Health Research Board

HRB drug and alcohol evidence reviews

Scoping review of case management in the treatment of drug and alcohol misuse, 2003–2013

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HRB drug and alcohol evidence reviews

The HRB Drug and Alcohol Review series supports drug and alcohol taskforces, service providers and policy-makers in using research-based knowledge in their decision-making, particularly with regard to their assigned actions in the National Drugs Strategy. Topics for review are selected following consultation with stakeholders to identify particular information gaps and to establish how the review will contribute to evidence-based selection and implementation of effective responses. Each study will examine a topic relevant to the work of responding to the situation in Ireland.

HRB National Drugs Library

The HRB National Drugs Library commissions the reviews in this series. The library's website and online repository (www.drugsandalcohol.ie) and our library information services provide access to Irish and international research literature in the area of drug and alcohol use and misuse, policy, treatment, prevention, rehabilitation, crime and other drug and alcohol-related topics. It is a significant information resource for researchers, policy-makers and people working in the areas of drug or alcohol use and addiction. The National Drugs Strategy assigns the HRB the task of promoting and enabling research-informed policy and practice for stakeholders through the dissemination of evidence. This review series is part of the library's work in this area.

Health Research Board

The Health Research Board (HRB) is the lead agency in Ireland supporting and funding health research. We provide funding, maintain health information systems and conduct research linked to national health priorities. Our aim is to improve people's health, build health research capacity and make a significant contribution to Ireland's knowledge economy. The HRB is Ireland's National Focal Point to the European Monitoring Centre on Drugs and Drug Addiction (EMCDDA). The focal point monitors, reports on and disseminates information on the drugs situation in Ireland and responses to it and promotes best practice and an evidence-based approach to work in this area.

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HRB drug and alcohol evidence reviews to date

Munton T, Wedlock E and Gomersall A (2014) *The role of social and human capital in recovery from drug and alcohol addiction*. HRB Drug and Alcohol Evidence Review 1. Dublin: Health Research Board

Munton T, Wedlock E and Gomersall A (2014) *The efficacy and effectiveness of drug and alcohol abuse prevention programmes delivered outside of school settings*. HRB Drug and Alcohol Evidence Review 2. Dublin: Health Research Board

Nic Gabhainn S, D'Eath M, Keane M and Sixsmith JA (2016) *Scoping review of case management in the treatment of drug and alcohol misuse, 2003–2013*. HRB Drug and Alcohol Evidence Review 3. Dublin: Health Research Board

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Key messages

What this document is:

This is the final report of a scoping review commissioned by the HRB National Drugs Library. The objective of the review was to examine the peer-reviewed non-experimental literature on case management and substance use published between 2003 and 2013, and to answer specific research questions based on the literature. These comprised questions on the nature of case management, the outcomes that have been studied, and gaps in the literature.

How this review was undertaken:

The review was undertaken with a series of iterative searches of electronic databases and academic peer-reviewed journals, applying a suite of inclusion and exclusion criteria. Potentially relevant studies were screened and relevant data were subsequently charted from included studies, based on individual study objectives and reporting of the study procedures and outcomes. Each included study was also assessed for methodological quality.

Key messages for practitioner groups:

Case managers (Delivering)

Case managers need to be cognisant of the quality of the service being provided in terms of intensity, location of service provision, and the appropriateness of the model of case management being employed to the context. Services should be faithful to the approach being followed, especially so when the management approach is manualised. Where possible, case managers should strive to work with others on a partnership or team basis.

Service managers and budget holders (Planning)

Prior to implementing a case management approach to service delivery, it is vital to ensure that the capacity to audit the impact of the new approach is built into the delivery system. Both the general criteria for success in case management and the specific criteria related to particular models of case management should be thoroughly reviewed. Service objectives may be met by alternative approaches and a strong rationale should be developed prior to implementation. Similarly, ongoing monitoring and audit is essential to ensure that the service is fit for purpose and that client needs are being met.

Researchers and planners

Evaluators and researchers should ensure that their designs are as robust as possible, that the methods adopted for measuring process and outcome are well validated and appropriate, and that their reporting of outcomes is full and thorough. There is a need to address specific gaps in the evidence base, particularly the linking of models of case management with client groups and detailed process evaluation studies.

Case management

The term 'case management' has no universal definition, and has been described, explained and defined in multiple ways. Effectively, it is a model used to work with people who engage with medical, social and criminal justice services that goes beyond the provision of a single service with a single goal at the point of delivery. In a case management approach to service provision, clients are typically offered, and receive, or are linked to, a range of services tailored to meet their specific, individual needs. The objective of linking clients to relevant medical and social services is a key characteristic of this approach. Case managers also frequently work as advocates for their clients. This advocacy work may involve liaising with housing associations to address accommodation needs or liaising with job centres to improve employability. The rationale behind the linkage and advocacy work is that clients frequently present with multiple needs or complications which impact on their recovery or rehabilitation. Developing and maintaining links with existing services can help to address these multiple needs and aid the recovery process. Case management is also used to increase client retention in services and improve treatment outcomes.

Vanderplasschen *et al.*, (2007) identified six basic models following their review of the case management literature up to 2003, and these are outlined briefly below.

- **The brokerage model**: Case managers act as 'brokers', assisting clients to identify their needs and gain access to other services or supports; generally, a brief engagement with clients involving one or two meetings only.
- **Generalist models**: Case managers work with clients to identify needs and negotiate access to required services and supports; a longer-term and closer relationship with clients is developed over time.
- **Assertive community treatment (ACT)**: Case managers work in teams to help identify client needs and provide services directly through assertive outreach to clients.
- **Intensive case management (ICM)**: Case managers work on a more intensive individual basis with clients and usually have a lower caseload; to identify need, provide services directly and link clients with relevant services.
- **The strengths perspective**: Case managers seek to empower the client to identify their own strengths to build on, rather than primarily focus on correcting their deficits; this approach encourages the use of informal sources of support and help.
- **Clinical case management**: Case managers provide direct clinical input to clients and combine that with assistance in accessing other resources, particularly from the health and social care sector.

Why focus on case management?

Rehabilitation: the fifth pillar of the National Drugs Strategy

In recent years, the role of case management has been promoted in a number of important policy reports in Ireland, which include plans to improve service coordination for people in recovery from substance misuse. For example, the importance of providing an integrated rehabilitation service to meet the needs of current, stablised and former drug users was acknowledged in an important policy document mid-way through Ireland's 2001–2008 National Drugs Strategy. The report of the Steering Group for the Mid-term Review of the National Drugs Strategy (2005) recommended that rehabilitation become the fifth pillar of the strategy, and that a working group be established to develop an integrated rehabilitation provision. The report of the Working Group on Drugs Rehabilitation (2007) made a number of key recommendations and set out the structural arrangements required to implement them. One of these was the establishment of a National Drug Rehabilitation Implementation Committee (NDRIC), chaired by a senior rehabilitation coordinator and supported by a committee comprising representatives of statutory agencies, rehabilitation and healthcare professionals, problem drug users and families of problem drug users. It also proposed the appointment of a number of rehabilitation coordinators to contribute to the development of local protocols, service level agreements, quality standards and care plans, and to the overall tracking of client progression.

The Working Group recommended that the NDRIC develop broad national protocols to facilitate inter-agency working, and cover issues such as confidentiality, common assessment tools, referral procedures, and conflict resolution between agencies. It also recommended the preparation of a quality standards framework for service providers, to include enhanced case management procedures. The framework should help to identify the core competencies required by service providers to enable them to deliver rehabilitation programmes.

The National Drugs Rehabilitation Framework

In 2010, the Health Service Executive (HSE) published the National Drugs Rehabilitation Framework (NDRF), setting out how services to current and former drug users were to be provided in the form of supported integrated care pathways (ICPs) with the cooperation of different service providers. The report recognised that service users may present with diverse needs, such as treatment, education, vocational training, employment support and accommodation, and that no single agency can cater for all possible needs. An individual care plan for each service user needs to be delivered by a multidisciplinary team. Where a service user has complex and multifaceted needs, a more intensive case management approach may be used. The framework stated that the provision of rehabilitation pathways is a shared responsibility of the education, training and employment sectors alongside the health, welfare and housing sectors, non-governmental organisations, communities, families, and the individual themselves.

The ICP comprises four steps, linked to the four-tier model of service provision: initial contact, involving screening and referral; initial assessment and identification of appropriate service; comprehensive assessment, following which a case manager is identified to support the individual on their rehabilitation pathway; and implementation of the care plan. A range of services is made available in several treatment settings. The NDRF was piloted in a number of locations and an evaluation of the pilot was subsequently published (Barry and Ivers, 2014). As part of the evaluation, a number of service users were asked about their experience with their key workers and case managers. They were generally positive about the support they had received and spoke about the benefits of connecting with services.

Most of the key workers/case managers involved in the evaluation reported always engaging in care planning and inter-agency meetings, and the remainder reported engaging sometimes. Service managers reported some difficulty in undertaking comprehensive assessments with clients. All service managers reported some engagement in inter-agency working, but all reported some difficulty implementing service level agreements. Both service managers and key workers/case managers reported an improvement in communication, in sharing of information and in making referrals following implementation of the framework. In their conclusion, the authors noted that there appeared to be general support for the framework, but that service providers clearly have difficulties in implementing elements of the framework, particularly the area of inter-agency working.

Recovery has become an increasingly important concept in the design and implementation of substance use treatment and rehabilitation services in a number of countries. Recovery now has a prominent role in drug policies in the United States, England, Wales and Scotland (Laudet and Humphreys, 2013).

The current EU Action Plan on Drugs (2013-2016) (Council of the European Union, 2013) calls on member states to implement recovery and social re-integration services as part of an expanded demand reduction pillar. In 2014 the Commission on Narcotic Drugs, the UN's drug policy-making body, passed a resolution on 'supporting recovery from substance use disorders' (E/CN.7/2014/L.9/Rev.1). A recent review of addiction services in North Dublin recommends that addiction services should be delivered around clinical care pathways for drugs and alcohol, with a focus on recovery defined as 'an individual, person-centred journey, enabling people to gain a sense of control over their own problems, the services they receive, and their lives and providing opportunities to participate in wider society' (Pilling and Hardy, 2013, p.6).

Arising from this international and national policy drive to improve coordination of services for people in recovery from substance use, and with case management being promoted as a key mechanism of coordination, it was decided to review some of the evidence on this intervention. Specifically, this review was commissioned to examine the non-experimental research literature on case management and people in recovery from substance misuse. The objectives of the review were to explore the nature of case management as reported in the literature, document the outcomes associated with case management and identify the gaps in the research literature. The purpose of the review is to produce a report that can be used by policy-makers and practitioners in Ireland

to update their understanding and use of case management as an approach to improving service coordination and recovery outcomes for people in recovery from substance misuse.

The review method

This is a scoping review. Scoping reviews involve searching, selecting, charting, assessing and collating the literature on a specific area of research interest (Daudt, van Mossel and Scott, 2013; Arksey and O'Malley 2005). Scoping reviews mirror systematic review processes in their execution, but differ in their outputs. Arksey and O'Malley (2005), in their definition of scoping studies, include reference to this review process being 'rapid'. However, this is questioned by Daudt *et al.,* (2013) who explicitly omit reference to 'rapid' from their definition (developed from that of Arksey and O'Malley, 2005), acknowledging that scoping reviews take time. Nevertheless, relative to other forms of reviewing the literature, such as systematic reviews, scoping reviews are less time consuming to carry out. Scoping reviews can be undertaken for one or more of the following purposes:

- To gain insight into the range, extent and nature of research on a specific area of interest
- To identify the types and sources of evidence in order to inform research, policy and practice
- To explore the feasibility and usefulness of undertaking a systematic review
- To identify gaps in the research.

(Arksey and O'Malley, 2005; Daudt *et al.,* 2013).

Arksey and O'Malley (2005) developed a six-stage framework for undertaking a scoping review which has been enhanced by Levac, Colquhoun and O'Brien (2010) and by Daudt *et al.,* (2013). This current review draws on the original framework and its subsequent developments. Table 1 summarises the stages of the framework which were adapted for this scoping review, notably through the use of quality assessment of articles identified, and it documents the activities undertaken at each stage.

While this framework appears linear as it is presented, moving from stage to stage through the process, due to the iterative nature of most stages, the results of the completion of one stage may result in the need to return to an earlier stage. The iterative nature of scoping reviews is commonplace, as the research team does not have an *a priori* protocol with specific components to follow. This is demonstrated in relation to stage 2 where, on completion, the outputs could mean a return to stage 1 with revisions of the research question followed by the need to repeat stage 2, the search. This pattern of moving backwards and forwards through the stages is mirrored within the stages with, for example, an iterative search process developing in stage 2 as the search is progressed. This pattern of development, both within and between stages, is reflected in this scoping review.

