

# Interventions to Improve Discharge from Acute Adult Mental Health Inpatient Care to the Community: Systematic Review and Narrative Synthesis

Natasha Tyler (✉ [natasha.tyler@nottingham.ac.uk](mailto:natasha.tyler@nottingham.ac.uk))

University of Nottingham <https://orcid.org/0000-0001-8257-1090>

Nicola Wright

University of Nottingham School of Health Sciences

Justin Waring

University of Birmingham

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## Research article

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## Abstract

**Background** The transition from acute mental health inpatient care to community care is often a vulnerable period in the pathway, where people can experience additional risks and anxiety. Researchers globally have developed and tested a number of interventions that aim to improve this improve support continuity of care and safety in the transitions. However, there has been little attempt to compare and contrast the interventions and specify the variety of safety threats they attempt to resolve. **Methods** The study aimed to identify the evidence base for interventions to support continuity of care and safety in the transition from acute mental health inpatient service to community care services at the point of discharge. Electronic Databases including PsycINFO, MEDLINE, Embase, HMIC, CINAHL, IBSS, Cochrane Library Trials, ASSIA, Web of Science and Scopus, were searched between 2000 and May 2018. Peer reviewed Papers were eligible for inclusion if they addressed adults admitted to an acute inpatient mental health ward and reported on health interventions surrounding discharge from the acute ward to the community. The results were analysed using a narrative synthesis technique. **Results** The total number of papers from which data was extracted was 45. The review found various interventions implemented across continents, addressing problems related to different aspects of discharge. For some interventions followed a distinct named approach (i.e. Critical Time Intervention, Transitional Discharge Model) others were grouped based on key components (i.e. peer support, pharmacist involvement). The primary problems interventions looked to address were reducing readmission, improving wellbeing, reducing homelessness, improving treatment adherence, accelerating discharge, reducing suicide. The 69 outcomes reported across studies were heterogeneous, meaning it was difficult to conduct comparative quantitative meta-analysis or synthesis. **Conclusions** The interventions reviewed are spread across a spectrum ranging from addressing a single problem within a single agency with a single solution, to multiple solutions addressing multi-agency problems. We recommend that future research attempts to improve homogeneity in outcome reporting.

## Background

The transition from acute mental health inpatient care to community care is often a vulnerable period in the pathway, where people can experience additional risks to their mental health and psychological wellbeing. Previous research with service users has found discharge to be a chaotic, stressful and emotionally charged time [1]. The term “revolving door” is widely used to describe how mental health service users can repeatedly transition between hospital and community care, and then back into hospital within a very short timeframe. However, the terminology of “revolving door”, within this context, has been criticised by service users and the survivor movement for situating the problem of repeated transitions with the individual rather than with the systems around them [2]. This ‘circuit of care’ stems not only from the person’s underlying health conditions, but often from the challenges of ensuring the continuity of care following inpatient admission. A pilot qualitative study conducted in the UK [1,3] identified examples of these challenges including; (1) problems with medication management and maintaining concordance; (2) increased risk to self (i.e. suicide) and others (particularly family members); (3) poor information sharing between services leading to both gaps and duplication in provision; and (4) poorer mental health due to the distress caused by multiple often difficult transitions. In recent years there has been considerable research evidencing the relationship between discharge from acute mental health inpatient units and suicide [4]. Research shows, for example, that between 2005 and 2015 seventeen percent of people who took their own life had recently been discharged from acute hospital services [4]. The significance of suicide as a marker of quality during and after acute care is further indicated by its routine use in many studies and evaluations of interventions to support hospital discharge, alongside other measures such as readmission and length of stay [5–8]. However, the variety of challenges that are present at this sensitive time in the service user journey transverse far beyond what can be measured solely using readmission or death by suicide rates.

Researchers globally have developed and tested a number of interventions that aim to improve the care transition. Some interventions are targeted to a particular group, i.e. to reduce the risk of post-discharge homelessness [9,10]. Other interventions focus on a particular source of risk to health following discharge, such as medicines management [11,12]. Whilst others are concerned with coordinating care, more broadly, between different agencies [13,14].

How such interventions are configured, in terms of their cause-and-effect mechanisms, and implemented in different contexts provides additional insight about how service leaders and researchers understand and seek to address the problems of care transitions from acute mental health settings. That is, whether the source of risk is located within the individual who needs additional education or support, with the care system in terms of the problems of coordinating care, or with wider social and community factors. As such interventions are so varied, it shows that different groups articulate the challenges associated with discharge in differently. It is increasingly recognised that the evaluation of quality improvement interventions, such as those for hospital discharge, should more explicitly articulate and appraise the underpinning Theory of Change for a given intervention (the rationale and assumptions about mechanisms that links processes and inputs to outcomes, also specifying the conditions necessary for effectiveness) [15–17].

There has been little attempt to compare and contrast the interventions and specify the variety of problems they implicitly or explicitly attempt to resolve. Previous systematic reviews of discharge interventions have been restrictive. For example, one systematic review focused only on transitional interventions that aimed to reduce readmission [18]. Another review was restricted to interventions that were delivered pre-discharge [19]. The problems each intervention hopes to address are often varied or implicit, as is the study design and outcome measures used. There has been little attempt to descriptively compare the types of interventions that exist and the quality and safety challenges that they aim to address. By removing the search restrictions we hope to compare and contrast the interventions that have been tested and look for commonalities and differences in effectiveness and in the way different researchers articulate the problems associated with discharge.

## **Aim**

To identify and synthesise the evidence base for interventions to support continuity of care and safety in the transition from adult acute mental health inpatient service to community care services at the point of discharge. We are not aiming to identify specific comparisons or outcomes.

## **Methods**

### **Study design**

Systematic review. The review follows Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines (for the PRISMA checklist, see Additional file 2). The study protocol was prospectively registered with PROSPERO (CRD42018097475).

### **Data sources**

Medical and social science databases (including PsycINFO, MEDLINE, Embase, HMIC, CINAHL, IBSS, Cochrane Library Trials, ASSIA, Web of Science and Scopus) were searched from 1st January 2000 to May 2018. A combination of controlled vocabulary index and free text terms were used to search electronic databases, including terms relating to Discharge (e.g. “discharge”, “hospital discharge”, “psychiatric hospital discharge”, “transfer”), mental health (e.g. “exp mental health”, “mental\* disorder\*”, “mental illness\*”, “schizophr\*”, “suicid\*”), and interventions (e.g. “exp intervention”, “discharge intervention”, “discharge planning) see Additional file 3 for a full list of search terms used. Where a controlled vocabulary index did not exist for a database or website, only free text terms were used. Forward and Backward searches were conducted on included papers using Google Scholar. All identified references were imported to Mendeley.

### **Selection criteria**

### **Inclusion criteria**

Papers were eligible for inclusion if they 1) addressed adults (18-65); 2) admitted to an acute inpatient mental health setting; 3) functional conditions (mental disorders other than dementia, and includes severe mental illness such as schizophrenia)

or 4) reported on health interventions or service provision; 5) interventions that aimed to improve discharge from the acute ward to the community. Papers were eligible for inclusion in the review if they were peer-reviewed empirical studies (quantitative or qualitative) reporting original data. We included interventions that aimed to improve the transition from in-patient to community care for hospitalised adult in-patient, components of the intervention could be delivered prior to discharge, shortly after discharge or could span both. Papers were not excluded based on country of origin.

## **Exclusion Criteria**

We excluded interventions not related to functional adult mental health (i.e. medical, surgical, paediatric/older adults population, organic conditions), interventions that were involuntary in nature (e.g. involuntary treatment orders or forensic interventions). We excluded interventions focused on treating specific psychiatric disorders (for example, using medication or specific psychotherapies) unless there was a component of the intervention specifically focused on improving the transition from in-patient to community care. Theses, editorials and opinion pieces were excluded. Studies that did not include primary data were excluded (e.g. systematic reviews). If a research team reported the same study in multiple papers, only the original paper was included. The search was restricted to English language only papers.

## **Screening**

All papers identified by database searches were downloaded to Mendeley to remove duplicates and screened at the title/abstract level for inclusion in full-text review by one reviewer (NT). Two reviewers (NW, JW) each independently screened 20% of the titles and abstracts of the unique papers. Then group discussions were held whereby the team discussed differences between the two reviewers. When the final list of included papers was ready a final discussion was held to ensure all researchers were in agreement regarding inclusion. Disagreement or uncertainty was resolved by consensus decision. Details of the excluded papers and reasons for exclusion are available on request.

## **Data extraction and quality appraisal**

Data were extracted from each study into a standardised table. Data extraction was conducted by one researcher (NT). As a check, one reviewer checked the extracted data from a random 10 papers. Data were extracted on: a) Aim of study b) Disciplinary perspective c) Theoretical background d) Geographical context e) Context for study f) Method g) Sample h) Analytical approach i) Outcomes measured j) Intervention details k) Evidence of outcome/Effect of intervention l) Evidence about genesis.

The methodological quality of studies was independently assessed by one reviewer (NT) using the Mixed Methods Appraisal Tool [20]. Complete listings of all studies and quality appraisal scores are presented in Additional file 1.

## **Analysis**

Due to the heterogeneity in the data (including study designed outcomes measured) it was not possible to statistically pool the data from the studies so a narrative synthesis approach was taken. Narrative synthesis is an approach to systematic review and synthesis of findings from multiple studies that depends primarily on using words and text to explain and summarise the findings [21]. The narrative synthesis was conducted using guidance [22]; which outlines four elements of the process 1) developing a theory of how the intervention works, why and for whom 2) developing a preliminary synthesis 3) exploring the relationships between and within studies 4) assessing the robustness of the synthesis. For each stage the guidance recommends useful tools and techniques, figure 1 illustrates the synthesis process and the tools we used. Extracted data were analysed by one reviewer (NT) using narrative synthesis.

# **Results**

## **Data Sources**

The search of the electronic databases generated 3595 hits including duplicates. Citation mapping revealed a further 36 papers which were included. 1662 unique papers were identified; 1542 papers were excluded after screening and 120 full papers were reviewed. We excluded 75 full texts for the following reasons: (1) not concerning mental health, (2) not concerning adult populations, (3) not describing an intervention (4) not including primary empirical results, (5) not an acute inpatient population (i.e forensic or organic) (6) not focused on discharge. Therefore, the total number of papers from which data was extracted was 45. Table 1 presents the 45 studies included in the review.

We first of all grouped the studies in terms of design and populations. We then grouped the studies by the type of interventions, then the problems they aim to address. Finally, we collate the outcomes reported and the facilitators and challenges reported in the studies.

### **Study design and population**

The majority of the studies included in the review were conducted in high income countries, primarily the USA, UK, Canada and Australia. However, a limited number were conducted in low and middle income countries such as Iran and China (see figure 3).

