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Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-045364
Article Type:	Original research
Date Submitted by the Author:	29-Sep-2020
Complete List of Authors:	Kim, Bo; VA Boston Healthcare System Weatherly, Christopher; Washington University in St Louis Wolk, Courtney; University of Pennsylvania Proctor, Enola; Washington University in St Louis
Keywords:	MENTAL HEALTH, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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Measurement of unnecessary psychiatric readmissions: a scoping review

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Word count: 3,998

Keywords: hospital readmission, administrative data, care transition, patient discharge, mental health

ABSTRACT

Objective: The objective of this study was to examine how published studies of inpatient to outpatient mental healthcare transition processes have approached measuring unnecessary psychiatric readmissions.

Design: Scoping review.

Search strategy: The study steps were structured according to Levac et al.'s enhancement to Arksey and O'Malley's framework for conducting scoping reviews. We searched literature databases for studies that (i) are about care transition processes associated with unnecessary psychiatric readmissions and (ii) specify use of at least one readmission time interval (i.e., the time period since previous discharge from inpatient care, within which a hospitalization can be considered a readmission). We assessed review findings through tabular and content analyses of the data extracted from included articles.

Results: Our database search yielded 3478 unique articles, 67 of which were included in our scoping review. The included articles varied widely in their reported readmission time intervals used. They provided limited details regarding which readmissions they considered unnecessary and which risks they accounted for in their measurement. There were no perceptible trends in associations between the variation in these findings and the included studies' characteristics (e.g., target population, type of care transition intervention).

Conclusions: The limited specification with which studies report their approach to unnecessary psychiatric readmissions measurement is a noteworthy gap identified by this scoping review, and one that can hinder both the replicability of conducted studies and adaptations of study methods by future investigations. Recommendations stemming from this review include (i) establishing a framework for reporting the measurement approach, (ii) devising enhanced guidelines regarding which approaches to use in which circumstances, and (iii) examining how sensitive research findings are to the choice of the approach.

ARTICLE SUMMARY

Strengths and limitations of this study

- Closely following Levac and colleagues' established methodological framework for conducting scoping reviews, this study performed a comprehensive search of how unnecessary psychiatric readmissions are measured by studies concerned with inpatient to outpatient mental healthcare transitions.
- Aligning to the purpose of scoping reviews to identify current gaps in knowledge and establish a new research agenda, this review does not assess the effectiveness of the approaches mentioned by the included studies in measuring unnecessary psychiatric readmissions.
- There may exist other approaches to unnecessary psychiatric readmissions measurement used (i) by studies not concerned with care transitions or (ii) within individual health care organizations, which have not been publicly shared through the mechanism of peer-reviewed

1
2
3 journal articles that are indexed by the databases included in our review.
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- 5 • This scoping review is a critical step towards enabling the field to evaluate various care
6 transition interventions' comparative effects on unnecessary psychiatric readmission rates.
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10 11 12 **BACKGROUND** 13

14 Care transition for individuals being discharged from inpatient mental healthcare to outpatient settings
15 is a growing focus for many healthcare delivery systems [1,2]. Drivers of this increased interest include
16 inpatient treatment's high-resource requirements [3], as well as individuals being able to better
17 maintain family, work, educational, and other responsibilities alongside outpatient treatment [4].
18 Studies of inpatient to outpatient mental healthcare transition processes, both observational [1,5] and
19 interventional [2,6], are thus on the rise, and many of them use the rate of post-discharge readmissions
20 as an individual-level outcome measure to assess the quality of transition [7,8]. Readmission rate
21 associated with a care setting is its proportion of individuals who are rehospitalized within a certain time
22 period since their previous hospitalization.
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25 Defining readmission rate requires, at minimum, (i) specification of the time period (i.e., readmission
26 time interval), (ii) classification of 're'-hospitalization (i.e., related to the previous hospitalization and
27 therefore possibly unnecessary or preventable, as opposed to an unrelated hospitalization due to a new
28 care need), and (iii) cases that should be included/excluded from consideration. These specifications are
29 becoming more important now than ever, as health care policy makers, payers, and professional groups
30 are increasingly paying attention to accurately identifying unnecessary readmissions and better
31 incentivizing their prevention [9–13]. However, it is unclear whether and how the increasingly prevalent
32 studies of inpatient to outpatient mental healthcare transitions are defining each of these aspects of the
33 measure.
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35