Table 1: Summary of the adapted Arksey and O'Malley's methodological framework (2005) drawing on Levac *et al.*, (2010) and Daudt *et al.*, (2013)

Staged framework for scoping studies	This scoping study
Stage 1: Identify the research question	Initial exploration of the literature identified that there was no agreed definition of case management used in articles, and this was acknowledged in systematic reviews of the topic area. It was therefore decided to adopt an exploratory approach consistent with the purposes of scoping reviews to address the following questions: 1. What additional knowledge regarding the nature of case management can we gain from a review of recent non-experimental research literature? 2. What outcomes have been evaluated in the non-experimental research literature? 3. What are the gaps in the non-experimental literature?
Stage 2: Identify and retrieve relevant articles[3]	Electronic databases and academic journals (see Appendix A) were identified and searches were undertaken using developed search strings (see Appendices B, C, D) in order to identify literature relevant to the study and in relation to the initial research questions. This stage was repeated through an iterative process as the search progressed, with the inclusion of alternative search terms and additional databases.
Stage 3: Article selection[4]	Inclusion and exclusion criteria for the scoping study were developed through an iterative process as the series of searches progressed. Articles identified were assessed as follows: 1. The articles were screened by title and abstract against the inclusion and exclusion criteria (see Appendix E). 2. Where the same article was identified more than once, the duplicate was removed. 4. Full-text screening was undertaken to ensure fit to criteria. 5. An analysis of a subsection of the literature identified specifically referenced assertive community treatment (ACT) and intensive case management (ICM) and these were added to the search strategy.
Stage 4: Charting the data	The articles were sifted, sorted and charted based on key issues and themes. Data were extracted from the selected articles and recorded in tables (data-charting forms). The format of these tables and the data identified for extraction were informed by the purpose of the scoping study and, as with the other stages, this was an iterative process progressing as the charting of this scoping study developed.
Stage 5: Quality review of articles[5]	Articles identified for inclusion in the review were assessed for quality using the Mixed Methods Appraisal Tool (MMAT) (see Appendices G and H).
Stage 6: Collating, summarising and reporting	The data extracted from the included studies and charted in the tables were collated and summarised under the following headings; location of study, study type, case management models, intervention duration, mode of delivery, study population, data collection and data type, study indicators and study outcomes.

3 Conducted by a single researcher, with referral to a senior team member in case of doubt about inclusion.

4 Conducted by the single senior researcher who had previously completed stage 2, and repeated by a second senior member of the research team.

5 Conducted independently by two senior members of the research team, followed up by discussion and agreement on minor discrepancies.

Framing the review

It was decided at the outset that the review team would search for articles published in peer-reviewed journals from 2003 to 2013 in order to extend and build on the knowledge produced by Vanderplasschen *et al.,* (2007). In their review, Vanderplasschen *et al*., searched for articles in peer-reviewed journals between 1993 and 2003; they reported that no evaluation studies of case management and substance-abusing populations were published in peer-reviewed journals prior to 1993. As their cut-off date for searching was 2003, it was decided that the search in this review for relevant articles would stretch from 2003 to 2013, representing a decade of evaluative inquiry into case management for substance-abusing populations. Following Vanderplasschen *et al*.'s lines of inquiry and extending same, in order to be included in this study articles must have reported on the evaluation of at least one model of case management targeting substance-abusing populations, and must have reported at least one outcome variable. All types of study design, excluding those with a randomised design, were considered for inclusion. The reason for excluding randomised control trials (RCTs) from this review is that Rapp *et al*., (2014) have undertaken a review of case management and people in substance addiction recovery, and only included RCTs. In addition, the review by Rapp *et al*. primarily addressed the effectiveness of case management for people in recovery for substance addiction; in essence, they sought to answer the question 'does case management work for this target group?'

Our review wanted to extend the knowledge base beyond effectiveness by addressing questions as to the nature of case management, the outcomes that have been evaluated in non-experimental designs, and gaps in the literature. These questions were designed mainly to provide evidence to assist practitioners to implement effective models of case management and set established benchmarks for evaluating the effectiveness of their work. In order to focus this review, the three research questions we agreed at the outset were:

1. What additional knowledge regarding the nature of case management can we gain from a review of recent non-experimental research?
2. What outcomes have been evaluated in the non-experimental research literature?
3. What are the gaps in the literature?

Search, identification and selection of articles

The processes of exploring, searching and identifying relevant literature went through a total of four iterations. Initial exploration of the literature sought to identify definitions of case management. The purpose of this was to use the definitions to build and develop further searches, as it was expected that evaluations of case management would include a definition, and these articles would help us to identify indicators, outcomes and active components of the intervention which would be used to develop further searches. On reading the full text of articles identified it became clear that they did not offer a consistent or detailed definition of case management; rather, if anything, they tended to list the functions or component parts of case management and, possibly, indicate the intensity of case management. It was agreed that, as the review was unlikely to establish an agreed or articulated definition of case management, the focus of the review would be reoriented and the systematic search process would be developed to reflect this.

The first search undertaken systematically was conducted using the following databases: Scopus, MEDLINE, PubMed, PsycINFO and CINAHL (see Appendix A). Search terms included, but were not restricted to, case management, substance (ab)use, drug (ab)use, evaluation and outcomes. (First search terms and results of searches are documented in Appendix B.) The searches returned a total of 1,453 articles; these were scanned by title and abstract with reference to the terms case management and substance abuse. This preliminary screening resulted in 304 articles which were exported into an EndNote database. These articles were screened based on a full-text reading against six criteria (see Appendix E).

When duplicates and articles outside the time frame were removed, the number remaining was 109.

It became evident as the first search progressed that the terms 'critical time intervention' and 'addiction' should be added, in order to investigate whether the use of these terms gave rise to further relevant articles. These terms, which featured in articles identified in the first systematic search, were used in a second systematic search with the

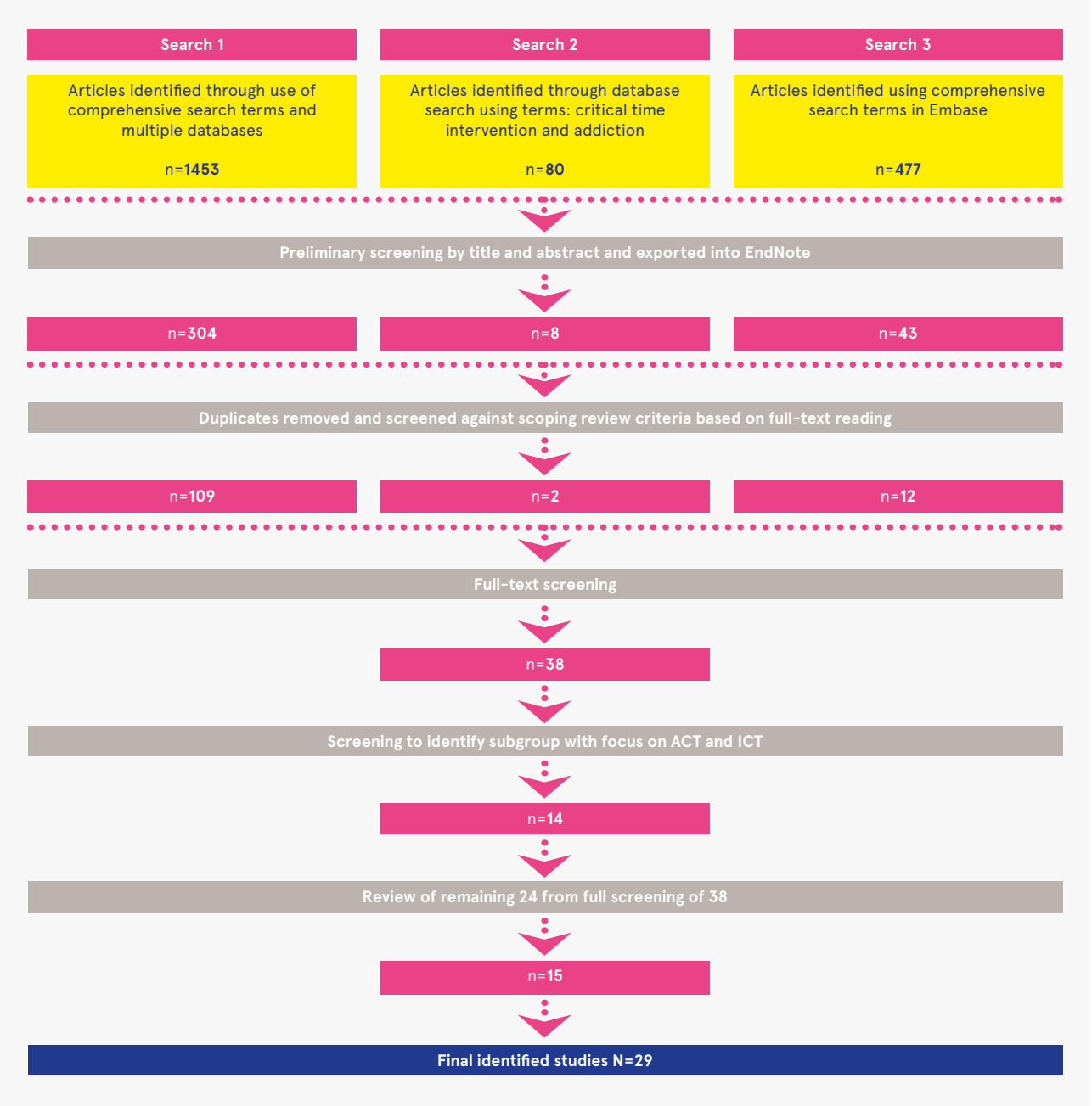
same databases (see Appendix C). The process of screening followed that of the first search and resulted in eight articles out of a total of 80 identified being exported into EndNote; two of these articles were kept for further review. Those excluded were found to be duplicates of studies already identified, or did not meet the criteria.

The third systematic search used search terms previously identified and focused on the Embase database (see Appendix D). This search identified a total of 477 articles which, when screened and reviewed as in the first and second searches, resulted in 43 articles, which, when further screened, were reduced to 12.

A total of 123 articles were identified from the three searches, which then underwent full-text screening. Arising from the full-text screening, 29 papers were selected based on the criteria for inclusion in this review. These 29 papers form the substantive basis of this report.

The search terms and results of the searches by database are detailed in Appendices B, C and D.

Table 2: Summary of searches undertaken as part of this scoping review



Quality assessment

The initial framework developed by Arksey and O'Malley (2005) does not recommend an appraisal of the methods of studies that are included in a scoping review. The rationale given by Arksey and O'Malley is that as a scoping study does not synthesise the results from multiple studies and does not look to 'weigh' the evidence, thus there is no need to appraise the methods used in the studies identified in the literature. Indeed, it is the absence of the synthesis and attempts to weigh the evidence that can sometimes distinguish a scoping review from a systematic review.However, Levac *et al.*, (2010) and Daudt *et al*., (2013) challenge this viewpoint, concluding that the assessment of the quality of included studies is necessary in scoping reviews. Critical appraisal of articles identified through a scoping study is, in and of itself, challenging. The nature of scoping studies can result in the identification of a myriad of diverse research designs, including quantitative, qualitative and mixed-methods approaches and therefore appraising these studies may require the use of multiple instruments.

A tool designed to facilitate the critical appraisal of studies with a range of designs has been developed: this is the Mixed Methods Appraisal Tool (MMAT) (Pluye *et al*., 2011). Reliability of MMAT criteria was, in an initial study, found to be moderate to perfect (Pace *et al*., 2012), and in subsequent research with a larger sample size of studies it was found to be an efficient tool with variations in reliability by criterion, from fair to perfect (Souto, Khanassov, Hong, Bush, Vedel and Pluye 2015). Souto *et al*., (2015) identified that further improvement was required in order to increase reliability, particularly in relation to two items in the qualitative research domain. Despite these cautionary notes regarding the reliability of the MMAT instrument, it is efficient to use and capable of detecting any major flaws in the reporting of methods. Therefore, it was decided to use it to appraise the methods of each of the studies included in this review.

The specific criteria developed as part of the MMAT varies by methodological domain and subdivision. In each domain and sub-division, once an article passes the screening questions, listed below, there is a series of specific criteria, expressed as questions, which are applied to determine study quality (see Appendix G). The maximum score possible for any article is 100% or (****).

MMAT screening questions:

1. Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed-methods question (or objective)?
2. Do the collected data allow for the research question (or objective) to be addressed?

Quality assessment of studies for this review

The MMAT was employed to review each of the 29 articles. As part of the review process, papers are divided into methodological domains: mixed methods, qualitative and quantitative. The quantitative domain is subdivided into three: randomised controlled, non-randomised and descriptive.

The current review contains peer-reviewed journal articles classified into four groups: qualitative studies (n=4), quantitative studies with a non-randomised design (n=20), quantitative studies with a descriptive design (n=2), and mixed-methods studies (n=3). The approach adopted to the classification of articles into these four groups was taken directly from the work on the MMAT as presented by Pluye *et al*., (2009), and the studies classified into each group are listed in Appendix G.

The three articles classified as mixed-methods studies did not conform to the classic mixed-methods designs as described, for example, by Creswell and Plano Clark (2007). The articles did not label themselves as being 'mixed methods', but they included qualitative and quantitative data which were collected and analysed with the purpose of meeting the overall research objective. In these cases the criteria for the appraisal of mixed-methods studies were applied. In accordance with guidance provided by Pluye *et al*., (2011), those articles classified as mixed methods were awarded quality scores in line with the lowest score of their specific components.