The methodological design used in the papers varied considerably, the most common design used was a randomised controlled trial; which is often considered the highest quality research [23]. However, many of the papers were evaluation studies (often a mixed methods review of the effectiveness of a pilot) or controlled studies (using a non-randomised comparison group), see figure 4.

Given the variation in design, there were also variation of the number of participants recruited in each study. Whilst most studies contained more than 20 participants, the majority contained less than 200. It must be noted that the participant numbers often included the control group; in which case only half of the participant group received the intervention.

### **Types of interventions**

During the preliminary synthesis we used the clustering method to identify similarities between interventions (table 2). For some interventions this was explicit due to the use of a name for a distinct approach (i.e. Critical Time Intervention, Transitional Discharge Model) for others this involved implicitly grouping interventions based on key components (i.e. peer support, pharmacist involvement).

### **Critical Time Intervention**

Critical time intervention was the most frequently tested intervention found in this systematic search. Critical time intervention (CTI) primarily aims to reduce homelessness, in the 'critical time' following discharge from hospital. It is delivered by trained 'CTI' workers with small caseloads. It is community based and time limited (with gradually reduced contact). It involves 3 phases (1) Transition (2) Try-out (3) Transfer of Care. Five studies [9,24–26] in the review reported on this intervention; which is primarily aimed at a particular population: those suffering homelessness and acute mental health hospitalisation. All of the studies were conducted in the USA. Two were randomised controlled trials (RCT) of 150 participants [9,25], two non-randomised experimental design [24,26] and one interviews with staff that deliver CTI (n=12) [27]. Two studies found significant reduction in homelessness for those that received the intervention [9,24]. Two studies also aimed to reduce readmission and found significant differences readmission rates [26,28], one of which was a brief CTI [26]; which delivered the same intervention in a shorter time period. Finally, the qualitative interviews found that CTI workers self-identified as 'extra support' and stressed the importance of three dyadic relationships to the success of the intervention (worker-client, worker-primary support, primary-support-client) [27]. In summary, the studies reviewed suggest that CTI could be an effective method of reducing homelessness post-discharge and reducing early readmissions.

### **Transitional Discharge Model/ Transitional Relationship Model**

The Transitional Discharge Model (TDM) also known as the Transitional Relationship Model, involves increasing continuity of care. Inpatient nurses work with the service users until they establish a therapeutic relationship with the community worker, then peer support is also introduced by a former consumer of mental health users who now lives successfully in the community (relationship is maintained for at least one year and begins before discharge). Three studies in this review tested this intervention, one was a large scale RCT; which found no significant differences in post-discharge costs or quality of life, but an unexpected finding of early discharge (on average 116 days earlier) [29]. A 25 participant randomised study found a significant reduction in readmissions[30]. The action-oriented research study highlighted the need to address inter-professional team working to improve staff uptake of the intervention [14]. Collectively, the results suggest that the TDM could be effective in reducing readmission and facilitating early discharge.

## **Peer Support**

Peer support is when past service users use their own experiences to help current service users, primarily on a one-to-one basis, but it can exist in various forms. Three studies tested peer support as a distinct single intervention (although others included it as part of multi-component interventions). How the peer support was delivered differed across studies (see table 2). One evaluation study found a reduction in self-reports of readmission, functional and clinical recovery in 38 service users [31], another found benefits to service users and costs reductions for services [32]. However a small pilot RCT found no statistical differences in terms of hope or quality of life [33]. In summary, the studies testing peer support as an individual intervention used small sample sizes and reported heterogeneous outcomes, therefore it's difficult to draw conclusions about its effectiveness.

## **Contact-based interventions**

The contact-based interventions were grouped together arbitrarily based on the provision of additional post-discharge contact with a professional beyond treatment as usual. Within this group there were various delivery of contact, i.e. letters, phone, face-to-face, video. The purpose of the contact also varied across studies, some aimed to reduce suicide, others to improve treatment adherence and one to reduce readmissions. There were six contact based interventions in this review (see table 2). The study that aimed to reduce readmissions found no effect of a 90-day transitional care intervention (phone calls and home visits) [34]. Of the studies that aimed to reduce suicide, one found letters to recently discharged service users ineffective [6], whilst the other found only very early telephone follow-ups to be effective in a large-scale randomised controlled trial [5]. A small-scale RCT found intensive case management (weekly face-to-face contact and phone calls from a counsellor) to be effective in reducing depression and suicidal ideation and increasing service contact, satisfaction and better relationships with professionals [35]. Two studies aimed to use technology to increase treatment adherence, one sent SMS messages and found a somewhat significant reduction in readmission and significant difference in treatment utilisation [36], the other used an MDT videoconference with rural patients and greater treatment adherence in the intervention group [37]. In summary, as the interventions varied in terms of delivery and outcomes reported it's difficult to draw conclusions. However, results collectively indicate that speed of follow-up contact is important in terms of suicide prevention and that contact-based interventions may not reduce readmission, but could be a useful mechanism for improving treatment adherence particularly in rural populations.

## **Role-based interventions**

Role-based interventions were defined by the introduction of a new role, position or job title in addition to treatment as usual. The specific tasks performed by each 'role' varied across the studies, see table 2. Seven role-based intervention studies were included. One study introduced a discharge co-ordinator to improve communication between primary and secondary care but found no significant difference in outcomes (readmission, length of stay, satisfaction, mental health) in a large scale controlled study [38]. Similarly, one large scale RCT found no effect of a Post-Discharge Network Co-ordinator on readmission, social support, quality of life or mental health [39]. A case study of 3 patients from the RCT revealed that this was likely due to many service user's small, conflictual or unstable social networks [40]. Two roles that focused on bridging

the gap between the inpatient and community care were found to be effective in reducing readmission rates [41] and median length of stay [42] in two retrospective comparison and evaluation studies. The introduction of a case management role was found not to reduce readmissions [43]. However, a nursing discharge programme was found to improve medication adherence [44]. In summary, role-based interventions are introduced to address different aspects of the discharge process and, therefore comparison is difficult. However, all of the role-based interventions besides one, had no effect on readmission rates. This could indicate that readmission rates are not influenced by the introduction of new staff roles.

### **(Psycho) educational Interventions**

Educational interventions, focused on the delivery of training or education to service users or their families. Five educational interventions were included in the review, four of which were conducted in Asia. Four focus primarily on teaching various self-management techniques to service users, whilst one focuses on educating family members too. As these were educational interventions the outcomes measured often included knowledge levels. Two studies reported a significant increase in knowledge about the psychological condition post intervention [45,46]. Others aimed to use education to reduce readmission, two reported this effect [47,48], whilst one reported no effect [49]. Educational interventions also showed some effect on reduction of symptoms, and treatment adherence [45,46,48]. One intervention, taught service users how to deal with situations that may occur in the community, in an effort to increase coping and concern about discharge, however no significant results were reported [50]. In summary, the outcomes measured in the educational interventions differ from those in the other interventions, with a greater focus on knowledge and behavioural outcomes, whilst there is an indication that psychoeducational interventions increase knowledge about one's condition, there is evidence to suggest that educational interventions may also improve some service-level outcomes such as readmission. However, the one study that reports behavioural/emotional outcomes reported no effect [50].

### **Summary of Other Interventions**

There were some interventions included in the review that did not fit within the aforementioned primary categories, these groups had 3 or fewer studies (see table 2). These were categorised as pharmacy interventions [12,51], (medications focused interventions led by pharmacists) needs-orientated discharge planning [45,52] (discharge planning interventions led by the needs of individuals), intervention to prevent homelessness (an intervention developed by Forchuk et al. [53,54] focused only on homeless individuals), transitional care model (a nurse-based in home initiative) [55,56], whole care pathway initiatives [57,58] (that consider multiple agencies in the care pathway) and multi-component models [59–61] (using multiple interventions simultaneously). Despite studies reporting on these interventions they tended to be single instances and do not provide sufficient evidence for narrative synthesis on a categorical level.

### **Underpinning theoretical assumptions about the challenges present at discharge from an acute mental health setting**

In order to think about the effectiveness of the interventions presented in this review, we need to first understand the underpinning theoretical assumptions of each intervention. Theory of change is not explicitly used in any of the reviewed studies, and many of the assumptions about the challenges associated with discharge are implicit within the design and evaluation of the intervention.

During the process of narrative synthesis, studies were clustered and grouped in multiple ways, one such way exemplified the threats to safety that the intervention aimed to solve and whether an effect was subsequently reported. As the outcomes were heterogeneous, it was difficult to directly compare outcomes, so instead we grouped the interventions in terms of the safety challenges they (implicitly or explicitly) aimed to address. We also considered whether an effect was evidenced, we defined an effect as a change in outcomes (or equivalent), reported in a positive light by the authors.

<Insert Figure 6: Safety Challenges and the evidence of effectiveness for interventions that aim to address each>

### **Reducing Readmission**

The most common challenge that the interventions aimed to solve was readmission to an acute ward within a given short-term period of time, sometimes indicative of shortcomings in service provision. Whilst some studies found evidence for a reduction in readmission due to the interventions, many failed to evidence this effect. The studies that had an effect on readmission tended to focus on either education, therapeutic relationships or continuity of care. Many of the successful interventions bridged the boundaries between ward and community by providing care from ward based professionals in the community [29,58] or having community teams leading discharge planning on the wards [41], with a focus on the development of therapeutic relationships. Interventions that were successful in reducing readmission (primarily in Asian countries) had a psychoeducational focus. Other effective interventions were focused on a particular population (homeless individuals) and managing financial/environmental challenges that the service users faced [26,28].

More interventions were shown to have little effect on readmission than those that did. Some of these interventions shared commonalities with the successful interventions, for example the community links team, offering intensive support in the community during the day [42]. Contact-based interventions were particularly unsuccessful in terms of reducing readmission, for example videoconferencing [37], follow-up letters [6] and follow-up phone calls [34]. A few studies that considered care pathways from a purely staff or service-level perspective were also not proven effective in terms of readmissions [57,62].

However, many of the interventions that failed to reduce readmission, were arbitrarily categorised as role-based, e.g. psychiatric discharge co-ordinators [63], pharmacy discharge planners [64], community link team [42], post-discharge network co-ordinators [39]. This suggests that it may not be sufficient to introduce a new role as a single intervention. There is also evidence to suggest that care co-ordinating roles may result in high levels of stress and burnout [65]. Furthermore, issues that might lead to readmission are manifest across multiple dimensions (clinical, personal, social) and researchers are increasingly questioning the validity of readmission outcome data, as better hospitals keep people alive, therefore multiple readmissions are in some cases a indication that a hospital is safer [18,66]. Many of the interventions in this review that span boundaries have proven successful in terms of reducing readmission. There is also success in the psychoeducational interventions and those that focus on therapeutic relationships, indicating that tackling the personal and emotional elements of the care transition may be equally important when aiming to reduce psychiatric readmission.