36 Also unclear is whether there is a shared understanding by the field regarding which definition is
37 appropriate for which mental healthcare circumstances. 3M Health Information Systems' Potentially
38 Preventable Readmissions Classification System [14] offers a widely used proprietary methodology for
39 measuring readmissions. It is difficult to glean from its publicly available information, however, what
40 constitutes a meaningful readmission time interval and any mental health-specific considerations that
41 need to be made when measuring unnecessary psychiatric readmissions.
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44 Without established approaches to measuring unnecessary psychiatric readmissions (which, if not
45 uniform, ought to at least be made explicit as to how they relate to or differ from one another), various
46 transitional interventions using the measure cannot be adequately assessed alongside one another.
47 Establishing widely usable, accepted, and comparable approaches to this measurement means setting
48 clear definitional parameters as to what constitutes an unnecessary psychiatric admission. Thus, as a
49 first step towards being able to evaluate the interventions' comparative effects on unnecessary
50 psychiatric readmission rates, we conducted a scoping review of peer-reviewed literature to delineate
51 the current landscape of how published studies have approached measuring unnecessary psychiatric
52 readmissions.
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METHODS

We structured the scoping review according to Levac and colleagues' enhancement [15] to Arksey and O'Malley's six-stage methodological framework for conducting scoping reviews [16]. The framework's stages are (i) defining the research question, (ii) identifying relevant literature, (iii) study selection, (iv) data extraction, (v) collating, summarizing, and reporting the results, and (vi) consultation process and engagement of knowledge users. We aligned to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) [17] (online Supplementary File 1). Our team previously published a study protocol paper detailing the methods for this review [18]; briefly, they are summarized below.

Stage 1: Defining the research question

Aligning the notion of 'unnecessary readmission' to Goldfield and colleagues' [19] concept of 'potentially preventable readmission' (defined as a subsequent admission that occurs within the readmission time interval and is clinically related to a prior admission), the scoping review aimed to answer the following questions:

1. What durations are used as the unnecessary psychiatric readmission time interval?
2. What criteria are applied to designating a psychiatric readmission as unnecessary?
3. What risks are adjusted for in calculating unnecessary psychiatric readmission rates?

Stage 2: Identifying relevant literature

We conducted a comprehensive review of the existing literature and evidence base to systematically examine what is known about measuring unnecessary psychiatric readmissions. Working with our institutions' librarians with extensive experience in building systematic and comprehensive search strategies, we harvested search terms using benchmark article terms and subject headings, titles and abstracts of key articles, dictionaries, and synonyms and subject headings within Embase and PubMed's MeSH database. We used Boolean logic and proximity operators to combine and refine the search terms. The search strategy was initially formulated for Medline (Ovid) (Table 1), then further tailored as appropriate for use with Embase (Ovid), PsycINFO, CINAHL, Cochrane, and ISI Web of Science article databases. These sources include relevant journals within the fields of medicine, health services, and the social sciences and were selected to capture a comprehensive sample of literature.

Table 1. Medline (Ovid) search strategy.

Search term/line number	Conceptual term of interest	Search term entered into Ovid-Medline	Number of hits
1	Mental disorders	psychiatric.ti. OR "mental disorder".ti. OR "mental disorders".ti. OR "mental illness".ti. OR "mentally ill".ti.	83986