Appendix G presents detail on the screening questions, quality criteria and scoring of the 29 articles included in this review. Achieved quality scores span the range of possible scores from 25% (*) to 100% (****). The four articles in the qualitative domain scored between 75% (***) and 100% (****); articles in the quantitative –

non-randomised subdivision – scored between 25% (*) and 100% (***); articles in the quantitative – descriptive subdivision – scored between 75% (***) and 100% (****); while those in the mixed-methods domain scored between 50% (**) and 75% (***). The quality scoring is an indicator of the reliability of the study findings. Table 3 below provides a categorisation of the articles by methodological domain and score.

Table 3: Reviewed journal articles by MMAT quality criteria scores

	25% (*)	50% (**)	75% (***)	100% (****)
Qualitative studies			Angell and Mahoney (2007) Kolind *et al.*, (2009) Tiderington *et al.*, (2013)	Redko *et al.*, (2007)
Quantitative descriptive studies			Dates *et al.*, (2009)	George *et al.*, (2010)
Quantitative non-randomised studies	Jansson *et al.*, (2003) Friedmann *et al.*, (2004) Day *et al.*, (2012) Shaboltas *et al.*, (2013)	McLellan *et al.*, (2003) Jones *et al.*, (2004) Merrill *et al.*, (2004) Smelson *et al.*, (2005) Cunningham *et al.*, (2007) Passetti *et al.*, (2008) May *et al.*, (2008)	McKay *et al.*, (2003) Chan *et al.*, (2005) Alexander *et al.*, (2007) Bowser *et al.*, (2010) Hughes *et al.*, (2013) Kirk *et al.*, (2013)	McLellan *et al.*, (2005) Smith *et al.*, (2010) Slesnick *et al.*, (2012)
Mixed methods studies		van Draanen *et al.*, (2013)	Passey *et al.*, (2007) Neumiller *et al.*, (2009)	

Narrative review of case management research

This section of the review relates to stage 6 in the scoping framework outlined in Table 1, which covers the collating, summarising and reporting of the relevant data extracted from the included studies. The section includes a narrative description of the key characteristics of 29 peer-reviewed articles examining the role of case management and substance use; the selected characteristics were chosen to provide insight into the issues raised in the three broad questions identified at the beginning.

1. What additional knowledge regarding the nature of case management can we gain from a study of recent non-experimental research?
2. What outcomes have been evaluated in the non-experimental research literature?
3. What are the gaps in the literature?

A data extraction tool was developed and used to record the characteristics of each study and its findings. Appendix F presents the extracted data arranged by the following parameters: purpose, methods and reported outcomes from the 29 studies included in review. These data are presented in a table and included are included in Appendix F. Data presenting the following parameters: citation, location, intervention, population, gender, delivery, model, length, team, qualitative or quantitative study and primary or secondary study are presented in a table that will be made available online in an additional document.

The content and findings from the 29 articles reviewed are presented under the following headings:

- Location
- Study type
- Case management models
- Intervention duration
- Mode of intervention delivery
- Study populations
- Data collection and data type
- Study measures and indicators
- Study outcomes

Location

Of the 29 articles reviewed, 21 were undertaken in the USA, and seven of these contained data collected across multiple sites in that country (Alexander *et al*., 2007; Angell and Mahoney, 2007; Dates *et al*., 2009; Friedmann *et al*., 2004; McKay *et al*., 2003; McLellan *et al*., 2003; Neumiller *et al*., 2004). Two articles reported on studies in Maryland (Jansson *et al*., 2003; Jones *et al*., 2004), two in New Jersey (Merrill, 2004; Smelson *et al*., 2005), two in California (Bowser *et al*., 2010; Chan *et al*., 2005), and one each in New York (Tiderington *et al*., 2013), Arkansas (Smith *et al*., 2010), Connecticut (Kirk *et al*., 2013), Missouri (Cunningham *et al*., 2007), Philadelphia (McLellan *et al*., 2005), the Midwest (Redko *et al*., 2007), the Northern Plains (May *et al*., 2008) and an unspecified large Midwestern city (Slesnick and Erdem, 2012).

Two of the remaining were undertaken in New South Wales, Australia (Passey *et al*., 2007; Day *et al*., 2012), two in England (Passetti *et al*., 2008; Hughes *et al*., 2013), two in Ontario, Canada

(George *et al*., 2010; van Draanen *et al*., 2013), one in St. Petersburg, Russia (Shaboltas *et al*., 2013) and one in both Denmark and Belgium (Kolind *et al*., 2009).

Study type

Two of the articles investigated fidelity to ACT interventions, which concentrated on the extent to which the examined interventions were faithful to the intended approach (Dates *et al*., 2009; George *et al*., 2010); four investigated the qualitative experiences of case managers across multiple settings (Kolind *et al*., 2009; Angell and Mahoney, 2007; Redko *et al*., 2007; Tiderington *et al*., 2003); and three examined aspects of case management implementation (Alexander *et al*., 2007; Neumiller *et al*., 2009; McKay *et al*., 2003). The remaining 20 articles reported on evaluations of case management interventions, although there were wide variations in the case management approaches described, the outcome measures employed, and the target population and contexts. The evaluation studies were rated weaker on quality assessment when compared with the other studies.

Case management models

Assertive community treatment (ACT) was examined in eight of the studies (Hughes *et al*., 2013, George *et al*., 2010; Passetti *et al*., 2008; Dates *et al*., 2009; Tiderington *et al*., 2013; Neumiller *et al*., 2009; Cunningham *et al*., 2007; Smelson *et al*., 2005). Two of these studies examined fidelity to the ACT model (Dates *et al*., 2009; George *et al*., 2010), one examined the implementation of ACT (Neumiller *et al*., 2009), and one added a time-limited case management (TLCM) approach to ACT (Smelson *et al*., 2005). Another study (Hughes *et al*., 2013) described alcohol assertive case management, which incorporated many of the dimensions of ACT. Four studies reported intensive case management (ICM) (van Draanen *et al*., 2013; Shaboltas *et al*., 2013; May *et al*., 2008; Angell and Mahoney, 2007). A further eight studies did not specify what type of case management model they examined (Jansson *et al*., 2003; Jones *et al*., 2004; Bowser *et al*., 2010; Slesnick and Erdem, 2012; McKay *et al*., 2003; McLellan *et al*., 2003; Friedmann *et al*., 2004; Merrill, 2004), and did not provide sufficient information on the intervention for this to be deduced, while two of the studies that looked at the experiences of case managers did so across different programmes and types of models (Alexander *et al*., 2007; Kolind *et al*., 2009).

The remaining studies examined clinical case management (McLellan *et al*., 2005), community case management (Passey *et al*., 2007), probation case management (Chan *et al*., 2005), targeted case management (Kirk *et al*., 2013), strengths-based case management (Redko *et al*., 2007), and a continuum of care model (Smith *et al*., 2010), and one compared individual to team-based case management (Day *et al.,* 2012).

Intervention duration

In 11 of the evaluations it was not possible to clearly identify the duration of the intervention from the data reported. In eight other evaluations, the duration of interventions ranged from four weeks (Jones *et al*., 2004) to a mean of 17 months (May *et al*., 2008), with most lasting 6–12 months (Bowser *et al*., 2007; McLellan *et al*., 2003; Hughes *et al.,* 2013; Passey *et al*., 2007; Slesnick and Erdem, 2012; Smelson *et al*., (2005).

Mode of intervention delivery

Six of the studies made it clear that case management was offered by a team (Smelson *et al*., 2005; Cunningham *et al*., 2007; Passetti *et al*., 2008; Day *et al*., 2012; Hughes *et al*., 2013; Shaboltas *et al*., 2013), and these were primarily associated with ACT. Four articles either did not specify whether a team approach was used or were unclear on this issue, and none of these specified their case management model (Jansson *et al*., 2003; McLellan *et al*., 2003; Friedmann *et al*., 2004; Bowser *et al*., 2010). Nine of the articles (Jones *et al*., 2004; Merrill, 2004; Chan *et al*., 2005; McLellan *et al*., 2005; May *et al*., 2008; Smith *et al*., 2010; Slesnick and Erdem, 2012; Kirk *et al.,* 2013; Passey *et al*., 2007; van Draanen *et al*., 2013) reported that a single case manager was used, but there was no clear pattern in the case management approach used in these studies. We can say that none of these studies employed ACT. None of the 10 remaining articles reported who delivered case management, and these studies were rated relatively poorly during the quality assessment process.

Where there was a team approach to case management, the case management team was usually multidisciplinary (Passetti *et al*., 2008; Cunningham *et al*., 2007; Hughes *et al*., 2003; Shaboltas *et al*., 2013), although in one case teams were described as nurse led (Day *et al*., 2012), and in another no detail on the case managers was provided (Smelson *et al*., 2005). In the four articles that were not clear or specific on whether there was a team approach (Jansson *et al*., 2003; McLellan *et al*., 2003; Bowser *et al*., 2010; Friedmann *et al*., 2004), information on the training or discipline of the case managers was either omitted or vague. A wide range of backgrounds for case managers was reported. These included: postgraduate students (Slesnick and Erdem, 2012), probation officers (Chan *et al*., 2005), social workers (Smith *et al*., 2010) and recovery specialists (Kirk *et al*., 2013). Four of the articles reported that the case managers were specifically recruited (May *et al*., 2008; Merril, 2004; Passey *et al*., 2007), and/or trained as case managers (McLellan *et al*., 2005; Passey *et al*., 2007).

Study populations

Data were collected from ACT teams in the studies of programme fidelity (Dates *et al*., 2009; George *et al*., 2010). The studies on implementation (Alexander *et al*., 2007; McKay *et al.,* 2003; Neumiller *et al*., 2009) used data collected from service providers and service users, and there were four qualitative studies on the experiences of case managers (Angell and Mahoney, 2007; Kolind *et al*., 2009; Redko *et al*., 2007; Tiderington *et al*., 2013). Eight of the 20 evaluations with clients of case management focused on women only; three of these evaluations were specifically aimed at women having, or at risk of having, alcohol or drug-affected babies (Jansson *et al*., 2003; Jones *et al*., 2004; May *et al*., (2008); a fourth evaluation was aimed at homeless women with young children (Slesnick and Erdem, 2012). Of the remaining four evaluations that focused on women clients only, two were aimed at women who were in receipt of welfare support, and were abusing substances (McLellan *et al*., 2003; Merrill, 2004); one evaluation focused on female offenders who had spent long periods of time in jail (Chan *et al*., 2005) and one evaluation focused on rural women who were drug dependent (Passey *et al*., 2007). The sex of programme recipients was not specified in two studies (Hughes *et al*., 2013; Smelson *et al*., 2005), both of which targeted inpatients or those regularly admitted to inpatient facilities.

Both sexes were the focus in the final 10 evaluation studies, with both men and women comprising the study sample in each of the 10 evaluations. The study populations in these mixed gender evaluations reported high levels of hospitalisation (Kirk *et al*., 2013; McLellan *et al*., 2005; van Draanen *et al*., 2013), offenders (Bowser *et al*., 2010; Smith *et al*., 2010), those in substance abuse treatment (Friedmann *et al*., 2004), those in opioid-specific treatment (Day *et al*., 2012), intravenous drug users (IVDUs) with HIV (Shaboltas *et al*., 2013), those who were alcohol dependent (Passetti *et al*., 2008), and those who were homeless (Cunningham *et al*., 2007).

Data collection and data type in nine non-evaluation studies

All nine of the non-evaluation studies collected primary data. Indeed, all the studies that used only primary qualitative data were among these non-evaluation studies (Angell and Mahoney, 2007; Kolind *et al*., 2009; Redko *et al*., 2007; Tiderington *et al*., 2013). The non-evaluation studies fell into three/four main groups; however, these were not mutually exclusive, as some studies fell into more than one group. As follows:

1. **Assessment of fidelity:** Both George *et al*., (2009) and Dates *et al*., (2009) collected quantitative data using the Dartmouth Assertive Community Treatment Scale (DACTS) to assess intervention fidelity. Neumiller *et al.,* (2009) also reported on DACTS data collected within a suite of other data for their study.
2. **Experiences of case managers:** Both Kolind *et al*., (2009) and Angell and Mahoney (2007) collected qualitative data by interview to investigate the experiences of case managers in implementing case management. Kolind *et al*., (2009) focused on how case managers in different jurisdictions approached and dealt with dilemmas in their work, while Angell and Mahoney (2007) focused on perceptions of working alliances from the perspective of case managers. Tiderington *et al*., (2013) also collected qualitative data by interview from case managers, but in their case the focus was on how case managers implement a harm reduction approach in their work, and this was supplemented by observational data.
3. **Reviews of activity across multiple sites:** Neumiller *et al.,* (2009) used both qualitative and quantitative data provided by individual intervention programmes as a series of case

studies of the ACT intervention. These data included fidelity measures as well as information on programme structure, adaptions and other dimensions of implementation. Alexander *et al*., (2007) reported on data collected as part of the National Drug Abuse Treatment Survey System (NDATSS), which were collected from programme administrators via telephone survey. Alexander *et al*.,'s specific interest was the extent to which specific elements of case management (active management, extent of coverage, and both on-site/off-site case management) are related to the reported engagement of clients with ancillary health and social care services. The data analysed by McKay *et al*., (2003) were collected from clients across 10 sites via standardised interviews, and were described as quantitative. These data focused on the services that clients reported receiving during their time in the case management interventions.