Whilst it is difficult to make any conclusions about effectiveness of interventions when the outcomes reported are heterogeneous, the studies are conducted within different health systems which may have different baseline levels of outcomes, the most promising results in terms of readmission involve reducing the epistemic, professional and physical boundaries between hospital and community, encouraging therapeutic relationships and educating and empowering service users.

### **Improving wellbeing and/or reducing symptoms**

Many of the interventions that focused on the care transition inherently aim to improve wellbeing and reduce symptoms. The studies that report evidence of this have few commonalities (see figure 6). Whilst some contact based interventions show an effect [36] others show no effect [6]. Some interventions show an increase in quality of life but no change in symptoms [59], on the contrary, others report a reduction of symptoms but no increase in quality of life [30]. Perhaps this lack of clarity in the results could be a manifestation of using such subjective, difficult to measure outcomes that could be easily confounded by factors peripheral to the discharge intervention. Rather than the effect of the transition intervention.

### **Improving Treatment and/or Medication Adherence**

Of the few interventions that report success in treatment or medication adherence improvement they tend to be brief [60,67], involve a co-ordinating agent [44,64,67] or use technology enhanced contact methods [36,68]. Unlike readmission, the successful interventions that aim to increase treatment adherence tend to be role-based and some included a co-ordinating

agent either a nurse [44,56] or a pharmacist [64]. Similarly, whilst contact based interventions were less effective in reducing readmission, two contact based interventions improved treatment adherence [36,37].

### **Reducing Homelessness**

There were two interventions included in this review that aimed at a single population within an acute ward, homeless individuals. All of the interventions reported success in reducing homelessness. The interventions studied by Forchuk and colleagues looked at financial assistance and support in accessing housing, essentially providing resources that service users might not otherwise have [54,69]. Whereas the other intervention, CTI, focused on therapeutic relationships, and helping service users access services [26–28]. Both interventions focused primarily on homelessness but also reported benefits in terms of other outcomes like readmission.

### **Reducing Suicide**

Only three studies in the review focused on reducing suicide post-discharge. In the one unsuccessful intervention 8 letters were sent to service users in the year after discharge, but this had no effect on suicide [6]. The two effective interventions focused either on early follow up post-discharge either by telephone [5] or consistent weekly face-to-face contact [70]. Indicating the immediacy and consistency may be key to interventions looking to solve this problem.

### **Accelerating discharge**

The interventions that are successful in reducing length of stay and accelerating discharge tend to have a systems or process level focus. For example integrated care pathways are evidenced to facilitate early discharge [57], as is introducing a community link team [42]. Whereas interventions that focus on a single element of the care pathway, or a single person seem less successful in solving this problem, for example the introduction of a team to co-ordinate discharge planning had little effect on length of stay [71,72]. Similarly, introducing a single professional to address this challenge [63] or relying on the education of the service user [49], also proved unsuccessful. This could indicate that individuals (either a single professional, team or service-user) are often disempowered within a multi-agency system, and therefore unable to generate meaningful change.

### **Variability of Outcomes**

Due to the vast differences in study design and population the outcomes measured were considerably different. A loose definition of outcome was used when extracting the data, anything that was measured or reported as a result of the intervention was extracted, due to the differences in design, only RCTs reported primary and secondary clinical outcomes. Using this outcome definition, there were 69 unique outcomes reported across the studies. Whilst there were commonalities amongst some (readmission, length of stay, symptoms), many looked at specific outcomes in regards to a particular research question (addiction severity, concern about discharge, financial cost to system). Even studies that reported the same outcomes could measure them in different ways. For example, readmission was measured using various time frames (e.g. within a week, within 30 days, within a year) and data was collected in various ways (e.g. interviews with service users, collecting hospital data). Table 3 shows the most commonly reported outcomes.

### **Examination of facilitators and challenges/barriers**

There were commonalities within the studies in terms of barriers and facilitators of effective implementation of interventions. All of which could be categorised as either staff level, service level, or service-user level, many sit within multiple categories. From a service level perspective, barriers were related to insufficient funding of services or interventions, ineffective information sharing and the effect of the physical location of services (particularly rural community services) [12,26,54,67]. The structural effect was also a reported facilitator along with planning [73].

The effectiveness of an intervention was often highly dependent on the behaviours, opinions, affect and education of the staff delivering them. The willingness of staff to adapt and exhibit flexibility was key, as was providing staff with adequate training around the intervention [14,29]. If staff worked in a multi-disciplinary manner, this was also considered facilitative to some interventions [56]. Having a 'champion' or staff member that advocates for the intervention was facilitative in some studies [14]. Staff were more responsive to interventions that reduced their workload or stress (as opposed to increasing it) [14,41,42]. One staff level barrier was when interventions was a lack of behaviour change in response to the intervention [29].

Barriers to successful intervention that were reported at a service-user level included behaviours that are often in opposition to recovery, for example substance-misuse, dependency on services or unstable social relationships [34,40,42]. Similarly, facilitators on a service-user level included behaviours or affect that are facilitative of recovery, such as a sense of belonging within community (and community services), structured daily routine within the community and being a part of stable and structured social networks [31,39,41,48,55]. This does not indicate that the success of the intervention is dependent on the behaviour of the service users, but instead highlights the considerable effect of the complicated personal and social variables that surround this emotionally-charged period.

A number of facilitators and barriers transposed these distinct categories. From a barriers perspective, miscommunication or a lack of shared knowledge or accountability could be pejorative to intervention effectiveness on either a service, staff or service-user level or between groups [14]. Similarly, from a facilitator perspective comparable themes transcend the groups: communication (and shared decision making) within and between the groups was a key facilitator for many interventions [56]. Connection amongst providers i.e. a supportive information sharing system, was also facilitative amongst staff groups and service providers [54]. Similarly, some researchers found therapeutic relationships between staff and service users advantageous [9,27,70].

## Assessing Robustness

We used the Mixed Methods Appraisal Tool [20] to assess the quality of the studies included in the systematic review. It must be noted that a number of studies in this review had less than 20 participants and take an evaluative or pilot approach rather than a quantitative robust test of effectiveness, additional file 1 outlines the quality assessment of each study. All of the studies included in the review met the screening criteria (used as a measure of minimum quality). The tool does not suggest researchers score the papers, however the table highlights the differences in study quality. As this systematic review does not make recommendations for the most effective intervention, the robustness of the studies is of lesser concern. Interestingly, many of the pilot studies found no or little effect of the interventions and it seems such interventions are rarely re-tested. For example, to our knowledge Walker et al., [63] is the only study to specifically test 'discharge co-ordinators' in relation to mental health, despite evidence that this method is effective in other patient populations and its inclusion in National Institute for Health and Care Excellence (NICE) guideline regarding transitional care [74]. Some studies use a similar approach, such as care managers responsible for facilitating discharge [67], but the name 'discharge co-ordinator' has not been tested to our knowledge since it was reported ineffective in 2000. Hence, the effectiveness of any particular intervention can only often be based on the results of a small number of studies.

## Discussion

The studies included in the review are varied in terms of origin and design. Whilst this review uses a broad inclusion criteria to demonstrate the variability in challenges they aim to address, it also meant that there is variability of the baseline health systems in which the intervention is implemented, complicating comparison. For example, the interventions from Asia frequently reported higher effectiveness rates than those in the UK or USA, indicating that there are potentially cultural differences within complex systems that affect comparability of outcomes cross-culturally, perhaps also differences in the

baseline or treatment as usual conditions. In the UK, for example, NICE guidelines recommend elements of some interventions as standard practice, (i.e. having a named staff member manage this discharge) [75]. Therefore, any effects of such interventions in the UK could be diminished within standard clinical practice.

This review highlights the different approaches that have been used internationally to tackle the varied challenges that discharge from an acute hospital poses. The variability of the interventions and the outcomes are likely a manifestation of the variations in how each research team interprets the problems associated with discharge. For example, those interventions that focus on pharmacist involvement, consider the active risk factor of medication non-adherence. Whilst the contact-based, or whole system interventions articulate the problem of ineffective communication. Some researchers chose to only measure outcomes relevant to the specific problem they aim to address, whilst others do not articulate how the measures used indicate an improvement in the particular challenge. Understanding the effective elements of interventions that address specific problems, would have greater advances for healthcare professionals looking to improve practice or policy makers attempting to improve quality and safety at a service-level.

The interventions reviewed are spread across a spectrum ranging from addressing a single problem within a single agency with a single solution, to multiple solutions addressing multi-agency problems. Within which some interventions include multiple elements, i.e. a) peer support b) group meetings and c) therapeutic relationship building. The notion that one intervention can solve a multitude of safety threats is also not evidenced in transitions literature outside in the wider patient population [76]. Hence, it's difficult to assess the effect of each component of multi-stage interventions on each single problem, particularly without an explicit underlying theory of change.

Designated roles supporting the transition of service users from inpatient to community care was highlighted in a number of studies included in this review. Care co-ordination has a long history within mental health services, for example in England and Wales the introduction of care co-ordinators stems from the Care Programme Approach in 1990 [77]. Assigned as the main point of contact for service users, care co-ordinators should facilitate care across agencies for an individual, including the transition from hospital to community. Care co-ordination is also an emergent concept in other areas of healthcare, particularly where individuals have complex needs. Whilst studies suggest that professionals working in co-ordination roles have high job satisfaction, they also experience high levels of stress and burnout [65,78]. Therefore, when implementing new transitional roles consideration needs to be given to how they will fit with existing co-ordination roles and the support required by the individual undertaken them.

There are few emerging findings from this review in terms of effectiveness, which is similar to other more focused systematic reviews in this field. The synthesis suggests that interventions that aim to reduce homelessness are effective in general, regardless of the approach taken [24,26,27,69]. Successful interventions either provide resources or psychosocial/therapeutic support in securing accommodation (or both). This arguably indicates the importance of addressing a single risk factor with a single solution (ideally with an underpinning explicit theory of change). Similarly, with interventions that aim to improve treatment adherence, there seems to be some success in introducing a co-ordinating agent (assigned nurse, social worker or pharmacist) [12,44,56,67]. When considering the reduction of readmission, some successful interventions aim to bridge care across organisations (either community staff on the ward, or ward staff in the community) increasing continuity of care [14,30,71]. The commonality amongst interventions that successfully accelerated discharge tended to use a multi-agency, systems level approach to intervention [29,42,57].

The heterogeneity in terms of outcome reporting made meaningful comparison of any interventions difficult. Even when interventions focus on a single solution, researcher's measured select outcomes using different measurement tools, so it is difficult to assess the effectiveness of any single element in regards to any single outcome measure. This is in line with a systematic review of interventions that aimed to reduce readmission, whereby quantitative meta-synthesis could not be conducted [18]. This could also be exacerbated by the fact that the outcomes are arguably not indicative of the success of an intervention as they can be easily confounded by external variables. A recent report by The Kings Fund has questioned

the validity of using clinical outcomes for a mental health population and recognised the importance of social and emotional outcomes [79].