2	Inpatient psychiatric settings	Exp "Psychiatric hospitals"/ OR Exp "hospital Psychiatric Department"/ OR "Psychiatric treatment center".mp. OR "Psychiatric Hospital".mp. OR "psychiatric unit".mp. OR "psychiatric units".mp. OR "Mental Institution".mp. OR "Mental Hospital".mp. OR "Psychiatric Department".mp. OR "Psychiatric treatment centers".mp. OR "Psychiatric Hospitals".mp. OR "Mental Institutions".mp. OR "Mental Hospitals".mp. OR "Psychiatric Departments".mp. OR "Psychiatric Ward".mp. OR "psychiatric inpatient".mp. OR "psychiatricinpatients".mp.	41507
3	Inpatient psychiatric admission	"psychiatric hospitalization".mp. OR "psychiatric hospitalizations".mp. OR "psychiatric readmission".mp. OR "psychiatric readmissions".mp. OR "psychiatric rehospitalization".mp. OR "psychiatric rehospitalizations".mp. OR "psychiatric admission".mp. OR "psychiatric admissions".mp	2905
5		1 or 2 or 3	110553
6	Patient Readmission	Exp "Patient Readmission"/	14332
7	Readmission	Readmission*.mp. OR readmitted.ti.	28315
8	Rehospitalization	Rehospitali*.mp.	5515
9	Unnecessary admissions	"Unnecessary admission".mp. OR "preventable hospitalizations".mp. OR "preventable hospitalization".mp.	315
10		6 or 7 or 8 or 9	31946
11		5 and 10	1747

Stage 3: Study selection

We screened peer-reviewed articles published in English from January 2009 through February 2019. We included an article if it (i) concerns the adult mental health population, (ii) measures psychiatric readmission rates, (iii) is set in a healthcare context, (iv) is conducted in (and explicitly mentions) the context of some care transition process that is either already being carried out (for non-intervention studies) or is being tested as an intervention (for intervention studies), and (v) specifies at least one readmission time interval used. We excluded editorials and other articles that report on individual viewpoints. For each of the title/abstract and full-text screening phases, the criteria were initially applied to 10% of articles to be screened, where two screeners (CPW and BK) first independently screened, then compared with one another their individual decisions on, whether each article meets the criteria. For articles for which the individual decisions differed, the screeners held discussions to reach consensus. The resulting shared understanding of the criteria was applied to screening the remaining articles, for which CPW and BK each served as the primary screener for a distinct half of the articles. For articles that the primary screener deemed as needing additional discussion, the non-primary screener among CPW or BK served as the secondary screener, and discussions were held to reach consensus.

Stage 4: Data extraction

Data extraction from articles to be included in the scoping review used an Excel [20]-based template. The template was piloted on 10% of articles to be reviewed, where CPW served as the primary data extractor for half of the articles, and BK served as the secondary extractor, reviewing the same articles to verify and augment the extraction. The other half of the articles had BK as the primary data extractor

and CPW as the secondary extractor. Articles for which the primary and secondary data extractors did not agree on the extracted content were discussed to reach consensus. The resulting shared understanding of the approach to data extraction was applied to the remaining articles, for which CPW and BK each served as the primary extractor for a distinct half of the articles. For articles that the primary extractor deemed as needing additional discussion, the non-primary extractor among CPW or BK served as the secondary extractor, and discussions were held to reach consensus.

Stage 5: Collating, summarizing, and reporting the results

Aligning to the specific questions that our scoping review aimed to answer (listed under the Stage 1: Defining the Research Question section), we summarized findings along the dimensions of (i) readmission time interval, (ii) unnecessary readmission definition, and (iii) case-mix adjustment approach used by our reviewed articles. We also assessed the extracted data for any prevalent trends in study characteristics across our reviewed articles, and independently reviewed the data to identify any emergent themes. We used constant comparison combined with consensus-building discussions [21] to finalize notable trends and themes to be reported.

Stage 6: Consultation process and engagement of knowledge users

We closely engaged our multidisciplinary research colleagues and partnered healthcare system representatives for each of Stages 1 through 5 above. These individuals we consulted have clinical and administrative expertise in mental healthcare services, as well as in how the services are structured and integrated to be delivered across different levels of the mental health care system. They included front-line practitioners, leadership of local, regional and national care networks, and health services researchers with expertise in care transitions and admissions data.

Patient and public involvement

Our consultants included patient representatives who helped shape the research team's study steps.