4. **Investigations into working alliances:** Two studies used exclusively qualitative methods to investigate working alliances between case managers and their clients. As noted above, Angell and Mahoney (2007) examined the perspectives of 15 case managers across two teams, while Redko *et al.,* (2007) examined working alliances from the perspectives of 26 clients via both focus groups and individual interviews.

Data collection and data type in 20 evaluation studies

Among the evaluation studies, two studies employed both qualitative and quantitative primary data (Passey *et al*., 2007; van Draanen *et al*., 2013). As part of the interview schedule administered to case management clients during Passey *et al*.,'s (2007) evaluation, respondents completed standardised surveys providing quantitative data, and answered qualitative questions about their case management experiences. In contrast, van Draanen *et al*., (2013) complemented their structured, standardised quantitative self-report data from clients with 10 semi-structured interviews. Friedmann *et al*., (2004) also employed both qualitative and quantitative data, but in this case the data were pre-existing, having been collected as part of the National Treatment Improvement Evaluation Survey (NTIES), and the qualitative subjective data were subsequently standardised and transformed into numerical data.

For two further evaluation studies, (Passetti *et al*., 2008; Smith *et al*., 2010), the data employed included quantitative administrative data on treatment factors (e.g., length of hospitalisation, programme engagement). Passetti *et al*., (2008) also reported on data collected via structured interview from clients about their social and psychological well-being. However, in neither case is it clear whether the data presented were collected specifically for the purposes of the evaluation being reported or whether the data were already extant. Five of the evaluation studies clearly drew exclusively on existing administrative data in order to undertake secondary data analysis (McLellan *et al*., 2005; Smelson *et al*., 2005; Merrill, 2004; Kirk *et al*., 2013; Hughes *et al*., 2013). In these five studies the primary sources of data were information sets collected at intake or admission, and later at discharge or follow-up, along with programmatic data collected on issues such as programme engagement and attendance.

All remaining 10 evaluation studies employed primary quantitative data, collected almost exclusively directly from clients. Structured interviews with clients were the primary source of the data employed by McLellan *et al*., (2003), Shaboltas *et al*., (2013), Jones *et al*., (2004), Cunningham *et al*., (2007), Slesnick and Erdem (2012), Chan *et al*., (2005) and Bowser *et al*., (2009). In the study by Shaboltas *et al*., (2013) the interview data were supplemented by the collection and analysis of blood samples from clients, whereas in the case of Slesnick and Erdem (2012) the interview data were supplemented by the data derived from urine analysis. Bowser *et al*., (2009) added some interview data from programme staff to their suite of data for analysis.

In the other three studies, the methods for data collection varied, or were unclear. Jansson *et al*., (2003) collected their data via telephone interviews, while Day *et al*., (2003) conducted data collection via self-completion questionnaires. In the report of the evaluation conducted by May *et al*., (2008), the information provided does not make it clear whether the structured assessment of the clients that was conducted was interviewer administered or collected via self-report.

Study measures and indicators

A wide range of measures was included in the articles reviewed. Both fidelity studies used a standardised measure, the DACTS (Dates *et al*., 2009; George *et al*., 2010), and both reported medium to high levels of fidelity in the ACT interventions they studied.

The four studies that collected qualitative data from case managers used an explorative approach to investigate the relationships between case managers and their clients (Angell and Mahoney, 2007; Kolind *et al*., 2009; Tiderington *et al*., 2013; Redko *et al*., 2007). The three implementation studies focused on programme modification within services and client outcomes such as the use of social, health and ancillary services (Alexander *et al*., 2007) and housing, education and employment (Neumiller *et al*., 2009; McKay *et al*., 2003).

The indicators employed within the 20 evaluation studies reviewed varied widely. For the purposes of this review, we categorised these indicators into eight groups as outlined in Table 4.

Table 4: Outcome indicators employed across evaluation studies

Type of indicator	Number of evaluations
Substance use	15
Psychosocial functioning	13
Treatment factors	10
Health	7
Crime/legal	6
Employment/education	5
Housing	4
Health service utilisation	4

Indicators classified in Table 4 as 'treatment factors' included such measures as programme retention and engagement with services; in contrast, 'health service utilisation' included measures such as re-hospitalisation and emergency department visits. Five of the evaluations did not include 'substance use' as an indicator. All five evaluations were carried out in the USA (Kirk *et al*., 2014; Friedmann *et al*., 2004; Merrill, 2004; Smelson *et al*., 2005; McLellan *et al*., 2005), and all used secondary analysis of administrative data. McLellan *et al*., (2005) assessed health service utilisation only; in contrast, Kirk *et al*., (2014), Merrill (2004) and Smelson *et al*., (2005) assessed treatment factors only. Friedmann *et al*., (2004) added some primary data collection to their use of existing administrative data, and assessed a selection of indicators comprising 'psychosocial functioning', 'treatment factors', 'health', 'employment/education' and 'housing'.

Study outcomes

Implementation studies

The three implementation studies also included reference to intervention outcomes. Alexander *et al*., (2007) reported a weak relationship between standard case management and the use of social services or aftercare plans, but that more active case management was associated with the increased use of health and ancillary services. The survey reported by Neumiller *et al*., (2009) focused on only ACT service providers; they reported challenges in implementation as well as successes related to reduced levels of hospitalisation, psychiatric symptomology and substance use among their clients. In turn, McKay *et al*., (2003) reported wide variation in service provision across different sites following the same programme; they also reported that longer client retention in treatment led to better alcohol use outcomes, but not to paid employment or positive outcomes in relation to drug use.

Evaluations

Evaluations not reporting positive outcomes

Among the 20 evaluations included in this review, only three did not find sufficient evidence to support the claim that case management contributed to improved outcomes for clients. These three studies were carried out in the USA. Chan *et al*., (2005) compared drug-involved women offenders receiving a probation case management (PCM) intervention and a standard probation intervention. Results showed modest change over time with both interventions, but PCM did not result in better outcomes when compared with standard probation. Friedmann *et al.,* (2004), who reported on outcomes from a national sample of substance abuse treatment centres, could find no evidence that designating case management staff facilitates

improved comprehensive services delivery in addiction treatment programmes. The third evaluation (Cunningham *et al*., 2007) examined the influence of 'working alliances' between case managers using ACT and their homeless clients on intervention outcomes, and reported no evidence of a causal relationship between the two. Cunningham *et al*., (2007) investigated causality in the relationship between client outcomes and the working alliance – essentially to determine whether symptom reduction in clients leads to a better working alliance or, conversely, whether a better working alliance between case managers and clients leads to symptom reduction. They reported that the relationship was small and largely reciprocal. The authors concluded that the working alliance instrument (WAI) may not be an appropriate tool for investigating the case management relationship for people experiencing homelessness, problematic substance use and material disadvantage, because the measure may not adequately capture the working alliance construct or because the problems faced by this client group are too severe to be modified by one-to-one interactions.

All three studies (Cunningham *et al*., 2007; Chan *et al*., 2005 and Friedmann *et al*., 2004) analysed quantitative data in quantitative non-randomised study designs and reported on the outcome indicators of psychosocial functioning and health factors. Two of these three evaluations reported on substance use outcomes (Chan *et al*., 2005; Cunningham *et al*., 2007). Chan *et al*., (2005) also included crime-related outcomes, while Friedmann *et al*., (2004) also included housing and education/ employment-related outcomes.

Evaluations reporting positive outcomes

Outcomes from comparative studies

Passetti *et al*., (2008) reported better outcomes for alcohol-dependent clients in receipt of flexible, assertive case management compared with a similar cohort of clients receiving usual care; those who received assertive case management were more likely to have completed assisted alcohol withdrawal and to have entered an aftercare placement. The positive impact of adding time-limited case management (TLCM) to usual care for follow-up care of patients with dual diagnosis being discharged from acute psychiatric care was reported by Smelson *et al*., (2004); those in the intervention group had higher attendance at initial and subsequent clinical appointments, and had higher levels of pharmaceutical treatment compliance. Jones *et al*., (2004) examined the impact of adding an unspecified model of case management to an existing combination of motivational interviewing and behavioural incentives for pregnant drug users, and reported more positive outcomes for those who had added case management. Although participation levels did not differ between the two groups of clients, those who received the added case management component were found to have lower levels of illicit substances in their urine tests, and to report fewer psychosocial needs than those who received usual care.

Day *et al*., (2012) reported more positive outcomes, including lower levels of opiate and other drug use, and improved mental and physical health and social functioning, among opioid treatment clients in Australia who received team-based case management when compared with those who received individual case management. Those who received the team-based case management also reported a more positive experience of case management, including lower waiting times, greater ease of access and higher overall rating of their care. The outcomes for drug-affected young children and their mothers were examined by Jansson *et al*., (2003) who investigated the impact of case management intensity, and reported better outcomes associated with higher-intensity case management compared with lower-intensity case management. These more positive outcomes included lower drug use rates, better physical and mental health outcomes for children and their mothers, and reduced rates of children being removed from their mother's care. Thus, where it has been examined, there appears to be some evidence to suggest that the addition of case management to existing approaches to client care and support may be effective.

Outcomes from evaluations not using a comparison group

The majority of the remaining 12 evaluations of case management were carried out in the USA (n=8), were based exclusively on quantitative data (n=12), involved primary data collection (n=7), and specified the model of case management being examined (n=8). With the exception of van Draanen *et al*., (2013), who employed a mixed-methods approach, all were classified into the methodological subdivision 'Quantitative – non-randomised'. The only evaluation of ACT in this group was the alcohol assertive case management approach evaluated by Hughes *et al*., (2013) in England among those with high rates of hospital admissions for alcohol, who reported a significant reduction in such admissions associated

with the intervention. Hughes *et al*., (2013) specifically noted that the creation of an extensive case profile was particularly helpful to enabling good planning for the client.

There were three examples of Intensive Case Management (ICM) evaluations in this group of studies, one each from Canada (van Draanen *et al*., 2013), the USA (May *et al*., 2003) and Russia (Shaboltas *et al.,* 2014). All three collected primary data and demonstrated reduced levels of substance use in their evaluations. van Draanen *et al*., (2013) also reported improved community functioning among their sample of those with frequent hospitalisations, and noted that case management seemed especially effective for those with very high levels of health service utilisation, who were male Caucasian Canadians. May *et al*., (2013) studied the impact of case management undertaken with First Nation women at risk of having babies with foetal alcohol syndrome, and reported that 38% were abstinent from alcohol at six months; they also reported fewer episodes of binge drinking among those still consuming alcohol. Shaboltas *et al*., (2014) reported good programme retention and reduced drug use among Intravenuous Drug Users (IVDUs) with HIV.

Kirk *et al*., (2013) and McLellan *et al*., (2005) studied those with high levels of health service utilisation in the USA, employing quantitative secondary analysis of administrative data. Kirk *et al*., (2013) reported that the targeted case management intervention they studied was associated with reduced levels of acute healthcare needs and associated costs, while the clinical case management intervention evaluated by McLellan *et al*., (2005) was associated with a decrease in admissions for detoxification and an increase in take-up of rehabilitation services.

Two evaluations reported on case management with offender populations in the USA. Smith *et al*., (2010) examined the application of a continuum of care model with prisoners in a secure facility who had been found not guilty of violent crimes by reason of insanity; they reported improved outcomes in relation to re-arrests, secure housing, substance use and hospitalisations. Bowser *et al*., (2010) reported improved behavioural outcomes in relation to substance use, crime and sexual behaviour among the ex-offenders in their sample. Although many details of the intervention were unclear or unspecified, Bowser *et al*., (2010) did note that outcomes were better for those who completed the intervention and those who received more intense levels of management.

The remaining four evaluations focused entirely on female populations. Both McLellan *et al*., (2003) and Merrill (2004) reported on interventions with substance-abusing populations in receipt of welfare support in the USA, while Slesnick and Erdem (2012) examined women who were homeless with a young child in the USA, and Passey *et al*., (2007) studied rural-dwelling women in Australia who were drug dependent. Neither of the interventions with the welfare recipients in the USA (McLellan *et al*., 2003; Merrill, 2004) specified a particular model of case management, although Merrill (2004) did report that a specific care coordinator was contracted to provide the intervention, and McLellan also noted that the intervention lasted for 12 months. Merrill (2004) found increased levels of referrals to other services, reduced substance use and fewer employment problems related to the case management intervention, and McLellan *et al*., (2003) found reduced substance use and improved employment and both family and social functioning related to case management.

Slesnick and Erdem (2012) reported on an unspecified model of case management provided by postgraduate students over a six-month period, and noted improved outcomes for participants in the areas of housing, substance use and mental health, and fewer problem behaviours among the children of the homeless women receiving the intervention. Passey *et al*., (2007) also reported reduced substance use and improvements in psychological and social functioning among a group of rural-dwelling women in Australia whom they studied, and who were receiving a 6-12 month community-based case management intervention.