Very few of the papers were explicit about the underlying Theory of Change. They often had unclear assumptions about what the nature of the problem was and how the interventions aimed to address it. This was further informed by the selection of the outcomes or measures used; which seemed in some cases to be pragmatic proxies rather than based upon a specific theory of change. For example, there is an emerging body of literature questioning the effectiveness of readmission as an outcome in mental health, as it only describes service use not clinical need [80,81]. Research suggests that using a framework to guide improvement initiatives is beneficial, for example using the action-effect method (a systematic, structured approach to identify and articulate an improvement interventions theoretical assumption [82].

In this paper we present a review of various discharge interventions that are not explicitly patient safety interventions, but that focus on improving quality and safety by addressing risk factors such as ineffective continuity of care or communication. All of the interventions aim to improve quality and safety, but are based upon limited understanding or articulation of what the quality and safety elements of healthcare are, nor are they informed by the safety literature. For example, they do not engage with patient safety literature that describes active and latent risk factors [83,84], nor the literature around 'systems-thinking' approaches to managing risk [84]. Current thinking in the field of patient safety emphasises the contribution of upstream 'latent factors' in conditioning, exacerbating and enabling 'active errors' or mistakes in the organisation and delivery of care [83,84]. These often involve local workplace and environmental factors, management pressures and organisational cultures. Such system factors are described as heightened at the point of discharge because care transitions tend to involve multiple sets of system factors interacting in the form of a complex system, as the patient moves across care domains [85]. Many of the threats to safety that are present in this time period are not explicit or directly visible in the working environment, as noted above they can be seen as latent risk factors whose impact on the continuity, quality and safety of care can be difficult to detect [83]. In relation to mental health care transitions, literature has outlined multiple systems-level risk factors in this time period, namely the lack of continuity of care and difficulties with communication between organisations and professionals [86–88] and many of the interventions implicitly or explicitly aimed to address one or more of these.

## **Recommendations**

In summary, in order to allow for a greater understanding of the elements of interventions that effectively reduce risk factors, a more structured approach to testing interventions is needed. This could be operationalised in multiple ways, firstly by generating an agreed upon core outcome set to be used as standard in all future mental health discharge interventions (any unique outcomes would be used in addition to this). Secondly, more clarity is needed in explicitly stating the problem (or latent risk factor) that an intervention aims to address (or each element in a multi-component intervention). This could explain or reduce the variability of effectiveness between similar interventions by providing more structure, transparency and means of comparison and subsequently advancement. In line with the majority of implementation, research the reviewed papers have very little underpinning theory (more specifically, theory of change) and articulation of what is needed within a complex system for the intervention to be successful [89]. Conceptualising these problems from a patient safety, systems-thinking perspective and with an explicit theory of change may make it easier a) describe the specific problem the interventions aim to address b) to understand the elements of an intervention that are effective in produce intermediate or long term desired outcomes and c) understand what long term outcomes would indicate an effective intervention.

## **Limitations**

By utilising a less restricted search criteria the outcomes reported are broad, and the aim of the studies varying, making quantitative comparison difficult. Due to variances in outcomes reported, quality of the studies used, cultural differences and the small number of studies within each intervention category no conclusive evidence can be drawn in regards to the

effectiveness of any intervention. In an attempt to highlight and synthesis a breadth of interventions, the studies included in the review were not excluded due to risk of bias or quality, provided they met the basic screening questions in the MMAT.

## **Conclusions**

There are numerous risk factors present in the chaotic, emotionally-charged and often dangerous period of discharge from an acute inpatient mental health ward. Heterogeneous interventions have been developed internationally in an attempt to solve some of these problems with variable success. Improving homogeneity of outcome reporting and applying theory of change to future research would allow better comparison of interventions.

## **Abbreviations**

CTI- Critical Time Intervention

NHS- National Health Service

NICE- National Institute for Health and Care Excellence

RCT- Randomised Controlled Trial

TDM- Transitional Discharge Model

UK- United Kingdom

USA- United States of America

## **Declarations**

### **Ethics approval and consent to participate**

Not Applicable

### **Consent for publication**

Not Applicable

### **Availability of data and material**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

### **Competing interests**

The authors have no competing interests

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### **Authors' contributions**

NT prepared the manuscript, screened and extracted data from each paper, conducted the narrative synthesis. NW and JW conceived the design of study, screened and extracted data from a proportion of papers and contributed to the preparation of the manuscript. All authors approved the final manuscript.

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## Tables

**Table 1: Tabulation and Description of the Studies used in the Systematic Review**

ID	Authors and year	Location and Setting	Intervention	Target population	Method	Main Findings	Problem
1	Abraham et al (2017)	USA, 1 urban psychiatric hospital	<b>Pharmacist involvement</b> to improve care coordination	16 health professionals, 6 patients, 20 patient charts (SMI patients)	Evaluation- Interviews and observations of charts	There were many challenges but Increased pharmacist involvement in LAI care coordination may contribute to bridging gaps in medication adherence to optimize treatment outcomes.	As LAI has increased and Care coordination for this population is complex, this intervention aims to support long-term medication adherence and patient outcomes
2	Attfield et al (2017)	UK, 2 trusts	Diagnostic-driven <b>Integrated Care Pathways (ICPs)</b>	A random sample of 400 service users	Retrospective case comparison study	The ICP Trust had a 13.5 day shorter average length of stay, (statistically significant). No significant differences were in readmission or 7-day follow-up	Reducing unnecessary tests, interventions and duplication within the care process— i.e. ceasing activities that will not negatively influence clinical outcomes
3	Bennewith et al (2014)	UK, 3 inpatient wards in southwest England, mixed urban/rural	A <b>contact-based</b> intervention for people recently discharged (letters sent to SUs)	102 patients received a letter, 45 all letters	Pilot case study. Interviews, analysis of outcomes (readmission)	In the context of a policy of intensive follow-up post-discharge, qualitative interviews with service users showed that most already felt adequately supported and the intervention added little to this.	Reduce suicide post-discharge by providing social connectedness
4	Chen (2014)	USA, all 4 community agencies providing CTI in NYC	Community support in <b>critical time intervention</b> (CTI), a time-limited, short-term psychosocial rehabilitation program designed to facilitate the critical transition from institutional to community settings.	12 CTI workers	Interviews	CTI workers self-identified as an “extra support” to develop community ties that will help clients sustain stable housing. Their practice of community support development was represented by a transient triangular relationship model, involving	To facilitate effective transitional services and enhance continuity of care among people with mental illness. Breaking the vicious cycle between institutionalization and homelessness.

						three dyadic relationships (worker-client, worker-primary support, primary support client) as the building blocks and specific strategies to facilitate the relational transition	
5	De Leo and Heller (2007)	Australia, one psychiatric inpatient unit	<b>Intensive case management</b> follow up of high risk people (ICM was weekly face-to-face contact with community case manager and telephone calls from counsellors)	60 male service users with a history of suicide attempts	RCT (TAU or intervention)	People in ICM had lower depression scores, suicide ideation, QoL. More contact with services, better relationships with therapists and satisfied with service.	A solution to the reduced care following discharge that is linked to suicide
6	Exbrayat et al (2017)	France, single centre	telephone follow-up 8,30 and 60 days post attempted suicide	436 patients (387 control patients who were matched from pre-intervention records)	a controlled study	Very early telephone follow-up of our patients effectively reduced recidivism and seemed to be the only protective factor against repeated suicide attempt.	To reduce suicide attempts post-discharge
7	Forchuk et al (2008)	Canada, one hospital	<b>Intervention to prevent homelessness-</b> immediate assistance in accessing housing and assistance in paying their first and last month's rent.	14 participants at risk of being discharged without housing (7 in intervention group)	RCT, incl. interviews	All the individuals in the intervention group maintained housing after 3 and 6 months. All but one individual in the control group remained homeless after 3 and 6 months. The exception joined the sex trade to avoid homelessness. The results of this pilot were so dramatic that randomizing to the control	To reduce discharge from inpatient wards to shelters or the street

						group was discontinued	
8	Forchuk et al (2013)	Canada, all patients in Ontario at risk of homelessness, 1 acute care hospital, 1 territory	<b>Intervention to prevent homelessness</b> - Pre-discharge assistance in securing housing	112 men and 107 women at risk of homelessness post-discharge	Programme evaluation design- interviews, focus groups	The results highlight several benefits of the intervention and show that homelessness can be reduced by connecting housing support, income support, and psychiatric care.	To stop people being discharged to street or shelters
9	Hampson et al (2000)	UK, one Trust (North Nottingham and Hucknall)	<b>Community Link Team (CLT)</b> to facilitate early discharge- team-based service offering intensive support during the day	142 (all admissions to team in 12 month period)	Retrospective comparison	The median length of stay during the CLT project was 19 days, a highly significant reduction from the 36 days in the NABUS study. This cannot be attributed to the team but justifies a randomised controlled trial to test this hypothesis,	To speed up discharge due to costs to provider and patients
10	Hengartner et al (2015)	Switzerland, one catchment area, which is an urban/suburban area of high-level resources near the city of Zurich	<b>Post-Discharge Network Coordination</b>	3 patients	Case studies- Narrative review and qualitative analysis of three patients who participated in the program.	Case reports revealed that patients' social networks are small and their relationships are commonly conflictual and unstable.	Reducing readmission and improving MH and psychosocial functioning. improve hospital discharge planning and to ease the transition from inpatient to outpatient care by coordinating a social support network
11	Hengartner et al (2016)	Switzerland, one catchment area, which is an urban/suburban area of high-level resources near the city of Zurich	<b>Post-Discharge Network Coordination</b>	151 patients	RCT using parallel group blocking	In the short-term (i.e., $t_0-t_1$ ), no significant effect emerged in any outcome. In the long term (i.e., $t_0-t_2$ ), the two groups did not differ significantly with respect to the rate and duration of rehospitalization.	Reducing readmission and improving MH and psychosocial functioning. improve hospital discharge planning and to ease the transition from inpatient to outpatient care by coordinating a social support network