RESULTS

Characteristics of reviewed articles

The database searches identified 3478 unique articles (Figure 1). Through screening the title and abstract for each of these articles, 762 were designated for full-text screening. The full-text screening found 67 articles to include in the review, containing information related to measurement of unnecessary psychiatric readmissions in the context of some inpatient to outpatient care transition process [1,2,6,8,22–84]. Included studies were conducted in 19 different countries – Australia, Brazil, Canada, China, Colombia, Denmark, Finland, France, Germany, Iran, Israel, Italy, Japan, Norway, Singapore, South Africa, Switzerland, the United Kingdom, and the United States. Table 2 lists the characteristics of each included article. Table 3 presents a summary of findings from the included articles. The articles spanned original research to systematic reviews, and methods used included quantitative, qualitative, and mixed-methods approaches. Seventeen of these articles reported on a randomized controlled trial of a care transition intervention.

<Figure 1. Flow chart of the scoping review.>

Table 2. Characteristics of articles included in the scoping review.

Author(s)	Publication year	Country	Design	Healthcare context and setting	Study/target population	Diagnoses and comorbidities	Care transition process category	Sample size	Control	Voluntariness of re/admissions	Readmission time interval	Criteria for designating a readmission as unnecessary	Criteria for excluding a readmission from being considered unnecessary	Risk adjustments in calculating readmission rates
Baeza, et al. [22]	2018	Brazil	Observational	Hospital(s)	Adults	Mental health disorders	Outpatient follow-up	401	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified
Barekatin, et al. [23]	2014	Iran	Randomized controlled trial	Hospital(s)	Adults	Bipolar I and schizophrenia/schizoaffective disorders	Outpatient follow-up; Patient education	123	Usual care	Unspecified	12 months	Unspecified	Unspecified	Unspecified
Barker, et al. [24]	2011	United Kingdom	Observational	Community setting(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	Unspecified	Historical control(s)	Both involuntary and voluntary	7 days - 12 months	Unspecified	Unspecified	Unspecified
Bastiampillai, et al. [25]	2010	Australia	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up	Unspecified	Historical control(s)	Unspecified	28 days	Unspecified	Unspecified	Unspecified
Bernet [26]	2013	United States	Observational	Healthcare system(s)	Adults (military veterans)	Mental health and substance use disorders	Outpatient follow-up	124	No control	Unspecified	12 months	Unspecified	Unspecified	Sociodemographic variables

1	Bonsack, et al. [27]	2016	Switzerland	Randomized controlled trial	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Care coordination; Community liaison; Discharge planning; Outpatient follow-up; Patient education	102	Usual care	Unspecified	12 months	Unspecified	Unspecified	Clinical and sociodemographic variables
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11	Botha, et al. [28]	2018	South Africa	Quasi-experimental	Psychiatric hospital(s)	Adults (male)	Serious mental illnesses	Outpatient follow-up; Patient education	120	Patients who had been discharged on non-recruitment days during the same time- period	Unspecified	90 days	Unspecified	Unspecified	Unspecified
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18	Burns, et al. [29]	2016	United Kingdom	Randomized controlled trial	Community setting(s) and psychiatric hospital(s)	Adults	Psychotic disorders	Outpatient follow-up	333 (Study 1 of 2); 330 (Study 2 of 2)	Patients without community treatment orders	Both involuntary and voluntary	12 months (Study 1 of 2); 36 months (Study 2 of 2)	Unspecified	Recall to hospital of a patient on a community treatment order (CTO), as this is understood as being part of the CTO process rather than an outcome (if a recall ended in the CTO being revoked, then considered a readmission, calculated from the first day of the recall)	Unspecified
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1 2 3 4 5 6	Bursac, et al. [30]	2018	United States	Quasi-experimental	Psychiatric prison unit(s)	Adults (male and justice-involved)	Mental health disorders	Care coordination; Community liaison; Discharge planning; Patient education	30	Patients who are frequently rehospitalized and participants themselves pre-intervention	Involuntary	15 days	Unspecified	Unspecified	Unspecified
7 8 9	Callaly, et al. [31]	2010	Australia	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	115	No control	Unspecified	28 days	Unspecified	Unspecified	Unspecified
10 11 12 13 14 15 16 17	Chen, et al. [32]	2019	China	Randomized controlled trial	Psychiatric hospital(s)	Adults	Bipolar I disorder	Patient education	140	Usual care	Unspecified	12 months	Unspecified	Unspecified	Service use variables
18 19 20 21	Clibbens, et al. [33]	2018	Various (predominantly middle- to high-income countries)	Rapid review	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Discharge planning	Various	Various	Unspecified	Various (28, 30 days)	Unspecified	Unspecified	Unspecified
22 23 24 25 26 27 28	Currie, et al. [34]	2018	Canada	Observational	Community setting(s) and psychiatric hospital(s)	Adults (with experience of homelessness)	Mental health disorders	Outpatient follow-up	497	No control	Unspecified	2, 6, 12 months	Unspecified	Unspecified	Service use and sociodemographic variables
29 30 31 32 33 34 35	Dixon, et al. [35]	2009	United States	Randomized controlled trial	Healthcare system(s)	Adults (military veterans)	Serious mental illnesses	Community liaison; Discharge planning; Outpatient follow-up; Patient education	135	Usual care	Unspecified	6 months	Unspecified	Unspecified	Health care site variables