Discussion

This review offers an additional contribution to the emerging evidence base on case management as an intervention for populations who engage in substance abuse. This is a scoping review and although different in design, builds on the work by Vanderplasschen *et al*., (2007) on this topic. Scoping reviews have now become an established part of the research infrastructure. A recent review by Pham *et al.,* (2014) identified 344 scoping reviews published between 1999 and 2012. The reviews varied in terms of purpose, method used, and detail of reporting. Almost three-quarters of reviews (74.1%) addressed a health topic. In this review, we framed our work using the guidelines of Arksey and O'Malley (2005) to explore the literature on case management for substance-abusing populations engaged in treatment and recovery.

The objective of this review was to examine the peer-reviewed non-experimental literature on case management and substance-abusing populations between 2003 and 2013, and to answer specific research questions on the nature of case management, the outcomes that have been studied, and gaps in the literature. Each of these questions is dealt with separately below. However, for the purpose of contextualising our work, we will begin by outlining the main issues and findings to emerge from three reviews examining the literature on case management for people in recovery from substance misuse.

Vanderplasschen *et al.,* reviewed 48 papers published between 1993 and 2003 that reported on the evaluation of models of case management when delivered to substance-abusing populations. They concluded that their review of case management `...does not show compelling evidence for the effectiveness of [case management], although several studies have reported positive effects concerning client outcomes, service utilisation, treatment access, treatment retention and quality of life...' (p7–8). Vanderplasschen *et al*., further noted that studies based on less methodologically strong research designs, such as descriptive, retrospective and quasi-experimental studies, tended to report these beneficial outcomes, whereas studies using a more rigorous methodological design, such as a randomised controlled trial, often failed to demonstrate a superior effect for case management compared to other interventions.

Subsequent to the work by Vanderplasschen *et al.,* (2007), two reviews of case management with substance-abusing populations have been published and both reviews reported on the findings of randomised controlled trials (RCTs). Rapp *et al*., (2014) undertook a meta-analysis of 21 RCTs which compared the efficacy of case management with standard care or other active interventions. They concluded that, although the effect sizes were small, case management was more effective than standard care conditions in improving outcomes, with a median effect size of 0.14. Rapp *et al.,* introduced a number of cautionary notes to their findings, primarily the danger of viewing case management as a panacea for the problems that substance-abusing populations present with to services. They pointed out that their review examined 455 diverse outcomes, including reducing HIV risk behaviour, linkage with and retention in treatment, and reduced substance use. Although the recipients of case management (the intervention) fared better than the recipients of standard care (the comparison) across all outcomes assessed, they suggested that it was unlikely that a psychosocial intervention could affect such a wide range of outcomes. Analagously they pointed out that the myriad of services considered to be `standard care', which at times included intensive

service provision, was likely to make it more challenging to assess the relative impact of case management. Treatment tasks and personal functioning outcomes were analysed separately, with effect sizes for all five groups of treatment tasks considerably larger than the highest personal functioning areas. It is not surprising that case management benefits treatment tasks given that the primary purpose of case management is to help individuals to find and use services more effectively. These findings underline how important it is for persons with substance abuse problems to link with services and remain in care if they are to benefit from treatment interventions.

In the most recent review of case management for populations that abuse substances, Joo and Huber (2015) included seven evaluations that used a randomised controlled trial to compare community-based case management (CBCM) with clinical case management and usual care. CBCM services were delivered within participants' communities, in local treatment centres and in participants' homes by case managers with a professional background in nursing, social work and mental health counselling. Studies undertaken in hospitals or prisons were excluded. The authors summarised the findings from the seven evaluations and reported that `... CBCM services reduced study participants' substance use and significantly influenced their abstinence rates. CBCM also reduced social problems such as family or legal issues and improved study participants' satisfaction and retention rates with services ... CBCM reduced healthcare services use and supported clients' unmet social needs ... the most impressive effect of CBCM for persons who are substance abusing was reducing the use of health services, especially mental health services ... study participants who were in the CBCM groups were less likely to visit mental health clinics and spent less time in hospital ...' (p544).

Joo and Huber (2015) did not report whether they explored the feasibility of undertaking a meta-analysis of these trials; they did not report on the possible heterogeneity of these studies which may have prevented a meta-analysis. They do acknowledge that their inclusion criteria limited the number of outcome variables under investigation. For example, they only included studies that reported on substance use and health services use and they pointed out that `... it is possible that other outcome variables can influence the effectiveness of CM with clients...' (p.544). They also highlighted the potential of reporting bias, as all seven studies reported positive outcomes.

Vanderplasschen *et al.* also maintained that in-depth qualitative studies of both clients and case managers are needed in order to better understand which elements of the intervention are connected to what outcomes. Our review examined four qualitative studies of the relationship between case managers and their clients. One of these used ACT to support the implementation of harm reduction interventions for homeless drug users (Tiderington *et al.,* 2013). Another study, which looked at a strengths-based case management intervention, sought to link aspects of the relationship between case managers and clients with personal outcomes, such as growing confidence and self-esteem. The client-provider relationship in an ACT intervention was also the subject of a qualitative study, again illustrating how certain elements of case management impact on personal functioning. Further studies in Denmark and Belgium provide an insight into how case managers' perceptions and decision-making impact on a client's personal outcomes. These qualitative studies can help to identify active elements within case management implementation and open up the possibility of identifying links to the numerous outcomes associated with the intervention through clinical trials.

In their concluding remarks Vanderplasschen *et al.,* (2007) pointed out that `...Although some studies have shown that this intervention [case management] works, it is still unclear what exactly makes this intervention work and how long its effects last...' (p.12). We address these concerns by presenting the findings of our review.

1. What additional knowledge regarding the nature of case management can we gain from a review of recent non-experimental research on the topic?

This scoping review of a non-experimental sample of the peer-reviewed literature on case management and people in recovery from substance misuse provides a number of interesting insights. For example, case management interventions tend to target clients experiencing extreme disadvantage relative to other substance misuse treatment clients, with a disproportionate application to females. In addition to being

included in the groups assessed in most of the 20 evaluations, females were the sole recipients in a fifth of these evaluations (McLellan *et al*., 2003; Merrill 2004; Slesnick and Erdem 2012; Passey *et al*., 2007). The groups of people being targeted by case management, and the women in particular, present with a multitude of personal and social problems including substance misuse, homelessness, economic deprivation and mental health problems. Perhaps, it is unrealistic to expect that any psychosocial intervention is capable of remedying such a multitude of problems; to reiterate the point made by Rapp *et al*., (2014), case management is not a panacea.

From the literature reviewed, it would appear that there are multiple objectives of case management, when working with people in recovery from substance misuse. These include reducing substance misuse and visits to hospital emergency departments; reducing hospital admissions and improving social and psychological functioning. In addition, there are a number of objectives reported in the literature which link case management with improving service coordination such as providing linkages with medical and social services and retaining people in treatment. The identification of such a broad range of objectives points to the multiple needs of the client base and the expectations on case management as an intervention.

The literature reviewed does not provide a sufficiently clear answer to the question of what models of case management should be used, for whom, and under what conditions. However, this review did identify a number of additional variants of case management, these are community case management, probation case management, targeted case management and continuum of care case management. The papers reviewed did not provide adequate information on these variants, so as to make a judgement on whether they constitute a model of case management.

This review identified a number of features of the delivery of case management that were associated with improved outcomes reported in the evaluations. For example, three evaluations reported improvements when the intervention was delivered for between 6 and 12 months (McLellan *et al*., 2003; Slesnik and Erdem, 2012; Passey *et al*., 2007), which suggests that the duration of the intervention could be an important variable to consider both in future planning and evaluation of case management. In two evaluations, the authors reported specifically that the intensity of the intervention was important. Bowser *et al*., (2010) reported better outcomes for those who completed the programme and who received more intense levels of management, and Jansson *et al*., (2003) reported better outcomes for the group receiving high-intensity case management compared to the group receiving low-intensity case management. Three evaluations reporting positive outcomes were of Intensive Case Management (Van Draanen *et al*., 2013; May *et al*., 2013; Shaboltas *et al*., 2014). The studies reporting on the duration and intensity of case management did not explore these variables in depth, and so the meaning and application of these constructs require further elaboration and evaluation.

Team-based case management and extensive engagement by case managers with the client group are also associated with positive outcomes. For example, Day *et al*., (2012) reported that team-based case management produced better outcomes and was rated higher by clients compared to individual case management. The Hughes *et al*., (2013) study on assertive case management, which is primarily delivered by teams, reported that positive outcomes were associated with good planning and the implementation of an extensive case profile of the client group. Kirk *et al*., (2013), on targeted case management, McLellan *et al*., (2005), on clinical case management, and Smith *et al*., (2010) reported that the continuum of care was associated with positive outcomes. These reports may suggest that team-based intervention and extensive engagement may be important variables of case management to explore in future elaborations and evaluations. However, there is a real need for authors to provide more detail in future studies on the nature of the case management interventions and the potential mechanisms of change if the effectiveness of case management is to be better understood and perhaps replicated.

2. What outcomes have been evaluated in the non-experimental research literature?

Of the 20 evaluations included in this review, 13 examined outcomes under the broad heading of psychosocial functioning, which, after substance use, is the second most frequent type of indicator in these studies. Two of these evaluations, one on a combination of ACT and ICM, and another on using a community-based CM model, had a particular focus on quality of life issues, and both

studies showed improvements in these outcome domains. Only three of the studies did not find sufficient evidence to support the claim that case management contributed to improved outcomes in at least one area (Chan *et al*., 2005; Friedmann *et al*., 2004; Cunningham *et al*., 2007).

Among the five evaluations included in this review that used a comparative group in their study design, the recipients of case management fared better in terms of reducing their substance use and improving access to, and retention in, services compared to the control groups (Passetti *et al*., 2008; Smelson *et al*., 2004; Jones *et al*., 2004; Day *et al*., 2012; Jansson *et al*., 2003). In the 12 studies using a non-comparative design, there were reported improvements across a large number of outcomes including substance use, personal functioning, compliance with and retention in treatment, social functioning and a reduction in hospital admissions (Hughes *et al*., 2013; van Draanen *et al*., 2013; May *et al*., 2013; Shaboltas *et al*., 2013; Kirk *et al*., 2013; McLellan *et al*., 2005; McLellan *et al*., 2003: Smith *et al*., 2010; Bowser *et al*., 2010; Merrill, 2004; Slesnik and Erdem, 2012; Passey *et al*., 2007). These reported findings are broadly in line with the work by Vanderplasschen *et al*., (2007) who also found that several non-randomised design studies reported positive effects.

However, there are a number of important issues that need to be highlighted here which temper the picture of the positive findings reported in this review. Only some of these studies used a baseline measure, and thus it was difficult to determine if a real improvement had occurred; it was even more difficult to determine the role of case management in making the improvement. Further, in almost all of the evaluations included in this review, data were drawn from self-report interviews or surveys and administrative data, and therefore may be prone to reporting bias or analytical bias. The improved outcomes reported in these studies may well be associated with the use of case management, or they may be due to unknown factors or influences which cannot be ruled out given the design of the evaluations reported. Only a quarter of the evaluation studies used a comparison group; the rest used retrospective single groups and before- and after-type designs. The descriptions of the case management interventions that were examined varied widely in terms of detail provided. In most cases, the information provided could not be used to replicate the intervention.

3. What are the gaps in the literature?

Vanderplasschen *et al.,* (2007) argued that there is a need to consider outcomes beyond drug use and other 'socially acceptable outcomes' and to take into account quality of life outcomes and clients' subjective perceptions when evaluating the effectiveness of case management. They also noted that there is little information on the crucial features of case management and what specific aspects of this intervention contribute to specific outcomes. This is exacerbated by the lack of fidelity in implementation and the distance between the model chosen and its practical application.

This scoping review identified similar gaps in the literature as those reported by Vanderplasschen and colleagues. For example, in the 20 evaluations included in this review, two broad categories of outcomes were evaluated. These comprised treatment tasks which included assessment of linking clients with services and retaining clients in drug treatment services; reducing the use of emergency and in-patient hospital services are also assessed under this category. The second category is broadly categorised as personal functioning and focuses on symptom reduction such as mental health problems, substance abuse and criminal behaviour; accommodation and employment status are sometimes included in this category. The predominant use of these hard outcomes to evaluate case management suggests an over-emphasis on using case management as a deficit-reduction intervention. Indeed, there is almost a complete absence in the literature of the strengths-based case management model being used and evaluated. This type of model prioritises the empowerment of the client group by emphasising their strengths and would be more amenable to evaluating the softer outcomes that may be associated with improvements in quality of life.