						Also, the intervention did not reduce psychiatric symptoms, did not improve social support, and did not improve quality of life.	
12	Herman et al (2011)	USA, 2 transitional residences in hospital grounds metropolitan area	<b>Critical Time Intervention</b> to Prevent Homelessness	150 previously homeless men and women with SMI	RCT	CTI group had less homelessness than TAU	Reduce homelessness following discharge
13	Jenson et al (2010)	Canada, poor city, high unemployment, 1 acute ward and 1 community service provider within same region	<b>Community-Based Discharge Planning</b> (in-reach model- discharge planner based in community visits ward daily)	36 service users	Single group programme evaluation, analysis of admin data and interview with clients	Readmission rates were 40% lower in the year following the change in service delivery model. This change was statistically significant	Shifting mental health services from institution to community
14	Khaleghparast et al (2013)	Iran, two hospitals	<b>Discharge planning</b> (self-care training programme/nursing process model)	46 service users	Longitudinal clinical trial	The intervention group had improved clinical symptoms and higher knowledge levels compared with the control group. Statistically significantly lower readmissions in the intervention group	To increase patient knowledge, reduce clinical symptoms and rehospitalisations
15	Kariel-Lauer (2000)	Israel, one hospital	<b>Re-entry group</b> (short-term group meetings- psychoeducational approach)	75 participants (42 in intervention) men and women	A controlled study	Intervention group had less readmissions, high rates of absorption into therapy and remaining in therapy	Reduce hospitalisations, increase compliance with outpatient appointments
16	Kidd et al (2016)	Canada, 1 large hospital in city	<b>'Welcome Basket.'</b> (6 week peer support, contact on wards, basket of items, environmental support)	23	Evaluation- a mixed methods design, Pre-post for quantitative outcomes, interviews and	Pre-post analysis indicated no change in psychiatric symptoms but improvement in Community functioning,	Reduce suboptimal outcomes in first month, bridge gap

					readmission rates	community integration, and quality of life. No difference in readmission	
17	Kisley et al (2017)	Australia, 1 hospital-intervention and control wards within it	<b>Motivational aftercare planning</b> (motivational interviewing with advance directives)	100 intervention plans, 197 control, 20 service user interviews	Controlled before-and-after (CBA) design, interviews	Intervention ward improved significantly (e.g. identification of triggers increased from 52 to 94%, $v_2 = 23.3$ , d.f. =1, $P < 0.001$ ). This did not occur in the control wards. The qualitative data (n = 20 interviews) showed improvements in participants' experiences of discharge planning.	To increase patient input into discharge planning, increase treatment plan following
18	Zheng and Arthur (2005)	China, 1 large hospital in Beijing	<b>Family Education</b>	101 patients (schizophrenia)	RCT, pre-test, post-test	There was a significant improvement in knowledge about schizophrenia in the experimental group and a significant difference in symptom scores and functioning at 9 months after discharge. Patients who were nonadherent to medication regimens were more likely to relapse.	Knowledge about condition and rehospitalisation. There is a need for culturally sensitive family treatments offered by nurses
19	Lin et al (2018)	Taiwan, one hospital	<b>Needs-oriented Hospital Discharge Planning for Caregivers</b>	114 caregivers (of people with schizophrenia) 57 in each group	A quasi-experimental research design	The caregiver burden and health status of the experimental group improved more significantly compared with the control group. The caregiver-involved	Reducing readmission and improving medication adherence, reducing caregiver burden

						discharge planning process developed in this study effectively reduced the burden placed on caregivers and improved their health status	
20	Reynolds et al (2004)	Scotland, 1 unit, 3 wards	<b>Transitional Discharge Model</b> (ward nurse worked with SU until relationship built with community nurse, then support from service users)	25 services user (14 control, 11 experimental)	randomized experimental design	In general, both the control and the experimental group demonstrated significant improvements in symptom severity and functional ability after 5 months. Usual treatment subjects in the control group were more than twice as likely to be re-admitted to hospital.	Readmissions and not able to adapt to community, focus on need for relationships
21	Rose et al (2007)	USA, 1 large urban medical centre, mostly African American patients	<b>Transitional care model</b> a nurse-based in-home transitional care intervention	10 service user (schizophrenia, bipolar)	Evaluation-Analysis of nurse logs	can offer an alternative to patients who might otherwise be left poorly treated or untreated in the community setting.	Lack of continuity of care and meet immediate post discharge needs of SU
22	Sato et al (2012)	Japan, 5 hospitals	<b>Community Re-entry Program.</b> Discharge Preparation Program (psychosocial program for preparing long-term hospitalized patients)	26 intervention, 23 control (schizophrenia)	RCT	the program may be capable of promoting discharge of long-term hospitalized psychiatric patients. With regard to the number of patients discharged in 6 months after the end of a program, there was no significant difference between both groups.	To reduce length of stay

23	Scanlan et al (2017)	Australia, three geographical areas, large non-governmental mental health service	peer-delivered, transitional and post-discharge support program	38 service users	Evaluation, outcome measures, interviews	Participants reported improvements in terms of functional and clinical recovery and in the areas of intellectual, social and psychological wellness. Participants self-report of hospital readmissions suggested that there was a reduction in hospital bed days following engagement with the program	Reduce readmission, increase wellbeing
24	Shaffer et al (2015)	USA, six community-based provider organizations within network of a not-for-profit, managed behavioral health care organization	<b>Brief critical time intervention</b> (a brief, three-month version of CTI,)	149 adults with readmission within 30 days, 224 control	A quasi-experimental investigation	BCTI was associated with decreased early readmission rates, suggesting that this model may be an effective approach to improve continuity of care for this population.	Reduce readmission
25	Bonsack et al (2016)	Switzerland, one psychiatric hospital	<b>Transitional Case Management</b>	51 intervention, 51 control	RCT	The focus on follow-up after discharge during hospitalization leads to an increased short-term rate of engagement with ambulatory care despite no differences between the two groups after 3 months of follow-up. This short transitional intervention did, however, not significantly reduce the rate of readmissions during the first year following discharge.	Improve engagement with care, reduce readmission

26	Shaw et al (2000)	Scotland, 3 acute wards, 1 hospital	<b>Pharmacy discharge planning</b> (receiving a baseline pharmaceutical needs assessment, information about medicines and then a pharmacy discharge plan sent to their community pharmacy)	97 service users	Controlled study	no significant difference between the groups in baseline medicine knowledge. One week post-discharge, both groups showed significant ( $P \sim 0.002$ ) <i>im</i> provement in knowledge of medication from baseline and this improvement was maintained at 12 weeks. Fewer medication problems for the intervention group. Reduced readmissions for the intervention group, but not significant	To reduce medicine-related problems that cause readmission
27	Simpson et al (2014)	UK, 4 wards, inner city (London)	<b>Peer support</b>	46 service users 23 peer support 23 control	pilot randomised controlled trial with economic evaluation	no statistically significant benefits for peer support on the primary or secondary outcome measures, there is an indication that hope may be further increased in those in receipt of peer support. The total cost per case for the peer support arm of the study was £2154 compared to £1922 for the control arm.	To increase hope and quality of life
28	Smelson et al (2010)	USA, 1 acute inpatient psychiatric unit	<b>Brief Treatment Engagement</b> (5 hours per week of services- assertive community treatment using BCTI, peer support,	102 veterans, (56 control)	prospective randomized trial,	Sixty-nine percent of TLC participants attended an outpatient appointment	Treatment engagement

			dual recovery therapy)			within 14 days of discharge, compared to only 33% of MA participants (P<0.01). TLC participants were also more likely to be engaged in outpatient services at the end of the intervention period (44 vs. 22%, P<0.01). This study provided evidence that an eight-week intervention could improve treatment engagement	
29	Taylor et al (2014)	USA, 1 large psychiatric hospital	<b>Brief Care Management Intervention</b> (brief interview prior to discharge)	87 intervention, 108 control, 195 total	Controlled study	individuals in the control group were more likely to be readmitted within 30 days of an index readmission than individuals in the intervention group (OR=2.44, p=.02). Bridging strategies utilized prior to discharge for individuals at higher risk of early mental health inpatient readmission may be used as an effective alternative to more costly interventions.	Increase aftercare engagement, reduce readmissions
30	Tomita et al (2012)	USA, two NYC hospitals	<b>Critical Time Intervention (CTI)</b>	150 total previously homeless men and women	RCT	At the end of the follow-up period, psychiatric re-hospitalization was significantly lower for the group assigned to CTI compared	Reducing readmission

						with the usual services group	
31	Ghadiri Vasfi et al (2015)	Iran, 1 hospital	<b>Aftercare Services</b> (three components: follow-up care (home visits or telephone follow-up), family psychoeducation, and social skills training for patients.)	120 patients (schizophrenia and bipolar) ages 15-65. 60 control	RCT	The cumulative number of hospitalizations during the follow-up period was 55 for the control group and 26 for the intervention group. Length of stay was significantly greater in the control group compared with the intervention group (rate ratio=2.38, 95% confidence interval=2.17-2.62). Psychopathology was less severe in the intervention group compared with the control group (p,.001).	Reduced readmissions and LoS
32	Virgolesi et al (2017)	Italy, 3 hospitals in Rome	<b>Nursing discharge programme</b> (a short-term nursing discharge programme with follow-up phone calls 7-10 days)	135 patients	prospective correlational design	The interpersonal and educational nursing intervention improves adherence to a treatment plan	Medication adherence and patient satisfaction
33	Walker et al (2000)	UK, 3 wards (2 control)	<b>Discharge co-ordinators</b>	343, 119 intervention, 224 control	Controlled cohort study	No differences in outcomes (readmission, LoS, MH status, satisfaction). More satisfaction for those without DC	Improve communication between primary and secondary care
34	D'Souza (2002)	Australia, rural hospital	<b>Telemedicine</b> (psycho-educational programme and MDT videoconferencing post-discharge)	51 (24 intervention, 27 control) male and female	Controlled study	More side effect in control group, more treatment adherence in intervention group. More satisfaction in intervention group	Improve treatment adherence
35	Puschner et al (2011)	Germany, 5 hospitals	<b>Needs-oriented discharge planning</b>	491	Multicentre RCT	no effect of the intervention on	Reduce high utilisation of