1 2 3 4 5 6 7 8 9 10	Donisi, et al. [36]	2016	Various (Australia, Canada, Colombia, Egypt, Germany, Ireland, Israel, Japan, Malaysia, New Zealand, Saudi Arabia, Taiwan, United Kingdom, United States)	Systematic review	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Various	Various	Various	Both involuntary and voluntary	Various (30 days; 1-12 months; more than 1 year)	Unspecified	Unspecified	Various variables (including clinical, service use, and sociodemographic)
11 12 13 14 15 16 17 18	Faurholt-Jepsen, et al. [37]	2017	Denmark	Randomized controlled trial	Psychiatric hospital(s)	Adults	Unipolar and bipolar disorders	Patient education	To be determined (study not completed at time of publication)	Usual care	Unspecified	3, 6 months	Unspecified	Unspecified	Service use and sociodemographic variables
19 20 21 22 23 24	Fullerton, et al. [38]	2016	United States	Observational	Various	Adults (Medicaid enrollees)	Mental health, substance use, and medical disorders	Outpatient follow-up	32,037	Patients with similar propensity scores who did not receive intermediate services	Unspecified	90 days	Unspecified	Unspecified	Unspecified
25 26 27 28 29	Giacco, et al. [39]	2018	Various (Australia, Japan, Switzerland, United Kingdom)	Systematic review	Psychiatric hospital(s)	Adults	Mental health disorders	Various	Various	Various	Both involuntary and voluntary	Various (12 months; 12, 24 months; unspecified)	Unspecified	Unspecified	Unspecified
30 31 32 33 34 35 36 37	Gouzoulis-Mayfrank, et al. [40]	2015	Germany	Randomized controlled trial	Psychiatric hospital(s)	Adults	Schizophrenia/schizophreniform/schizoaffective and substance use disorders	Outpatient follow-up; Patient education	100	Usual care	Voluntary	3, 6, 12 months	Unspecified	Unspecified	Unspecified