This review also identified a major gap in the literature around any attempt to identify what specific aspects of case management contribute to improved outcomes. This gap would appear to be influenced by the design of the primary studies and the reviews that have been undertaken to evaluate and review case management when delivered to people in recovery from substance misuse. For example, the 20 evaluations included in this review were primarily concerned with evaluating the outcomes of case management as an intervention; the other nine studies included in this review were

primarily qualitative explorations of the process and implementation of case management. The reviews undertaken by Vanderplasschen *et al.,* (2007), Rapp *et al*., (2014) and Joo and Huber (2015) also focused primarily on the outcomes of case management. In essence, these primary and secondary studies sought to determine whether case management works for people in recovery from substance misuse, and in the main, they have produced some evidence to suggest that case management is an effective intervention to use with this target group. While such study designs are important in determining the efficacy and effectiveness of an intervention, we suggest that the evidence base would also benefit from an evaluation approach that seeks to understand not only does it work, but for whom and under what conditions and in what contexts? We suggest that the Realist approach to evaluation and synthesis may be an appropriate approach for researchers and reviewers to consider using in future investigations of case management (Pawson *et al*., 2005). The Realist approach is a theory-driven approach to evaluation and synthesis: it seeks to uncover the processes or mechanisms that lead to particular outcomes, and the context within which these occur.

We have suggested earlier that certain features of case management identified in this review, notably the duration, intensity, team-based nature of some of the work and nature of the engagement between case managers and clients, could be important variables that require further elaboration and evaluation. Although our observations are based on a small number of studies, we reiterate the point that these features and perhaps many more could be investigated using the Realist approach. For example, a recent review that we located at the end of our work by Jackson *et al*., (2014) provides a useful example on how the Realist approach might elucidate important learning about case management in future investigations.

The review by Jackson *et al*. examined interventions that aim to improve the pyschosocial and employment outcomes of individuals in receipt of prescribed methadone treatment, to determine what interventions work (or do not) and why. The populations under study in the review by Jackson *et al.* are similar to those under study in the articles included in this scoping review and the interventions share similar features; one specific intervention is case management based.

Jackson *et al*. highlighted a finding from their work that is also reported in the case management evaluations: retention in treatment via attendance and compliance is key to improved outcomes. Jackson and colleagues investigated this claim further and reported: `In the early stages of the analysis a key pattern was evident in the data: attendance at the intervention [or what some articles refer to as retention or compliance] was associated with positive client outcomes, and conversely, lack of attendance was linked to poor outcomes. However, good attendance was also sometimes linked to disappointing outcomes suggesting that attendance alone does not lead to positive outcomes. Our candidate theory, therefore, was that attendance at interventions was important but not enough for positive outcomes... We began, therefore, to look at the literature on engagement, and more specifically literature focused on drug treatment and engagement. As we explored this literature we found that a number of researchers suggest that engagement is linked to positive outcomes...' (p.6). They further concluded that `... engagement with an intervention appears to be key to an intervention working to improve [outcomes]...' (p.17). This is a Realist review and the methods used enabled the authors to draw certain conclusions about why an intervention may work and under what conditions.

It could well be hypothesised that engagement is also a key mechanism that is associated with improved outcomes in clients of case management, for example, when the intervention is intensive, of longer duration, accompanied by a good working alliance between the case manager and client and with dedicated care plans. These components could well contribute to the client engaging with the intervention and `investing' in their recovery and accruing some benefits. Further evaluation and synthesis of case management with people in recovery from substance misuse are needed to investigate the role of these potential features of case management in delivering improved outcomes for clients.

Conclusion

The findings from the three reviews highlighted above (Vanderplasschen *et al.,* 2007; Rapp *et al*., 2014; Joo and Huber, 2015) suggest that (a) the knowledge base for case management is improving, (b) it appears that case management can make a significant contribution to the lives of people who access services to address their substance misuse

and other related problems, and (c) that case management is a complex intervention delivered to people with multiple personal and social needs. The work on this scoping review commissioned by the HRB provides a further contribution to the emerging knowledge base, and our main findings are in line with those reported by the three reviews cited above.

Case management is generally offered, and provided, to client groups with multiple, interacting disadvantages and challenges in many areas of their lives. In that context, the generally positive findings reported from the majority of evaluations included in this review have potentially important implications. The findings suggest that case management may indeed have a useful role in helping health and social care service providers to alleviate some of the problems facing these client groups. Some specific case management approaches do appear to confer benefits over others; and this is the case for those that are intensive and flexible and use team-based approaches.

It is important to acknowledge the limitations associated with the approach taken to this review. First, this review includes 29 peer-reviewed journal articles published between 2003 and 2013, and second, it excludes any evaluation studies that had a randomised study design. It also excludes studies where substance misuse was not a primary attribute of the participants. The inclusion criteria applied determine the studies identified and therefore we cannot rule out the possibility that using different inclusion criteria may have yielded additional or alternative studies that may have challenged some of the findings in this review. Nonetheless, to summarise the three main findings from this review which address the three main questions posed.

(1) The nature of case management as an intervention is poorly described in the research we reviewed; the target groups are characterised by multiple problems and disadvantages and the interventions are delivered to achive multiple objectives all of which make this a complex intervention which requires further theoretical elaboration. However, key features such as duration, intensity, case manager-client alliance and the nature of engagement appear to be assocated with positive outcomes.

(2) The outcomes evaluated in the literature reviewed can be categorised as (a) treatment tasks and (b) symptom reduction, with little focus on other dimensions of the quality of life of clients. Outcomes primarily belong to the deficit-reduction model with scant focus on the strengths-based model of case management. Only five of the 20 evaluations reporting positive outcomes used a comparative group; most evaluations relied on self-report questionnaires and surveys and used a retrospective analysis of secondary data sources.

(3) This review has identified major gaps in the literature that leave unanswered many key questions about the effectiveness of case management. For example, there is no attempt to identify the key mechanisms of change in any of the evaluations, despite 17 of the 20 included reporting positive outcomes. Therefore, we know little about how these improvements occurred and if so, what aspects of case management (if any) contributed to the improvement. Arising from our work, we suggest some features that require further elaboration and evaluation and we suggest adopting the Realist approach for this work. Nevertheless, there is some evidence to suggest that assertive, intensive, flexible, accessible, team-based approaches that include a focus on harm reduction, development of good working alliances, and stabilisation of clients within their communities, demonstrate considerable promise

Finally, we concur with Purdy (2010) that the evidence on the impact of case management is `promising but mixed'. When case management is delivered in tandem with drug treatment services for clients in recovery, there is evidence that this intervention approach delivers improved outcomes for the client groups. However, there remains a difficulty in attributing any tangible impact to the case management intervention when there are multiple factors at play. A further complication when assessing impact is that case management does not refer to a standard intervention; programmes can vary widely, which makes it difficult to make comparisons or generalised conclusions. The impacts of case management can also be difficult to quantify, and may not be measurable in the short term, thus further heightening the difficulties of attributing cause and effect.

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Appendix A: Electronic databases searched

Scopus

The world's largest abstract and citation database of peer-reviewed literature and quality web sources in the fields of science, technology, medicine, social sciences and arts and humanities. The database has 22,000 titles from more than 5,000 international publishers and 20,800 peer-reviewed journals. Literature covered from 1823.

From www.scopus.com

MEDLINE

MEDLINE is the U.S. National Library of Medicine® (NLM) premier bibliographic database containing over 21 million references with citations from over 5,600 worldwide journals with articles in life sciences with a concentration on biomedicine and health. It generally covers literature from 1946 to the present.

From http://www.nlm.nih.gov/bsd/pmresources.html#

PubMed

PubMed comprises over 24 million citations for biomedical literature from MEDLINE, life science journals, and online books. PubMed citations and abstracts include the fields of biomedicine and health. PubMed is developed and maintained by the National Center for Biotechnology Information, at the U.S. National Library of Medicine, located at the National Institutes of Health.

From http://www.ncbi.nlm.nih.gov/pubmed

PsycINFO

PsycINFO® is an expansive abstracting and indexing database devoted to peer-reviewed literature in the behavioural sciences and mental health. It holds nearly 4 million records with nearly 2,500 journals covered, 99% of which are peer reviewed.

From http://www.apa.org/pubs/databases/psycinfo/

CINAHL

CINAHL is the definitive research tool for nursing and allied health professionals. It holds 5,300 journals, of which 1,400 are available in full text. It generally covers literature from 1937 to the present.

From https://www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete

Embase

Embase is a key resource for biomedical evidence, including published, peer-reviewed literature, in-press publications and conference abstracts. Embase provides coverage of the biomedical literature, with over 28 million records from over 8,400 currently published journals, and with access to data going back to 1947.

From http://www.elsevier.com/online-tools/embase

Appendix B:

Search 1 – Search terms and hits by database

The search terms used in the first search:

Case management term	Issues term	Outcome term
Case management **OR**	Substance (ab)use **OR**	Evaluation **OR**
Brokerage model case management	Drug (ab)use	Outcomes
Generalist model case management	Addiction	Effectiveness
Assertive community treatment		
Intensive case management		
Assets-based case management		
Strengths-based case management		

The number of hits from each database in search 1 is tabled below:

Database	Hits	Detail	
Scopus	165		(ABS ("case management" OR "brokerage case management" OR "generalist case management" OR "assertive community treatment" OR "intensive case management" OR "assets-based case management" OR "strengths-based case management") AND ABS (addiction OR "drug abuse" OR "substance abuse") AND ABS (evaluation OR outcome OR effective*)) AND PUBYEAR > 2002 AND PUBYEAR < 2014
MEDLINE	164		(case management and (addiction or drug abuse or substance abuse) and (evaluation or outcome or effective*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] *Search terms used:* » abuse » addiction » case » drug » effective* » evaluation » management » outcome » substance **Search returned:** 293 text results **Sort by:** Dates = 164 (10 saved)
PubMed	137		(case management[Title/Abstract] AND (substance abuse[Title/Abstract] OR drug abuse[Title/Abstract] OR addiction[Title/Abstract] OR recovery[Title/Abstract])) AND (("evaluation studies"[Publication Type] OR "evaluation studies as topic"[MeSH Terms] OR "evaluation"[All Fields]) OR outcomes[All Fields] OR effectiveness[All Fields]) AND (("2003/01/01"[PDAT] : "2013/12/31"[PDAT]) AND "humans"[MeSH Terms])

Database	Hits	Detail	
PsycINFO	184		(case management and (addiction or drug abuse or substance abuse) and (evaluation or outcome or effective*)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests and measures] *Search terms used:* » abuse » addiction » case » drug » effective* » evaluation » management » outcome » substance **Search returned:** text results= 184
CINAHL	803		((AB "case management" OR AB "brokerage case management" OR AB "intensive case management" OR AB "assets-based case management" OR AB "generalist case management" OR AB "strengths-based case management" OR AB "assertive community treatment" AND AB addiction OR AB "substance abuse" OR AB "drug abuse" AND AB evaluation OR AB outcomes) AND (S11)) AND (addiction or substance abuse or drug abuse) AND (evaluation or effectiveness or outcomes)
Total hits	**1,453**		

Appendix C:

Search 2 — Search terms and hits by database

An additional subsequent search was done using the term 'critical time intervention' to ascertain that no article was missed by not including it originally. Following removal of duplicates, and screening against inclusion/exclusion criteria, two articles were kept for further review. The table below illustrates the hits by database using this term.

Database	Hits	Detail
Scopus	8	(TITLE-ABS-KEY ("critical time intervention") AND TITLE-ABS-KEY (addiction) OR TITLE-ABS-KEY ("drug abuse") OR TITLE-ABS-KEY ("substance abuse")) AND SUBJAREA (mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2002
MEDLINE	2	Show results for: (TITLE-ABS-KEY ("critical home intervention") AND TITLE-ABS-KEY (addiction) OR TITLE-ABS-KEY ("drug abuse") OR TITLE-ABS-KEY ("substance abuse")) AND SUBJAREA (mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2002 ("critical time intervention" and addiction).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] *Search terms used:* » addiction » critical » critical time intervention » intervention » time **Search returned:** two text results
PubMed	12	"critical time intervention" and addiction

Database	Hits	Detail
PsycINFO	16 38	1. ("critical time intervention" and addiction).mp. [mp=title, abstract, full text, caption text] *Search terms used:* » addiction » critical » intervention » time **Search returned**: 16 text results 2. ("critical time intervention" and "substance abuse").mp. [mp=title, abstract, full text, caption text] *Search terms used:* » abuse » critical » intervention » substance » time **Search returned:** 38 text results 3. ("critical time intervention" and "drug abuse").mp. [mp=title, abstract, full text, caption text] *Search terms used*: » abuse » critical » drug » intervention » time **Search returned**: 12 text results
CINAHL	4	TX critical time intervention AND TX (addiction or substance abuse or drug abuse)

Appendix D:

Search 3 – Terms used and hits by database

A third search was conducted to determine whether the Embase database would provide articles that had not been located on the other databases used. Six articles were kept for further review.

The search terms used in the third search are the same as those used in the first and are tabled below:

Case management term	Issues term	Outcome term
Case management **OR**	Substance (ab)use **OR**	Evaluation **OR**
Brokerage model case management	Drug (ab)use	Outcomes
Generalist model case management	Addiction	Effectiveness
Assertive community treatment		
Intensive case management		
Assets-based case management		
Strengths-based case management		

The number of hits from the Embase database in search 3 are tabled below:

Database	Hits	Detail
Embase	477	#1 AND (2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR2014:py) AND (`article'/it OR `article in press'/it OR `review'/it)  477  #1  `case management'/exp OR `case management' AND (`addiction'/exp OR `addiction')

Appendix E:

Inclusion-exclusion criteria

To be included in the reviewed articles:

- Reports on the evaluation of (at least) one model of case management
- The evaluation must not be of a randomised trial.
- The target group must be substance abusers.
- The publication must be in the English language.
- The article must have been published between 2003 and 2013.

