88.2	8	High	Strong
Gastro-oesophageal laceration-haemorrhage syndrome	17	11.8	23.5	64.7	7	High	Weak
Cholelithiasis	17	82.4	11.8	5.8	1	None/very low	Strong
Acute and chronic pancreatitis	17	0	17.6	82.4	8	High	Strong
Unspecified liver disease	17	23.5	41.2	35.3	5	Medium	None
Diabetes mellitus (type II)	17	64.7	17.6	17.7	3	None/very low	Weak
Alcoholic myopathy	17	5.9	29.4	64.7	7	High	Weak
Degeneration of nervous system due to alcohol	17	17.7	23.5	58.8	7	High	None
Oncology							
Malignant neoplasm of colon	10	40.0	40.0	20.0	4.5	Medium	None
Malignant neoplasm of rectum	10	40.0	40.0	20.0	4.5	Medium	None
Malignant neoplasm of liver and intrahepatic bile ducts	10	10.0	40.0	50.0	6.5	High	None
Malignant neoplasm of lip cavity and pharynx	9	0	44.4	55.6	6.5	High	None
Malignant neoplasm of larynx	9	11.2	44.4	44.4	6.5	High	None
Malignant neoplasm of breast	9	22.2	55.6	22.2	4.5	Medium	None
Malignant neoplasm of oesophagus	10	10.0	60.0	30.0	6.5	High	Weak

of the specialties. Although for a number of gastroenterology (6 out of 10) and emergency medicine conditions (7 out of 14) there was consensus for medium or high impact, the number where at least moderate consensus for these impact levels was reached was very low (three for each of the two specialties). For cardiology, there was no consensus for all except one condition, alcoholic cardiomyopathy, where there was strong consensus for high levels of reduction in risk of hospital admission. For oncology, the only condition where consensus was reached (albeit weak consensus) was malignant neoplasm of oesophagus with suggestions of high impact.

Other issues to consider

Seven cardiologists, six emergency medicine physicians, nine gastroenterologists and seven oncologists gave at least one suggestion on other issues to consider. Five themes were identified from the open text responses and these are discussed below.

Severity of disease/condition

As highlighted before, the influence of the severity of disease or condition on the impact of reduction in alcohol consumption on prognosis or risk of hospital admission emerged as a common theme across all four specialties. Severity of disease was suggested as important by three cardiology respondents, two emergency medicine respondents, two gastroenterology respondents and one oncology respondent.

For cardiology, reducing alcohol consumption was viewed as highly beneficial to the prognosis of mild, moderate and severe heart failure; moderate and severe hypertensive disease; and severe cardiac arrhythmias, haemorrhagic stroke and ischaemic stroke. Reducing alcohol consumption was also viewed as highly beneficial in reducing the risk of hospital admission for moderate and severe heart failure and cardiac arrhythmias, and severe hypertensive disease.

For emergency medicine, reducing alcohol consumption was viewed as highly beneficial to the prognosis of mild, moderate and severe non-pedestrian road traffic accidents and fall injuries; moderate inhalation of gastric contents or inhalation and ingestion of food causing obstruction of respiratory tract and work or machine injuries; and moderate and severe fire injuries and accidental excessive cold. Reducing alcohol consumption was also viewed as highly beneficial in reducing the risk of hospital admission for mild, moderate and severe pedestrian road traffic accidents, fall injuries and mental and behavioural disorders due to use of alcohol; moderate epilepsy and status epilepticus; moderate and severe inhalation of gastric contents or inhalation and ingestion of food causing obstruction of respiratory tract and accidental excessive cold.

The gastroenterologists viewed reducing alcohol consumption as highly beneficial to the prognosis of mild, moderate and severe alcoholic gastritis; moderate and severe gastro-oesophageal laceration-haemorrhage syndrome and alcoholic myopathy; and severe unspecified liver disease. Reducing alcohol consumption was also viewed as highly beneficial in reducing the risk of hospital admission for moderate and severe degeneration of nervous system due to alcohol; and severe alcoholic gastritis, gastro-oesophageal laceration-haemorrhage syndrome, unspecified liver disease and alcoholic myopathy.

Oncologists viewed reducing alcohol consumption as highly beneficial to the prognosis of mild malignant neoplasm of lip cavity and pharynx, and malignant neoplasm of oesophagus; and mild, moderate and severe malignant neoplasm of liver and intrahepatic bile ducts. However, they viewed reducing alcohol consumption as non-beneficial to the reduction of the risk of hospital admissions of all the conditions included under oncology regardless of severity. The results are however based on responses from only three respondents.