1	Grinshpoon, et al. [41]	2011	Israel	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	908	No control	Unspecified	180 days	Unspecified	Unspecified	Various variables
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6	Habit, et al. [42]	2018	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Information provision	Unspecified	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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9	Hanrahan, et al. [43]	2014	United States	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and major medical (e.g., diabetes, asthma, cancer) disorders	Outpatient follow-up; Patient education	40	Usual care	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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15	Hegedüs, et al. [44]	2018	Switzerland	Pilot/Exploratory	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Patient education	29	Usual care	Unspecified	7 days	Unspecified	Unspecified	Unspecified
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21	Hengartner, et al. [45]	2017	Switzerland	Secondary analysis following a randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Community liaison; Discharge planning; Outpatient follow-up	151	Usual care	Both involuntary and voluntary	12 months	Unspecified	Unspecified	Unspecified
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26	Hengartner, et al. [46]	2016	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Community liaison	151	Usual care	Unspecified	3, 12 months	Unspecified	Unspecified	Unspecified
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32	Hennemann, et al. [47]	2018	Various (Finland, Germany, Hungary, Netherlands, Sweden)	Systematic review	Various	Adults	Mental health disorders	Patient education	Various	Various	Unspecified	Various (4, 9, 12, 18, 24 months)	Unspecified	Unspecified	Unspecified
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1	Hutchison, et al. [8]	2019	United States	Observational	Psychiatric hospital(s)	Adults (Medicaid enrollees)	Mental health and substance use disorders	Community liaison; Outpatient follow-up	1,724	Usual care	Unspecified	30 days	Unspecified	Unspecified	Diagnosis, geographic area, service use, and sociodemographic variables
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9	Kidd, et al. [48]	2016	Canada	Quasi-experimental	Psychiatric hospital(s)	Adults	Serious mental illnesses	Community liaison; Outpatient follow-up	23	No control	Unspecified	1, 6 months	Unspecified	Unspecified	Unspecified
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21	Kim, et al. [49]	2011	United States	Observational	Hospital(s)	Adults (military veterans)	Mental health and substance use disorders	Outpatient follow-up	53,363	No control	Unspecified	84 days (other than study period)	Unspecified	Unspecified	Diagnosis, insurance type, service use, and sociodemographic variables
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28	Kisely, et al. [50]	2014	Various (United Kingdom, United States)	Systematic review	Community setting(s)	Adults	Serious mental illnesses	Outpatient follow-up	Various	Usual care	Unspecified	Various (11-12, 12 months)	Unspecified	Unspecified	Unspecified
29															
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31															
32	Kolbasovsky [51]	2009	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up; Patient education	652	Historical control(s)	Unspecified	30 days	Unspecified	Unspecified	Diagnosis, insurance type, service use, and sociodemographic variables
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1	Kurdyak, et al. [1]	2018	Canada	Observational	Psychiatric hospital(s)	Adults	Schizophrenia	Outpatient follow-up	19,132	No physician follow-up	Unspecified	210 days	Unspecified	Unspecified	Clinical, geographic area, service use, and sociodemographic variables
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9	Lay, et al. [52]	2015	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Patient education; Outpatient follow-up	238	Usual care	Involuntary	12 months	Unspecified	Unspecified	Unspecified
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15	Lay, et al. [53]	2012	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education; Outpatient follow-up	To be determined (study not completed at time of publication)	Usual care	Both involuntary and voluntary	12, 24 months	Unspecified	Unspecified	Unspecified
16															
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22	Lee, et al. [54]	2015	China	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	210	Usual care	Unspecified	6, 12, 18 months	Unspecified	Unspecified	Unspecified
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32	Liem, et al. [55]	2013	China	Systematic review	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	140	Usual care	Unspecified	12, 24 months	Unspecified	Unspecified	Unspecified
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1	Mattei, et al. [56]	2017	Italy	Observational	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Patient education	52	Not taking part in any psychoeducational groups / rehabilitation activities	Both involuntary and voluntary	6 months	Unspecified	Unspecified	Unspecified
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9	McDonagh, et al. [57]	2018	United States	Quasi-experimental	Hospital(s)	Adults (military veterans)	Mental health disorders	Care coordination; Patient education	Unspecified	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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21	Nubukpo, et al. [58]	2016	France	Observational	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	330	No control	Unspecified	24 months	Unspecified	Unspecified	Unspecified