			<b>intervention</b> (manualised needs-led discharge planning and monitoring intervention with two intertwined sessions administered at hospital discharge and 3 months thereafter.)			primary or secondary outcomes	inpatient care
36	Bauer et al (2012)	Germany, 1 hospital	<b>SMS-based maintenance intervention</b>	165 females. Eating disorders	RCT	Somewhat significant difference in readmission (depending on analysis). Significant difference in treatment utilisation.	Maintain treatment
37	Hanrahan et al (2014)	USA, 1 hospital	<b>transitional care model (TCM)</b>	40 (20 control)	RCT	The intervention group showed higher medical and psychiatric rehospitalization than the control group ( $p = .054$ ). Emergency room use was lower for intervention group but not statistically significant. Continuity of care with primary care appointments were significantly higher for the intervention group ( $p = .023$ ). The intervention group's general health improved but was not statistically significant	Reduce transition failures
38	Forchuk et al (2012)	Canada, 6 hospitals	<b>Transitional relationship model (TRM)</b> (providing hospital staff involvement until a	No pp numbers as ethnographic analysis. 14 A wards,	A quasi-experimental, action-oriented research design	Staged large-scale implementation of theTRMallowed	To improve staff uptake of interventions

			therapeutic relationship has been established with a community care provider as well as peer support.)	12 <i>B</i> wards and 10 <i>C</i> wards.		for iterative improvements to the model leading to positive outcomes. This study highlights the need to address work environment issues, particularly interprofessional teams.	
39	Hegedus et al (2018)	Switzerland, 2 wards, 1 hospital	<b>Short transitional intervention in psychiatry (STeP)</b>	14 control, 15 intervention	quasi-experimental pilot study to determine the feasibility of the intervention,	The STeP did not affect primary or secondary outcomes; however, it was shown to be feasible, and patients' feedback highlighted the importance of post-discharge contact sessions.	Prepare patients for situation outside of hospital
40	Botha et al (2018)	South Africa, 1 hospital	<b>90-Day Transitional Care Intervention</b> (four phone calls and one home visit, focusing on maintaining adherence, appointment reminders and psychoeducation.)	60 male patients	Retrospective comparison to matched control group	Structured telephone-based transitional interventions have no effect on readmission rates in this setting.	Bridge gap, reduce readmissions
41	Khanbhai et al (2018)	Australia, 1 medical centre	<b>Discharge checklist</b>	230 checklists	quasi-experimental, pre-post intervention design	There was a small, but statistically non-significant, reduction in readmission rates.	Reduce readmission
42	Forchuk et al (2005)	Canada, 26 wards, 4 hospitals	<b>Transitional discharge model (TDM)</b>	390	randomized clinical trial using a cluster design	The intervention group postdischarge costs and quality of life were not significantly improved compared with the control group. Although not predicted a priori, intervention	Reduce bed occupancy, improve QoL

						subjects were discharged an average of 116 days earlier per person. Based on the hospital per diem rate this would be equivalent to \$12M CDN hospital costs	
43	Kaspow and Rosenheck (2007)	USA, 8 VA medical centres	<b>Critical Time Intervention Case Management</b> (a modification of the critical time intervention (CTI) community case management model)	278 control cohort, 206 intervention cohort	nonrandomized pre-post cohort design	<b>19% more days housed in each 90-day reporting period over the one-year follow-up (p&lt;.002) and 14% fewer days in institutional settings (p=.041). Veterans in phase 2 also had 19% lower Addiction Severity Index (ASI) alcohol use scores (p&lt;.001), 14% lower ASI drug use scores (p=.003), and 8% lower ASI psychiatric problem scores (p=.001).</b>	Reduce homelessness,
44	Lawn et al (2008)	Australia, 3 hospitals	<b>Peer support</b>	No pp numbers in evaluation	Evaluation methodology. Qualitative feedback was sought from all participant groups including consumers, carers, peer support workers, mental health staff, GPs, mentored peer coordinator, and MHL staff. Quantitative data was collected via case note audit and electronic	Using peers to provide support to consumers at this stage of their recovery seems highly effective as an adjunct to mainstream mental health services. It has personal benefit to consumers and peers, substantial savings to systems, as well as much potential for encouraging mental health service	To reduce hospital avoidance and facilitate early discharge

					records of mental health service	culture and practice towards a greater recovery focus and improved collaboration with GPs	
45	Juven-Wetzler et al (2012)	Israel, one ward	<b>“Continuation of Care” model</b> (continuing follow-up in the ward, by the same staff, instead of being referred to the outpatient department.)	35 service users	Pre and post within participant design	The number of hospitalizations in the 18 months following the index hospitalization was 1.79 _ 3.51 as compared to 4.67 _ 1.79 before the index hospitalization (p = 0.0002), and the number of days of hospitalization 18 months after was 24 _ 41.65 as compared to 119.71. COC via inpatient follow-up significantly reduces the number and length of hospitalizations in “revolving door” psychiatric patients	Reduction length of stay and readmission

**Table 2: Arbitrary clustering of interventions based on intervention categories**

Intervention category	No of papers	Authors Name and years	Description of Intervention
Critical Time Intervention	5	Tomita (2014), Kasproh (2014), Herman (2011), Shaffer (2015), Chen (2014)	<ul style="list-style-type: none"> <li>• Focused on Homelessness</li> <li>• Delivered by CTI workers</li> <li>• Develop Therapeutic relationship</li> <li>• Time limited (gradually reduced contact), Small caseloads, Community based</li> <li>• Phase 1: Transition Provide support &amp; begin to connect client to people and agencies that will assume the primary role of support</li> <li>• Phase 2: Try-Out Monitor and strengthen support network and client's skills.</li> <li>• Phase 3: Transfer of Care Terminate CTI services with support network safely in place.</li> <li>• Also includes Brief CTI (shorter time)</li> </ul>
Transitional Discharge Model (TDM)	3	Forchuk (2005),(2012), Reynolds (2004)	<ul style="list-style-type: none"> <li>• Ward nurses work with SU until a therapeutic relationship is established with the community worker</li> <li>• Then peer support introduced</li> <li>• AKA Transitional research model (TRM)</li> </ul>
Transitional care model	2	Hanrahan (2014), Rose (2007)	<ul style="list-style-type: none"> <li>• Nurse based in home transitional care intervention, to increase CoC</li> <li>• A) comprehensive discharge planning</li> <li>• B) home visits and telephone contacts with a nurse (assessments, care, psychoeducation)</li> <li>• Aimed at most challenging patients with long history of readmission</li> <li>• Immediately providing intensive support and identifying problems early before readmission</li> <li>• Increase QoL through symptom management, medication adherence and enhanced family support</li> </ul>
Peer Support	3	Lawn (2005), Scanlon (2017), Simpson (2014)	<ul style="list-style-type: none"> <li>• <b>Scanlan</b>- peer-delivered support programme: peers delivering providing individualised practical and emotional support to individuals for 6-8 weeks following discharge</li> <li>• <b>Simpson</b> - Peer support workers to provide peer support for 4 weeks to discharged service users, initial contact begins on ward</li> <li>• <b>Lawn</b> - Peer support workers trained along other health professionals. Service users matched to peers experience and skills, 8-12 hours, 1-2 week period. Also hospital avoidance packages for those who are thought to need them.</li> </ul>
Contact based interventions	6	Bennewith (2014), Bauer (2012), D'Souza (2002), Exbrayat (2017), De Leo (2007), Botha (2018)	<ul style="list-style-type: none"> <li>• <b>Bennewith</b>- letters sent to follow up recently discharged service users at home</li> <li>• <b>Bauer</b>- SMS sent to recently discharged service users about maintaining treatment</li> <li>• <b>D'Souza</b> - MDT videoconferencing with rural patients post-discharge</li> <li>• <b>Exbrayat</b> - nurse telephone follow up 8, 30 and 60 days post suicide attempt</li> <li>• <b>De Leo</b>- Intensive Case Management : Weekly face-to-face contact with community case manager and telephone calls from counsellors</li> <li>• <b>Botha - 90 Day Transitional Care Intervention</b> - 4 phone calls, 1 home visit focusing on maintaining adherence, appointment reminders and psychoeducation</li> </ul>
Role-based Interventions	6	Walker (2000),	<ul style="list-style-type: none"> <li>• <b>Walker</b>- Discharge co-ordinators - educational role with service users and family, develop relationships, 6-</li> </ul>

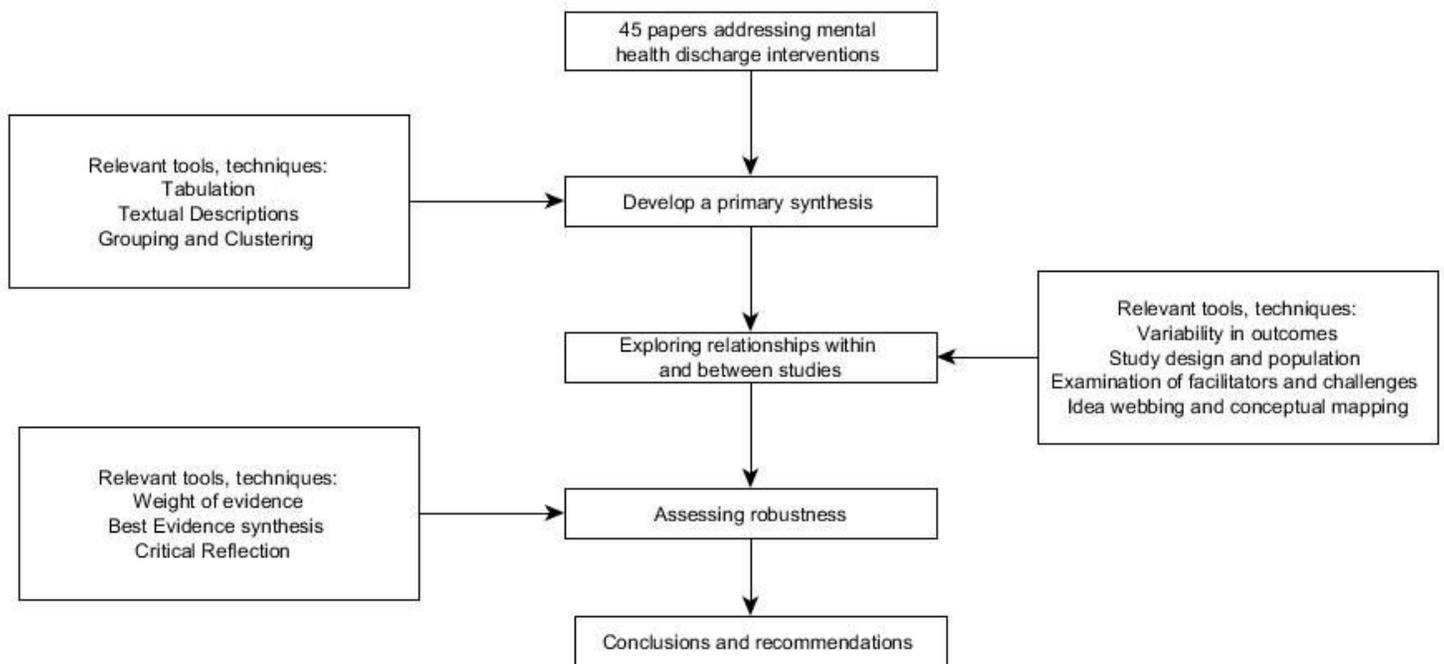
		Virgolesi (2017), Hengartner (2016,17), Jenson (2010), Bonsack (2016), Hampson (2000)	<p>8 weeks post-discharge, Dr routinely telephoning GP practice regarding impending discharge and arrange an appointment with GP within 7 days of discharge, posting discharge summary to practice</p> <ul style="list-style-type: none"> <li>• <b>Virgolesi</b> - Nursing discharge programme- information interventions provided by nursing staff, direct hospital medication, distribution and follow-up telephone calls. Nurses attend a 10-hr class organised into 5 modules: introduction to medication adherence, conceptual framework of medication adherence, medication adherence, intervention programmes, structure of medication adherence interview, and case studies.</li> <li>• <b>Hengartner</b> - Post-discharge Network Co-ordinator - delivered by social workers, support service users to build and maintain social network and link to community care system - goes to ward on 1<sup>st</sup> week, develops plan before discharge, home visit 3 days post discharge</li> <li>• <b>Jenson</b>- Community based discharge planning - in reach, community nurse visits ward daily</li> <li>• <b>Bonsack</b> -Transitional Case Management -- a nurse, or a social worker was added to the treatment as usual procedure. Their role was not to replace the other care providers but to coordinate care provision and to represent the patient's viewpoint.</li> <li>• <b>Hampson</b>- Community Link team - to facilitate early discharge team-based service offering intensive support during the day.</li> </ul>
Pharmacist Interventions	2	Abraham (2017), Shaw (2000)	<ul style="list-style-type: none"> <li>• <b>Abraham</b>- pharmacist consult intervention- psychiatrist has to order a pharmacist consult in the EHR for all LAI orders, hard copy of form sent to inpatient pharmacy and clinical pharmacist. Pharmacist has to approve LAI prescription before administered. Day of discharge injection clinic. Pharmacist led transitions in care program and medication delivery available prior to discharge. Following discharge continued treatment in outpatient clinic.</li> <li>• <b>Shaw</b>- Pharmacy discharge planning- baseline pharma needs assessment, information about medicines and then plan sent to community pharmacist</li> </ul>
Intervention to prevent homelessness	2	Forchuk 2008, 2013 (n=2)	<ul style="list-style-type: none"> <li>• Immediate assistance in accessing housing, assistance paying first months rent</li> </ul>
(Psycho)educational	5	Kariel-Lauer (2000), Zheng (2005), Sato (2012), Khaleghparast (2013), Hegadus (2018)	<ul style="list-style-type: none"> <li>• <b>Kariel-Lauer</b>- Re-entry group - short term group meetings, psychoeducational approach</li> <li>• <b>Zheng</b> - Family education- 8hr with service users, 36 with family in hospital, 2 hours per month for 3m post-discharge. Nurse with &gt;10yr experience provided intervention. Purpose is to educate families about schizophrenia, treatment, teach skills to help families cope</li> <li>• <b>Sato</b> - Community re-entry program- discharge preparation programme - psychosocial preparation for long-term service users</li> <li>• <b>Khaleghparast</b>- self-care training programme, delivered by nurses- 6 1 hour sessions pre-discharge, 1 a fortnight post</li> </ul>