Provision of interventions for reducing alcohol consumption

Provision of interventions for reducing alcohol consumption was highlighted as important by four emergency medicine physicians, three gastroenterologists, three cardiologists and one oncologist.

One emergency medicine physicianphysician viewed the emergency department as the best place to intervene as the presenting condition would potentially be related to alcohol consumption. The following were also suggested for emergency medicine: a clear pathway and intervention strategies that are acceptable to both patients and health care professionals (one respondent); the time of day that patients with alcohol problems are most likely to present to the emergency department (one respondent); full cost analysis, including ambulance time (one respondent).

Three gastroenterology experts perceived use of brief screening questionnaires, and the availability of easily accessible interventions as well as multidisciplinary teams to support patients with alcohol problems as important. While two cardiology experts suggested provision of interventions such as counselling and self-help material within the cardiology setting, another was of the opinion that alcohol problems among cardiology patients should be dealt with in community settings and not in the hospital. One oncology expert suggested the availability of psychological support for alcohol problems.

Availability of support systems

The availability of appropriate support services after discharge from hospital, such as easily accessible community or rehabilitation services, was mentioned by one cardiologist, three gastroenterologists, one oncologist and one emergency medicine physician. Some of these experts suggested support should go beyond alcohol services to include other aspects such as nutritional support (one gastroenterologist and one oncologist), and social factors such as family support, joblessness, homelessness (one gastroenterologist), and children and young people safeguarding issues (one emergency medicine physician).

Prioritizing by disease/condition and not by specialty

Some responses suggested prioritizing by disease/condition rather than by specialty. One cardiology respondent perceived cardiology patients not as a priority and suggested other conditions such as liver disease, trauma, acute alcohol excess and patients admitted with fits as priority.

Five gastroenterology respondents suggested focusing on patients with particular conditions such as alcohol dependence, liver cirrhosis or developing cirrhosis, alcoholic liver disease inpatients, head injury and those admitted for detoxification.

For oncology, prioritization of patients with alcohol dependence or those where alcohol use is known to be problematic was suggested by two respondents. Two specialists highlighted that once a cancer is diagnosed, oncologists may not be too concerned about alcohol intake, particularly if the cancer is very advanced. Probing the patient about alcohol intake would be more likely if the patient comes to the clinic smelling of alcohol, or is having recurrent admissions for treatment-related toxicity. Two oncology experts highlighted that the diagnosis itself can actually alter the drinking patterns either for better or for worse, and in some instances making it difficult for patients to stop drinking.

Population level impact

One cardiology respondent suggested considering how the impact of reducing alcohol consumption on prognosis and risk of hospital admissions for a particular disease/condition would translate to an impact at population level. They highlighted that, for some

conditions such as alcohol-related heart failure or cardiomyopathy, although reducing alcohol intake could lower the incidence, this would have a limited impact on the population as a whole.

Discussion

Principal findings

The findings from this study reflect strong support among the experts that reducing alcohol consumption could result in improvement in prognosis for gastroenterology and emergency medicine patients. There were high levels of uncertainty of the benefits for oncology and cardiology patients, except for alcoholic cardiomyopathy where there was unanimous consensus for high benefit. The responses from the experts who participated in this study did not reflect the assumption that reducing alcohol consumption would result in benefits on the risk of hospital admission for patients for any of the specialties.

The severity of disease or condition was viewed as an important consideration when targeting patients for screening and interventions for alcohol problems. For most cardiovascular and gastroenterology diseases or conditions included in the second questionnaire, the proportion of specialists suggesting potential benefit from reduced alcohol consumption on prognosis and reduction in the risk of alcohol consumption generally increased with increasing severity of disease. For oncology, it was the opposite with the proportion suggesting potential benefit generally decreasing with increasing severity of disease. For emergency medicine, while in some cases the proportion suggesting potential benefit increased with increasing severity of disease, for some it was highest for moderate disease or condition (e.g. for work or machine injuries). The availability of easily accessible intervention for reducing alcohol consumption was suggested as important particularly for emergency and gastroenterology patients. Another issue viewed as important was the availability of aftercare and social support services within the community.