Appendix F:

Purpose, methods and reported outcomes from the 29 studies included in the review

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Alexander JA *et al*., (2007)	To assess if extensive coverage of clients, active management of the referral process and on-site and off-site case management will improve the utilisation of health and social services by clients?	Data were collected using a telephone survey with 545 clinical supervisors from a nationally representative sample of outpatient drug abuse treatment units.	Results suggest that active case management during the referral process and providing case management both on-site and off-site may be associated with greater use of health and ancillary social services.
Angell B and Mahoney C (2007)	To explore how case managers develop therapeutic alliances and manage adherence issues with clients using intensive case management (ICM).	Data were collected from Interviews and on-site observation with 15 case managers.	Case managers reported relationship development with clients as a key positive feature of their work, with specific reference to the development of intimacy with clients, relationships with clients' wider networks and acting alongside or with their clients. Case managers also reported that it was important to them that they felt that both they individually, and the wider case management team, mattered to clients.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Bowser BP *et al.*, (2010)	To evaluate Case Management (CM) as a low-threshold counselling and referral service to reduce drug use and related risk behaviours and improve social integration.	Data were collected from 281 drug abusing ex-offenders using the Federal Office of Budget and Management Government Performance and Results Act (GPRA) Questionnaire.	The total number of CM and education sessions received, along with having higher income by month six, were associated with programme completion. Those who completed the programme were found to have spent fewer days in jail and have lower rates of cocaine, crack and heroin use than those who had either dropped out or been terminated by programme staff.
Chan M *et al.*, (2005)	To compare outcomes between the intervention group (n=65) receiving Probation Case Management (PCM) and the control group receiving standard probation (n=44).	Data were collected from 109 drug-involved women offenders who were interviewed at programme entry and at 6 and 12 months using the Addiction Severity Index, Beck Depression Inventory, Brief Symptom Inventory, Social Support Evaluation List.	Adding CM to probation (the intervention; PCM) did not result in superior outcomes compared to standard probation.
Cunningham J *et al.*, (2007)	To examine the causal relationship between the working alliance and client symptoms in the client-case manager relationship during assertive community treatment (ACT).	Data were collected from 162 homeless persons with severe mental health disorders and substance use disorders using the Working Alliance Inventory and the Brief Psychiatric Rating Scale.	No causal relationship was identified between the working alliance and client outcome; the relationships were described as 'largely reciprocal'.
Dates B *et al.*, (2009)	To describe the fidelity of interventions that adapted assertive community treatment to the needs of homeless adults with co-occurring mental and addictive disorders.	Data were collected from six programmes implementing ACT using Dartmouth Assertive Community Treatment Scale.	Overall, average total fidelity scores were within the moderate fidelity range, with modest increases over time.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Day CA *et al.*, (2012)	To compare client experiences of intensive case management (ICM) and the team-based model of case management (TBCM).	Data were collected using a survey from 163 opioid treatment clients, 62 of whom received ICM and 101 who received team-based case management (TBCM).	Respondents rated services received via TBCM higher compared with ICM. TBCM clients were more likely to report ease of access and less waiting time to see a case manager compared to ICM clients.
Friedmann *et al.*, (2004)	To assess the role of dedicated case managers within community-based substance abuse treatment.	Data collected as part of the NTIES – a longitudinal evaluation of a national sample of substance abuse treatment programmes were analysed for 2,829 clients across 55 programmes.	Clients in addiction treatment programmes that had designated CM staff did not report higher utilisation of services compared to those in programmes without case managers.
George *et al.*, (2010)	To assess the fidelity of programme implementation across assertive community treatment (ACT) teams.	Data were collected from 67 two-person ACT teams using the Dartmouth Assertive Community Treatment Scale.	The DACTS is a 28-item scale covering three domains: Human Resources – which inlcudes speciality staff, staff continuity and caseloads; Organisational Boundaries – which inlcudes having responsibilities and explicit criteria for treatments and admissions; and Nature of Services – which includes the extent to which the services are community-based, assertive, individualised and intense.
Hughes NR *et al.*, (2013)	To establish whether an Alcohol Assertive Outreach Team (AAOT) is an effective model for reducing hospital admissions and emergency department attendances among frequent users.	Data were analysed on 54 patients in receipt of CM from the AAOT. Data were retrieved from national audit system that records number of alcohol-related admissions to hospitals.	The total number of hospital admissions in three months fell from 151 prior to the intervention period to 50 following the intervention. Emergency department (ED) attendances also fell from 360 in three months to 146 following the intervention period.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Jansson LM *et al.*, (2003)	To evaluate the Reaching Families Early intervention on keeping mothers and infants together, getting mothers into treatment and improving parenting skills.	240 women, who gave birth to a drug-affected baby and agreed to a referral, where eligible, were divided into two groups for comparison based on intensity of service delivery.	Mothers who received higher-intensity care were more likely to be abstinent from illicit drugs and to have retained custody of their child (ren) at two-year follow-up compared to mothers receiving lower-intensity services.
Jones *et al.*, (2004)	This trial compared the effectiveness of motivational interviewing (MI) + behavioural incentives (BI) compared with MI + BI plus an additional case management component on treatment compliance, illicit drug use, and other areas of life functioning.	Data were collected from 31 non-treatment seeking, drug-using pregnant women receiving usual care (controls), and 59 non-treatment seeking, drug-using pregnant women received added case management (the intervention). Participants completed the Addiction Severity Index (ASI), the Structured Interview for DSM-IV, a psychosocial needs survey, referrals to social services and utilisation assessment forms, urine testing.	When CM was added to the intervention, the use of social services increased. The MI + BI + CM group reported reduced needs in their drug treatment. The addition of CM resulted in less drug use and fewer psychosocial needs at one-month follow-up, but similar levels of poor participation in the intervention were observed with both models.
Kirk *et al.*, (2013)	To evaluate case management in re-directing frequent users of acute care to less costly non-acute services.	Data were analysed on 165,305 people who had four or more admissions to detoxification or acute inpatient services within a six-month period over a five-year period.	Within 12 months acute care episodes fell by 56% and there were a 19% increase in engagement in non-acute care services.
Kolind *et al.*, (2009)	To explore the knowledge gained from the experiences and perspective of case managers in Belgium and Denmark.	Data collected from 16 case managers using interviews and focus groups.	Core dilemmas identified were: planning and monitoring within the context of chaotic lives; balancing flexibility while meeting legal demands; linking and coordinating care; advocacy and client empowerment.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
May *et al.*, (2008)	To evaluate the role of intensive case management (ICM) in reducing the rate of foetal alcohol spectrum (FAS) in children of high-risk mothers.	Data were collected on 131 women using an array of instruments at baseline and at six-month follow-up intervals up to 72 months after enrolment. Instruments included the Alcohol Use Disorder Identification Test (AUDIT), Short Inventory of Problems (SIP) plus the SOCRATES scale and data on alcohol consumption and pregnancy outcomes.	38% of enrolled women reported complete abstinence from alcohol use at six months. Binge drinking was reduced at both 6 months and 12 months. Of 149 pregnancies, only two children were suspected of having some form of severe FAS, and at follow-up, 70% of women were using birth control or not drinking, or both.
McKay *et al.*, (2003)	To evaluate the CASAWORKS for Families Intervention over 12 months in improving stable employment rates.	Data were collected pre and post intervention from 529 substance-abusing women using the 'Welfare-to-Work Addiction Severity Index' (WTW-ASI), Treatment Services Review – Welfare to Work version (TSR-WTW) and Case Management Review.	Longer retention was associated with reduced alcohol use but was not associated with employment or drug use outcomes.
McLellan *et al.*, (2003)	To evaluate the CASAWORKS for Families intervention over 12 months in improving stable employment rates.	Data were collected pre and post intervention from 529 substance-abusing women in receipt of welfare using the Welfare to Work Addiction Severity Index.	Improvements were reported in substance use and family and social functioning at six months, and in employment by 12 months. At 12 months, more than 46% were abstinent from alcohol and other drugs, and 30% were employed part-time or more.
McLellan *et al.*, (2005)	To assess the feasibility of clinical case management (CCM) working with Multiple Detox Only (MDO) patients to improve engagement with services.	Data were collected from administrative records on 890 multiple detoxification-only (MDO) patients over three years.	MDO patients receiving CCM showed a 55% reduction in detoxification-only admissions, a 70% increase in use of rehabilitation services, and a 20-day increase in the average length of stay per episode.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Merrill J (2004)	To assess a CM intervention that aims to improve assessment of addiction severity, reduce fragmented service delivery and promotes a continuum of care approach..	Administrative data collected on an unreported number of substance-abusing women on welfare were analysed before and after intervention.	Increased referral rates for treatment were reported. An increase in services provided was reported and reductions in alcohol and drug use were reported.
Neumiller *et al*., (2009)	To explore the implementation of the assertive community treatment (ACT) model for people who are homeless with co-occurring mental and addictive disorders (CODs).	Data were collected from nine programmes implementing assertive community treatment using a 24 -item survey.	Stabilisation of clients was associated with housing assistance, maintenance; medication adherence; and delivery of intensive, multidisciplinary services. Adaption of the ACT model to the specific needs of clients was reported as essential to good work practice in this context.
Passetti *et al*., (2008)	To pilot the feasibility of using assertive community methods in an intervention called the Flexible Access Clinic (FAC) for the treatment of alcohol-dependent individuals with a history of poor engagement with services.	Data were collected on 118 alcohol-dependent referred to the Flexible Access Clinic and 223 referred to the usual care clinic. Both groups reported a history of poor levels of engagement with services.	It was reported that individuals attending the FAC and receiving the assertive community methods presented for assessment an average of 14 days earlier than those receiving treatment as usual (TAU). The FAC group reported higher rates of completing assisted alcohol withdrawal and entering an aftercare placement and entering aftercare earlier than the TAU group.
Passey *et al*., (2007)	To evaluate the Women's Referral and Access Program (WRAP) model in improving the quality of life in women dependent on illicit drugs.	Data were collected from 63 women in Australia at baseline and 6-month follow-up using the overall quality of life scale (WHOQoL-BREF), Rosenberg's Self-Esteem Scale, the Brief Treatment Outcome Measure (BTOM) and structured interview related to intervention objectives.	The women reported improvements in self-esteem, severity of dependence, psychological well-being and social functioning, with reductions in drug use.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Redko *et al*., (2007)	To investigate how clients perceive the working alliance with case managers	Data were collected from 26 clients of the Reducing Barriers to Drug Abuse Treatment Services Project (RBP) using focus groups and interviews.	It is reported that the working alliance evolved in ways that allowed many clients to build self-esteem, self-confidence, regain a sense of identity and seek substance abuse treatment.
Shaboltas *et al*., (2013)	To evaluate adding on intensive case management (ICM) to the substance abuse (detoxification plus therapy) and antiretroviral therapy (ART) treatment programmes for intravenous drug users (IVDUs).	Data were collected from 60 HIV-infected, intravenous drug users (IVDUs) who had recently started antiretroviral therapy (ART) or who were eligible to start. Individuals were interviewed every two weeks for up to eight months.	Overall, 52% were active IVDUs at enrolment and 45% were active at their last follow-up visit. 66.7% attended all of their ART clinic visits. 90% of participants remained in programme to the end.
Slesnick and Erdem (2012)	To evaluate a CM intervention that seeks to connect homeless mothers with social services.	Data were collected at baseline and 3 and 6 month follow-up from 15 homeless women and their 2-6 year-old children recruited from a homeless shelter using an array of instruments including urine screening, computerised clinical interview and self-report questionnaires, Beck Depression Inventory; Child Behaviour Checklist and Parenting Stress Index.	Participants showed reductions in substance use, homelessness and mental health problems, and reduced internalising and externalising of problems among their children.
Smelson *et al*., (2005)	To assess the feasibility of the Time Limited Case Management (TLCM) /Assertive Community Treatment programme to improve engagement in outpatient treatment.	Administrative data were analysed on 26 dually diagnosed patients who received the TLCM service (the intervention group) and 33 patients who refused to participate (the comparison group).	TLCM patients attended more days of treatment at the Day Centre, had greater pharmacy refill compliance, and were less likely to be lost to follow-up at eight weeks than were the comparison group.