			<ul style="list-style-type: none"> <li>• <b>Hegedus- Step</b> – Short transitional intervention in psychiatry –aims primarily to prepare patients for specific situations that could arise during the days immediately following discharge- cards with potential scenarios on</li> </ul>
Needs-oriented discharge planning	2	Puschner (2011), Lin (2018)	<ul style="list-style-type: none"> <li>• <b>Puschner</b> – manualised needs led discharge planning and monitoring intervention with 2 intertwined sessions, 1 at discharge 1 3 months after. The intervention aimed at improving this communication (between primary and secondary) by means of information (needs assessment)-based standardised recommendations for outpatient treatment and monitoring of compliance with these recommendations.</li> <li>• <b>Lin</b> – Needs-orientated discharge planning for caregivers- Nurses served as care coordinators and provided 6-step hospital discharge planning services to caregivers. integrated therapeutic partnership, mental health education, and needs oriented services.</li> </ul>
Whole Care Pathway Initiatives	2	Attfield (2017), Juven-Wetzler (2012)	<ul style="list-style-type: none"> <li>• <b>Attfield</b> -Integrated care pathways- reducing unnecessary tests interventions and duplications- (ICPs), is a 'multidisciplinary plan of care that provides detailed guidance for each stage in the care of a patient with a specific condition, over a given period of time'</li> <li>• <b>Juven-Wetzler</b> Continuation of care model- continuation of care by the same staff from the ward rather than outpatient referral</li> </ul>
Multi-component interventions	3	Kidd (2016), Smelson (2010), Ghadiri Vasfi (2015),	<ul style="list-style-type: none"> <li>• <b>Kidd</b>- Welcome Basket- 6 weeks- peers support- contact on wards prior to discharge and post, basket of items, environmental support</li> <li>• <b>Smelson</b>- Brief treatment engagement- - 5 hours per week of services in community- assertive community treatment using BCTI, peer support, dual recovery therapy</li> <li>• <b>Ghadiri</b> -Aftercare Services- – 3 components, follow-up care (home visits or telephone), family psychoeducation, social skills training for patients</li> </ul>
Discharge Checklist	1	Khanbahi (2018)	<ul style="list-style-type: none"> <li>• Drs Checklist as an aid memoir</li> </ul>
Motivational Aftercare Planning	1	Kisley (2017)	<ul style="list-style-type: none"> <li>• Motivational interviewing with advanced directives</li> </ul>
Brief Care Management-	1	Taylor (2014)	<ul style="list-style-type: none"> <li>• a brief interview that addresses goals and barriers to treatment which was administered by care managers of a managed behavioral health organization prior to the individuals' discharge</li> </ul>

Table 3: Number of studies that reported the most common outcomes

Outcome	No of Studies
Readmission	22
Length of stay	11
Mental Health symptoms/psychopathology	10
Quality of life	7
Treatment adherence	5
Outpatient/appointment adherence	4
In housing	4
Global functioning	4
Service user satisfaction with discharge	4
Medication adherence	3
Depression	3
Knowledge about own condition	3
Service user satisfaction with treatment	3

## Figures

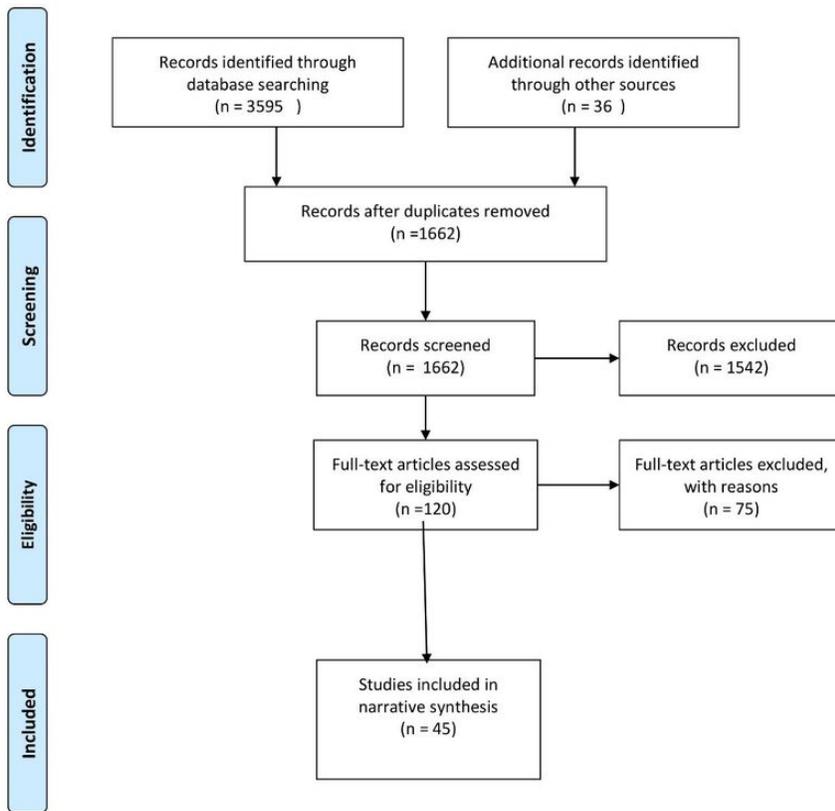


**Figure 1**

Narrative Synthesis Technique as outlined in Popay et al (2006) [24] and the tools and techniques used at each stage



## 250PRISMA 2009 Flow Diagram

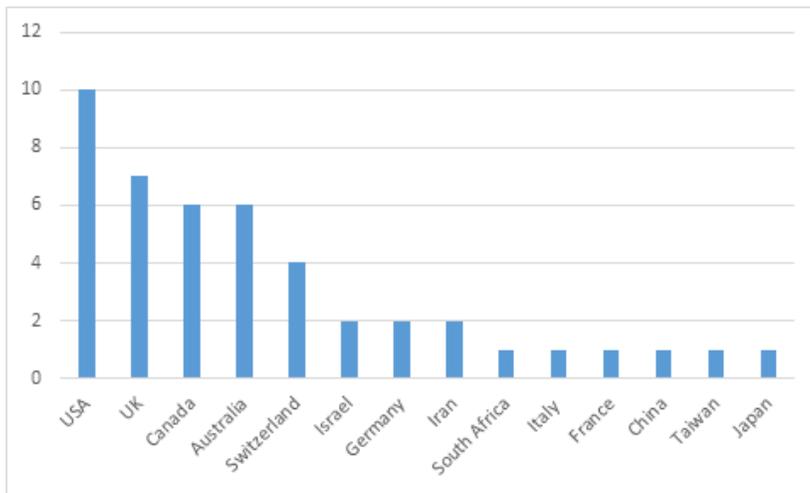


From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

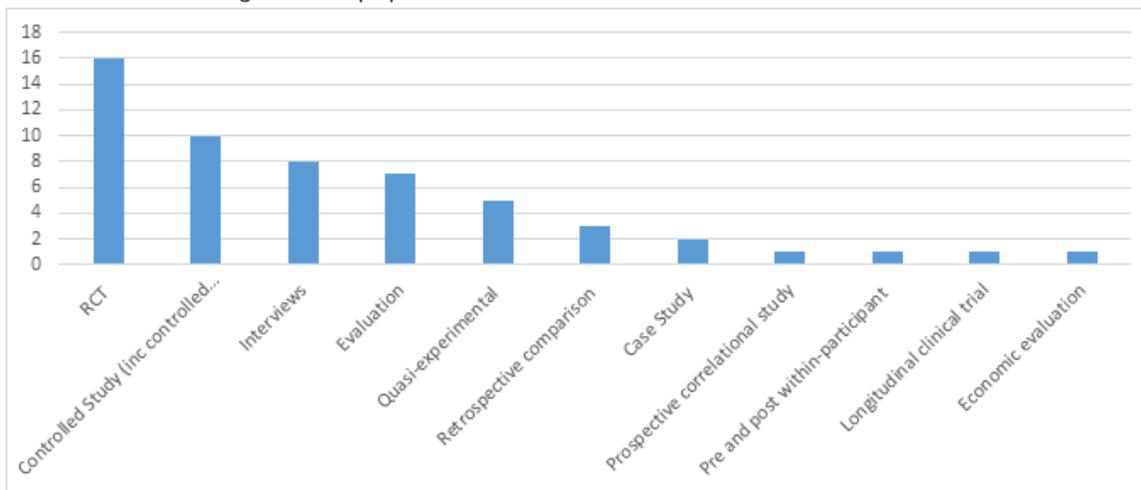
**Figure 2**

PRISMA flow chart to report numbers of included and excluded papers at each stage