Study strengths and weaknesses

Although respondents were anonymous to each other, the researchers could link their responses to their email addresses. It is therefore possible that participants gave responses that they perceived to be aligned with current scientific and professional opinions. Linking the email addresses to the responses was however necessary to facilitate follow-up of non-responders for higher response rates. Even with such a procedure, however, the overall response rate from all those invited for the Delphi survey was about 31%, with approximately 51% retention rate for the second questionnaire. The number of respondents for each specialty for the first round of the Delphi was sufficient for consensus when considering recommendations by Fitch and colleagues of a minimum of seven [37]; while in the second round this was achieved for two specialties. For oncology, only three specialists responded to questions on the impact of reducing alcohol consumption on the risk of hospital admissions in the second questionnaire, making the interpretation of data from this section particularly difficult. It is also possible that participants gave responses that they perceived to be aligned to current discussions and literature on the topic because of the increased attention on alcohol problems and increased expectation for health care professionals to proactively detect and provide interventions for patients with alcohol problems.

We specifically asked the respondents not to consider the cost implications as this was not within the scope of the research described here. Moreover, although cost is important in the selection of treatment options, a recent study suggests outcomes of consensus development are affected by availability of resources only to a very limited extent [27]. In order for the research to be relevant to a number of stakeholders, we involved clinicians, a psychologist, commissioning managers for alcohol services and a team of researchers in the research process. The research process could however also have benefited from involving a representative from each of the other specialty areas of focus, namely cardiology, gastroenterology and oncology; for example, in the framing of the questions. However, the framing of the questions was only highlighted as problematic by one oncologist.

Comparison with other studies

There are suggestions that providing treatment for problem drinkers can reduce health care utilization, including hospital admissions, and cost [40–42]. However, our study suggests that benefits on reducing hospital admissions are not clear to health care professionals. In addition, a recent systematic review by Bray and colleagues concluded that screening and brief interventions for alcohol problems have little or no effect on inpatient or outpatient health care utilization, but may have a small, negative effect on emergency department utilization [43].

Implications of the study

The fact that availability of easily accessible intervention for reducing alcohol consumption was suggested for emergency and gastroenterology patients in particular is potentially related to the fact that, overall, reducing alcohol consumption was viewed to be more beneficial within these two settings when compared with cardiology and oncology patients. These findings could imply that health care professionals might be more willing to implement screening and interventions for alcohol problems among patients with gastroenterology and emergency medicine conditions than among patients with oncology and cardiology conditions. This opens up a useful discussion about the targeting of resources for hospital-based alcohol treatment. For example, where targeted screening and intervention by presenting condition is the strategy of choice, a focus on gastroenterology and emergency medicine could be an acceptable starting point.

Even though interventions for alcohol problems might be viewed as important for emergency medicine and gastroenterology patients, attempts to get health care professionals working with these patients, as well as in other general hospital settings, to screen for alcohol problems and deliver appropriate interventions have repeatedly failed [44,45]. Literature suggests that implementation can be facilitated by education and training of health care professionals to: (i) increase the awareness and understanding of alcohol problems; (ii) increase their knowledge on the benefits of, and skills in, detecting alcohol problems and providing interventions; and (iii) perceive screening and interventions for alcohol problems as their responsibility [44,46].

Where it is difficult for health care professionals to detect and deliver appropriate interventions, easy access to specialists on interventions for alcohol problems would encourage better identification and referral of patients, particularly where alcohol treatment could have a high impact [44]. Thus, at policy and practice levels, hospital settings such as emergency medicine and gastroenterology where high proportions of patients could greatly benefit from alcohol interventions can, as a minimum, implement an interdisciplinary collaborative team model where addiction specialists work alongside other health care professionals [44,45].

Unanswered questions and future research

Williams *et al*. conducted a secondary analysis of data to evaluate the associations between poor physical health and drinking after hospitalization and whether associations varied by alcohol dependence status and readiness to change [24]. Their results suggest that having an alcohol-attributable illness may catalyse reduction in drinking among medical inpatients with non-dependent unhealthy alcohol use and those who do not view their drinking as problematic. Our results suggest that even among the alcohol-attributable diseases or conditions, some are perceived by health care professionals as benefiting more from reduction in alcohol consumption in terms of prognosis and risk of hospital admissions than others. There is however still a need for robust empirical evidence on whether patients with diseases or conditions, which are perceived as potentially having the largest expected health gains from interventions aimed at reducing alcohol consumption, actually benefit more than those with other diseases or conditions. There is also a need for comparative evidence on the effectiveness, cost-effectiveness and acceptability of targeted screening by disease or condition versus universal screening. Research exploring effective and cost-effective ways of maximizing response rates of health care professional questionnaires is also needed [47].