Author and year of publication	Purpose of study	Data collection: source and method	Reported outcomes
Smith *et al*., (2010)	To evaluate the effectiveness of assertive community treatment plus the effectiveness of intensive case management model in preventing criminal recidivism and substance abuse.	Data were collected and analysed on 89 men and two women with severe co-occurring psychiatric disabilities and chemical dependency who had been acquitted of violent crimes by reason of insanity.	Ninety per cent were reported to achieve no re-admission and no re-arrest and 49% were reported to achieve no re-admission, no re-arrest, abstinence, steady housing and involved in meaningful activity.
Tiderington *et al*., (2013)	To explore case managers' use of harm reduction within Housing First, with a specific focus on client-provider relationships	Data were collected using in-depth interviews and on-site observation from 10 homeless patients with substance-abuse disorders and 14 service providers across two assertive community treatment (ACT) teams within 'Housing First'.	It is reported that a heuristic model of harm reduction practice emerged that highlighted the influence of relationship quality on the paths of communication regarding substance use.
van Draanen *et al*., (2013)	To evaluate intensive case management in reducing the excessive use of the Toronto Withdrawal Management System and hospital emergency departments by problematic substance users.	Data were collected from 65 participants at baseline, three- and six-month follow-up using the Addiction Severity Index and the Multnomah Community Ability Scale (MCAS), service use forms were used for the quantitative survey plus semi-structured interviews with 10 participants.	Improvements in community functioning and decreased days of problematic substance use and money spent on alcohol and drugs were reported. Fewer improvements were reported for female clients.

Appendix G:

Detail of the screening questions, quality criteria and scoring of the 29 articles included in the review

A: Application of MMAT criteria to qualitative studies

Question	Tiderington *et al.*, (2013)***	Angell and Mahoney (2007)***	Kolind *et al.*, (2009)***	Redko *et al.*, (2007)****
Are there clear qualitative research questions (or objectives)?	Yes, clear	Yes	Yes	Yes
Do the collected data allow for the research question (or objective) to be addressed?	Yes	Yes	Yes	Yes
Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (or objective)?	Yes*	Yes*	Yes*	Yes*
Is the process for analysing the qualitative data relevant to address the research question (or objective)?	Yes, very clear and relevant*	Yes, very clear and relevant*	Yes, relevant*	Yes, very relevant*
Is appropriate consideration given to how findings relate to the context (e.g., the setting in which the data were collected)?	Yes, at least partially*	Yes, very clearly*	Yes, very clearly*	Yes very clearly*
Is appropriate consideration given to how findings relate to researchers' influence (e.g., through their interactions with participants)?	No, there is no reference to these issues	No, there is no reference to these issues	No, there is no reference to these issues	Yes, this is referenced *

B: Application of MMAT criteria to quantitative descriptive studies

Question	Dates *et al.*, (2009)***	George *et al.*, (2010)****
Are there clear quantitative research questions (or objectives)?	Yes, clear	Yes, clear
Do the collected data allow for the research question (or objective) to be addressed?	Yes	Yes
Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed-methods question)?	Yes*	Yes, all programmes in the province were included in the sample frame*
Is the sample representative of the population under study?	Yes, but some lack of detail supplied*	Yes probably, but this is not formally tested*
Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes, clearly*	Yes, clearly*
Is there an acceptable response rate (60% or above)?	No, data are presented from only 6/13 programmes because others had missing data.	Yes, the response rate was 85%*

C: Application of MMAT criteria to quantitative non-randomised studies (i)

Question	Alexander *et al.*, (2007)***	Bowser *et al.*, (2010)***	Chan *et al.*, (2005)***
Are there clear quantitative research questions (or objectives)?	Yes, very clear	Partially with reference to evaluation and programme impacts but not explicitly stated	Yes clear
Do the collected data allow for the research question (or objective) to be addressed?	Yes partially, limitations acknowledged	Yes in terms of programme impact	Yes
Are participants (or organisations) recruited in such a way that it minimises selection bias?	No, potential selection bias in recruitment acknowledged.	Yes, as all clients in an outreach programme recruited.*	Yes, purposive recruitment and assignment with formal screening.*
Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/ intervention and outcomes?	All measures employed were administrative.* No cross-group contamination evident.	Yes, standard measures used.* No cross-group contamination evident.	Yes, standard measures used.*
In the groups being compared (exposed versus non-exposed; with intervention versus without; cases versus controls) are the participants comparable, or do researchers take into account (control for) the difference between these groups?	This question is not relevant – a single group was followed up over time.*	This question is not relevant – a single group was followed up over time.*	Partially, socio-demographic factors indicate comparability, but significant difference identified in legal problemsseverity.
Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?	Yes, response rate of 89% reported at recruitment. Full data available on completion.*	Partially. No reference to refusal rates at recruitment, but 60% of clients retained for full year.	Yes. Follow-up rates at six months 77% and at 12 months 84%.*

	Cunningham *et al.*, (2007)**	Day *et al.*, (2012)*	Friedmann *et al.*, (2004)*	Hughes *et al.*, (2013)***	Jansson *et al.*, (2003)*
	Yes, very clear	Yes, clear	Yes very clear	Yes clear	Yes clear
	Yes, very targeted	Partially, with limitations	Yes	Partially	Yes
	Yes, appropriate purposive sampling of homeless in various sites, with formal screening into the study.*	No, self-selection bias as convenience sample.	Yes, purposive sample of programmes and their clients.*	Yes, as based on 30 patients with recorded alcohol-related unscheduled admissions.*	No, potential for self-selection and participation bias both acknowledged in limitations.
	Yes, two standard measures used. Reliability data cited for one of them, the other well known.* A single group, and therefore no contamination.	Yes, clear origin as survey instrument developed for the study. No cross-group contamination evident.*	Unclear due to lack of detailed information on measurement instruments	Standard administrative measures employed.* Single group, so no cross-contamination	Data collected by telephone interview. Lack of detail of measures. No cross-contamination, as this was single group
	Statistical control used in the structural equation modelling, but no reference to socio-demographic factors taken into consideration.	No, groups differed in number, treatment characteristics and drug use.	No reference to socio-demographic factors taken into consideration	This question is not relevant, as this was a single group followed up over time*	Yes. Group divided into high/low users of intervention.* Participants comparable in terms of socio-demographics.
	No. No reference to refusal or participation rates or follow-up engagement – therefore unknown.	No. ICM site 21% of total client group and TBCM site 50.5% of client group.	Partially. Missing data from 10 units with potential of non-response bias identified as a study limitation, but statistical approaches employed to reduce effect.	Partially. No reference to refusal or participation rates at recruitment. Follow-up was virtually complete.	No. Initial response rate less than 60%.

D: Application of MMAT criteria to quantitative non-randomised studies (ii)

Question	Jones *et al.*, (2004)**	Kirk *et al.*, (2013)***	May *et al.*, (2008)**
Are there clear quantitative research questions (or objectives)?	Yes, clear	Yes	Yes, very clear
Do the collected data allow for the research question (or objective) to be addressed?	Yes	Yes	Yes, with limitations in follow-up numbers
Are participants (or organisations) recruited in such a way that it minimises selection bias?	Yes, purposive recruitment*	No detail provided on participants selection.	This is unclear, as the required details are not provided.
Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/ intervention and outcomes?	Yes, standardised measures used.*	All measures employed were administrative.* A single group, so no cross-contamination.	Yes, standard measures employed.* A single group; therefore no contamination.
In the groups being compared (exposed versus non-exposed; with intervention versus without; cases versus controls) are the participants comparable, or do researchers take into account (control for) the difference between these groups?	Partially. Socio-demographically comparable. Significant differences in employment, drug, legal, family/social severity, increasing psychosocial needs at baseline.	This question is not relevant, as a single group was followed up over time.*	This question is not relevant – a single group was followed up over time.*
Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?	Partially. Initial recruitment 92%. Follow-up retention unclear.	Yes, as analysis of held administrative data.*	No, initial recruitment was at 76% of those eligible, with 64% entering treatment. Outcome data collected on less than 80% of those recruited or treated.

	McKay *et al.*, (2003)***	McLellan *et al.*, (2003)**	McLellan *et al.*, (2005)****	Merrill *et al.*, (2004)**	Passetti *et al.*, (2008)**
	Yes, clear	Yes, very clear	Yes, very clear	Yes, very clear	Yes, clear
	Yes	Yes	Yes	yes	Yes, at least partially – and the limitations are acknowledged.
	Unclear. Sample is a sub-sample of a larger study. No detail provided on initial recruitment.	Partially. Study acknowledges limitations to recruitment.	Yes. Retrospective selection based on administrative records.*	Unclear, as information not provided.	Unclear. Participants were re-referred following disengagement from services and details were not supplied about how they were identified.
	Yes, standard validated measures employed.* A single group; therefore no contamination.	Yes. An adapted validated standard measure. A single group. so no cross-contamination.	Yes. Standard measure employed.* A single group, so no cross-contamination.	All measures employed were administrative.*	Yes, standard measures employed.* No cross-group contamination evident.
	This question is not relevant – a single group.*	This question is not relevant as a single group was followed up over time.*	This question is not relevant as a single group was followed up over time, with time series comparison.*	Information not provided on differences.	Partially. Comparison of the two groups on socio-demographic factors indicate comparability, but comparison group consumed higher amounts of alcohol at intake.
	Yes. Outcome data – at follow up: 1 month 85% 3 months 82% 6 months 77% 12 months 80%*	No. 76.8% completed. Six-month follow-up, 79.4% completed. 12-month follow-up, 69.2% completed. Baseline, six-month and 12-month follow-up.	Yes, as analysis of held administrative data.*	Yes, as analysis of held administrative data on service utilisation.*	Yes, initial engagement rates were acceptable (63.2% and 55.2%), full data available on completion as the primary outcome was entry to aftercare.*

E: Application of MMAT criteria to quantitative non-randomised studies (iii)

Question	Shaboltas *et al.*, (2013)*
Are there clear quantitative research questions (or objectives)?	Yes, clear
Do the collected data allow for the research question (or objective) to be addressed?	Yes
Are participants (or organisations) recruited in such a way that it minimises selection bias?	No, there were clear biases in selection.
Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/intervention and outcomes?	Data collected by interview and clinical testing. Little detail given on measures. A single group; therefore no contamination
In the groups being compared (exposed versus non-exposed; with intervention versus without; cases versus controls) are the participants comparable, or do researchers take into account (control for) the difference between these groups?	This question is not relevant – a single group was followed up over time.*
Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?	Initial response rates were low (approximately 34% of those eligible enrolled in the programme), but retention was high (80%).

	Slesnick *et al.*, (2012)****	Smelson *et al.*, (2005)**	Smith *et al.*, (2010)****
	Yes, clear	Yes, clear	Yes
	Yes	Yes – with limitations associated with the extant differences between groups	Yes, with limitations in measurement
	Yes, application of clear inclusion/exclusion criteria for participation.*	Yes, all recruited while inpatients.*	Yes, all referrals guided by specific criteria.*
	Yes, standard validated measures employed.* A single group, so no cross-contamination	All measures employed were administrative.* No cross-group contamination evident.	All measures employed were administrative.* A single group; therefore no contamination.
	The question is not relevant as this was a single group.*	No, the comparison group were those who refused treatment. There were no demographic differences between groups, but the intervention group had longer current and previous hospitalisations prior to referral to intervention.	This question is not relevant – a single group was followed up over time.*
	Yes, standard measures used for inclusion/exclusion criteria for participation. Follow-up rates at three months 93.3% and at six months 86.6%.*	No, no reference to refusal or participation rates or follow-up engagement – therefore unknown.	Yes, 95% of those referred were admitted to the programme, and 86% of those completed follow-up.*

F: Application of MMAT criteria to mixed-methods studies

Question	Neumiller *et al.*, (2009)*** qualitative and descriptive quantitative
Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed-methods question (or objective)?	Yes, clearly
Do the collected data allow for the research question (or objective) to be addressed?	Yes
Is the mixed-methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed-methods question (or objective)?	Yes*
Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?	Yes*
Is appropriate consideration given to the limitations associated with this integration (e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design?	No, there is no mention of limitations.
Are the criteria for qualitative studies met?	a. Yes, clearly* b. Yes, clearly* c. Yes, all eligible programmes were invited to participate.* d. Measurements were either standard or developed via workshop and are appropriate to the research questions.*
Are the criteria for quantitative studies met?	a. Yes, all documentation collected was relevant.* b. Little detail provided on analysis, but it appears appropriate.* c. Yes, there is reference to the context of the data in the interpretation.* d. No, but researchers did not interact directly with data providers. Therefore, this question is only marginally relevant.

	van Draanen *et al.*, (2013)** qualitative and non-randomised quantitative	Passey *et al.*, (2007)*** qualitative and non-randomised quantitative
	Yes, for both components	Yes, clearly
	Yes, at least partially	Yes
	Yes*	Yes*
	There is no integration of data.	Yes, partially*
	Not relevant as there is no integration of data.	Concordance between quantitative and qualitative data referenced.*
	a. Yes, interviews with programme participants.* b. Yes, thematic analysis.* c. No, no reference to context. d. No, no reference to researcher bias.	a. Yes, interviews with participants.* b. Yes, thematic analysis.* c. No, setting not referenced in findings. d. Yes, acknowledged that outcomes possibly are a consequence of participation.*
	a. Unclear whether there is bias in the recruitment. b. A structured questionnaire was employed but no detail provided on its origin or validity. c. A single group was used and therefore no contamination. d. A single group compared before and after intervention – only those with complete data included. e. No reference to refusal or participation rates. There are complete outcome data.	a. Yes, appropriate purposive sampling of a select group based on classification by assessment into one of four groups.* b. Instrument developed and validated in country of application for specific group. A single group, so no contamination. c. A single group compared before and after intervention. d. Poor retention rate from baseline to completion.

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