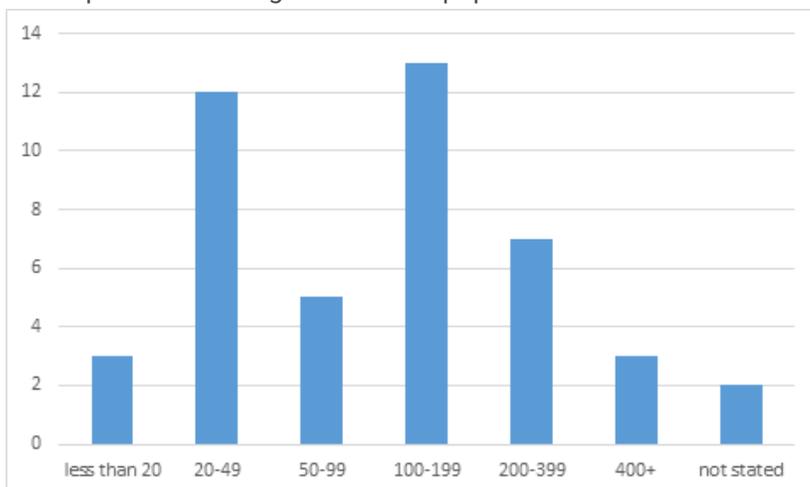
**Figure 3**

The countries of origin of the papers reviewed



**Figure 4**

The experimental design used in the papers reviewed



**Figure 5**

The number of participants in the papers reviewed

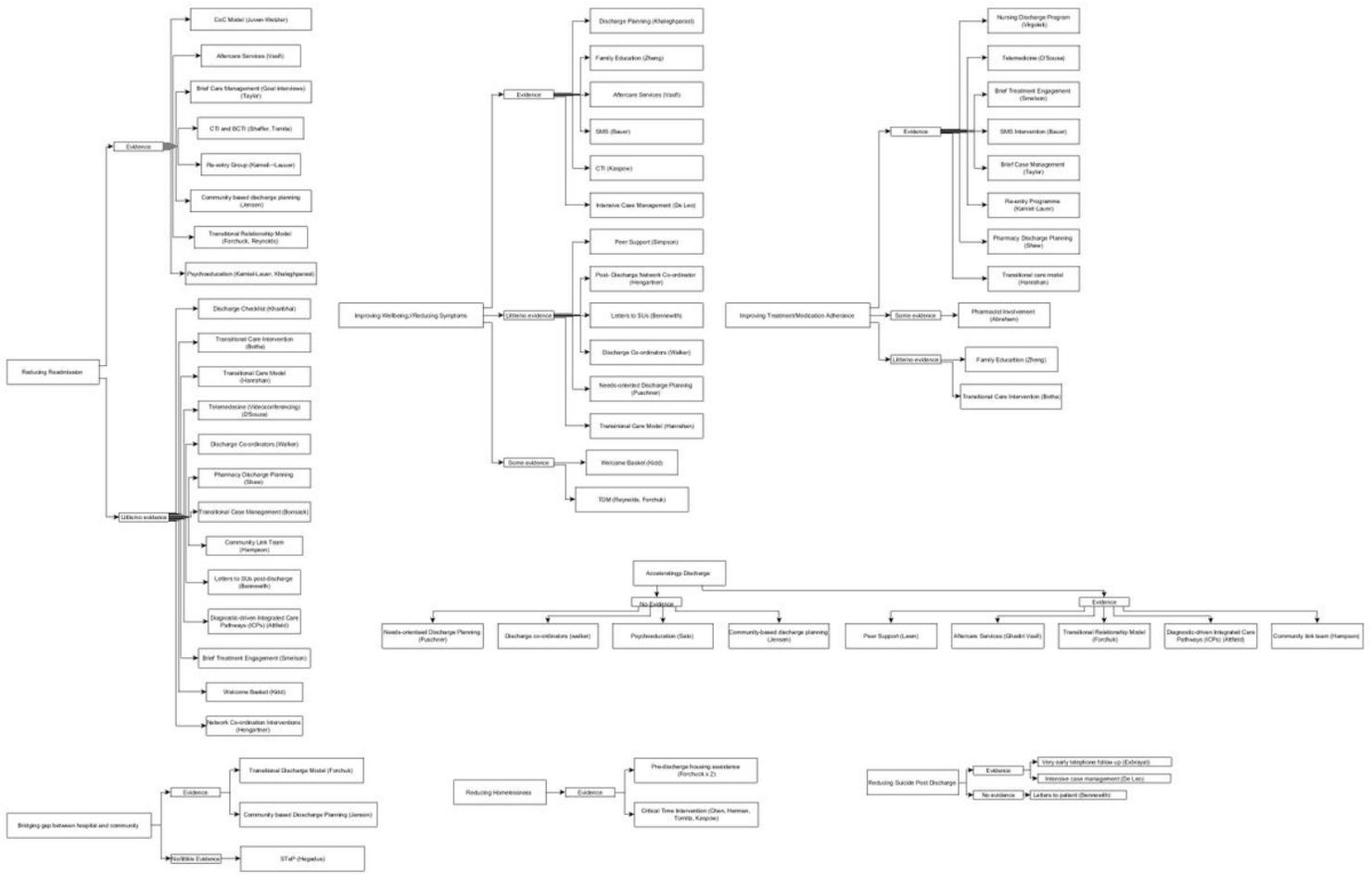


Figure 6

Safety Challenges and the evidence of effectiveness for interventions that aim to address each

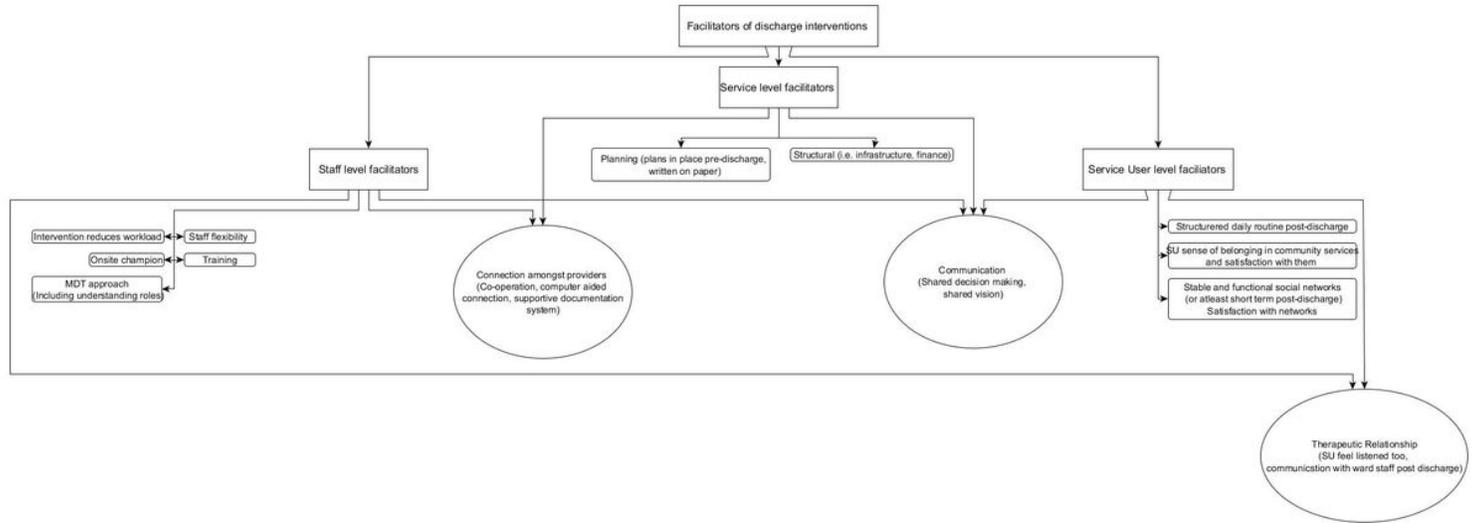
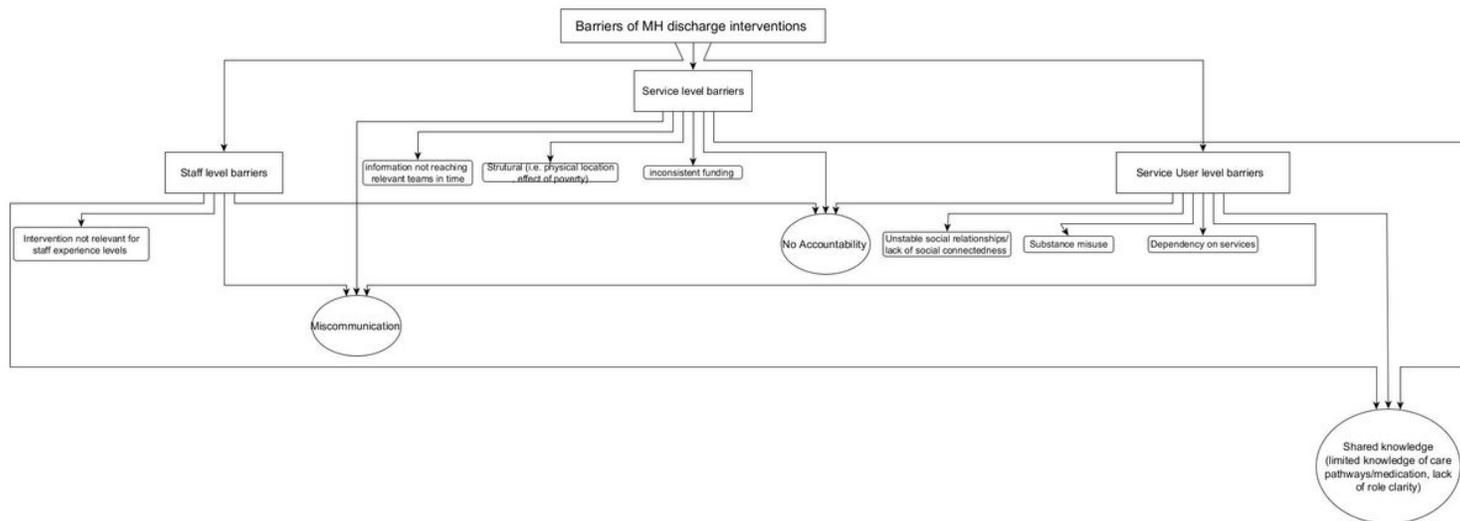


Figure 7

Facilitators of discharge interventions identified from the review



**Figure 8**

Barriers of discharge interventions identified from the review

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [supplement1.docx](#)
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- [supplement3.xlsx](#)