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Contributors

Noreen D. Mdege conceived and designed the study, and collected, analysed and interpreted the data. Duncan Raistrick conceived and designed the study, interpreted the data, and supervised the study. Graham Johnson designed the study and interpreted the data. Noreen D. Mdege wrote the manuscript. All authors critically revised the manuscript for important intellectual content and have seen and approved the final version. All authors had access to the data used in this paper.

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Competing interests

All authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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Appendix 1: List of diseases or conditions included in the Delphi survey by specialty

Cardiology

Alcoholic cardiomyopathy
Hypertensive diseases
Ischaemic heart disease
Cardiac arrhythmia
Heart failure
Haemorrhagic stroke
Ischaemic stroke

Emergency medicine

Methanol poisoning
Ethanol poisoning/toxic effects of alcohol
Road traffic accidents – non-pedestrian
Fall injuries
Work/machine injuries
Firearm injuries
Fire injuries
Accidental excessive cold
Intentional self-harm/event of undetermined intent
Assault
Inhalation of gastric contents/inhalation and ingestion of food causing obstruction of respiratory tract
Epilepsy and status epilepticus
Mental and behavioural disorders due to use of alcohol
Spontaneous abortion

Gastroenterology

Alcoholic gastritis
Alcoholic liver disease
Oesophageal varices
Gastro-oesophageal laceration-haemorrhage syndrome
Cholelithiasis
Acute and chronic pancreatitis
Unspecified liver disease
Diabetes mellitus (type II)
Alcoholic myopathy
Degeneration of nervous system due to alcohol

Oncology

Malignant neoplasm of colon
Malignant neoplasm of rectum
Malignant neoplasm of liver and intrahepatic bile ducts
Malignant neoplasm of lip cavity and pharynx
Malignant neoplasm of larynx
Malignant neoplasm of breast
Malignant neoplasm of oesophagus

Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Impact on prognosis by severity of disease/condition.
Table S2. Impact on risk of hospital admissions by disease condition.

Definitions

Assessment	The use of procedures designed to explore fully the nature and extent of a person's problems with alcohol or illicit drugs, and to gain an understanding of exactly how they might be helped.
Comprehensive assessment package	Questionnaire(s) that are used as a package to explore fully the nature and extent of a person's problems with alcohol or illicit drugs, and to gain an understanding of exactly how they might be helped.
Dependence	When the level and pattern of alcohol or illicit drug use has resulted in a dependence syndrome which is a cluster of cognitive, behavioural and physiological symptoms.
General hospital setting	Inpatient medical units, hospital outpatients and accident and emergency departments (including trauma centres) based at hospitals not specializing in the treatment of psychiatric disorders or addiction.
Harmful use	When alcohol or illicit drug use is already causing damage to the user's physical or mental health.
Hazardous use	A level and pattern of unhealthy alcohol use or illicit drug use that puts the user at risk of harmful consequences (which maybe negative physical health, mental health or social consequences).
Illicit drug use	The use of drugs which are under international control (and which may or may not have licit medical purposes) but which are produced, trafficked and consumed illicitly.
Intervention	An act performed to prevent harm to a patient or to improve the mental, emotional, or physical function of a patient.
Novel psychoactive substance	A new narcotic or psychotropic drug, in pure form or in preparation, that is not controlled by the 1961 United Nations Single Convention on Narcotic Drugs or the

	1971 United Nations Convention on Psychotropic Substances, but which may pose a public health threat comparable to that posed by substances listed in these conventions.
Problem drug use	Regular illicit drug use with or without drug use disorders or dependence.
Screening	The use of procedures to identify individuals with alcohol or illicit drug use related problems or consequences, or those who are at risk for such problems.
Screening instruments	Questionnaires that are used to identify individuals with alcohol or illicit drug use related problems or consequences, or those who are at risk for such problems.
Unhealthy alcohol use	Any level of drinking that causes problems or puts the drinker at risk of developing problems

Glossary

ADAPTA	Addressing Drinking Among Patients: comparing Two Approaches
AHW	Alcohol health worker
ARiAS	Addiction Research in Acute Settings
BI	Brief intervention
HSCIC	Health and Social Care Information Centre
GGT	Serum gamma-glutamyltransferase
MCV	Mean corpuscular volume
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NPS	Novel psychoactive substance
RCT	Randomised controlled trial
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization

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