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27	Ortiz [59]	2018	United States	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Care coordination; Outpatient follow-up	60,254	No control	Both involuntary and voluntary	30 days	Unspecified	Unspecified	Diagnosis and service use variables
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31	Passley-Clarke [60]	2018	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education	216 patients, 2 staff	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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33	Perez, et al. [61]	2017	Colombia	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	224	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified
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1	Prochaska, et al. [62]	2014	United States	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education	224	Usual care	Both involuntary and voluntary	3, 6, 12, 18 months	Unspecified	Unspecified	Clinical variables
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5	Rabovsky, et al. [63]	2012	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education	87	Open social activity group	Unspecified	12 months	Unspecified	Unspecified	Unspecified
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8	Roos, et al. [64]	2018	Norway	Randomized controlled trial	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up	41	Usual care	Voluntary	12 months	Unspecified	Unspecified	Unspecified
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12	Rothbard, et al. [65]	2012	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	176	Usual care	Involuntary	12 months	Unspecified	Unspecified	Clinical, diagnosis, insurance type, service use, and sociodemographic variables
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18	Rowley, et al. [66]	2014	United Kingdom	Pilot/Exploratory	Psychiatric hospital(s)	Adults (male)	Mental health, substance use, and medical disorders	Care coordination; Discharge planning	50 staff	No control	Unspecified	1 month	Unspecified	Unspecified	Unspecified
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22	Shaffer, et al. [2]	2015	United States	Quasi-experimental	Community setting(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up	149	Historical control(s)	Unspecified	30, 31-180 days	Unspecified	Unspecified	Diagnosis, service use, and sociodemographic variables
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31	Shimada, et al. [67]	2016	Japan	Non-controlled intervention	Psychiatric hospital(s)	Adults	Schizophrenia	Outpatient follow-up	44	Group occupational therapy only	Unspecified	12 months	Unspecified	Unspecified	Unspecified
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1	Simpson, et al. [68]	2014	United Kingdom	Pilot/Exploratory	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	46	Usual care	Unspecified	1, 3 months	Unspecified	Unspecified	Unspecified
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8	Sledge, et al. [69]	2011	United States	Randomized controlled trial	Psychiatric hospital(s)	Adults	Serious mental illnesses	Outpatient follow-up	74	Usual care	Unspecified	9 months	Unspecified	Unspecified	Unspecified
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21	Sloan, et al. [70]	2010	United States	Quasi-experimental	Hospital(s)	Adults (military veterans)	Mental health and substance use disorders	Outpatient follow-up	1,409	Patients discharged while in the continuity of care model	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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25	Taylor, et al. [71]	2016	United States	Observational	Psychiatric hospital(s)	Adults (Medicaid enrollees)	Mental health disorders	Patient education	195	Usual care	Both involuntary and voluntary	30 days	Unspecified	Unspecified	Homelessness, service use, and sociodemographic variables
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37	Thambyrajah, et al. [72]	2014	Singapore	Observational	Various	Adults	Mental health disorders	Community liaison	88	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified
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1	Thomas, et al. [73]	2013	Various (United Kingdom, United States)	Systematic review	Various	Adults	Mental health disorders	Outpatient follow-up	Various	Various	Voluntary	Various (12, 37-42 months)	Unspecified	Unspecified	Unspecified
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5	Tomita, et al. [74]	2014	United States	Secondary analysis following a randomized controlled trial	Residential program(s)	Adults (with experience of homelessness)	Serious mental illnesses	Community liaison	150	Usual care	Unspecified	13.5-18 months	Unspecified	Unspecified	Unspecified
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12	Tomko, et al. [75]	2013	United States	Observational	Hospital(s)	Adults	Mental health and substance use disorders	Patient education; Outpatient follow-up	504	Patients excluded from the discharge medication service (e.g., due to being a part of other treatment teams)	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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22	Valimaki, et al. [76]	2017	Finland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Psychotic disorders	Information provision; Patient education	1,139	Usual care	Both involuntary and voluntary	12 months	Unspecified	Unspecified	Unspecified
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26	Videbech [77]	2016	Denmark	Research database construction	Community setting(s) and psychiatric hospital(s)	Adults	Depressive disorders	Outpatient follow-up	54,001	Not applicable (study is on constructing a research database)	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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31	Vigod, et al. [78]	2013	Various (United States, other high-income countries)	Systematic review	Various	Adults	Mental health disorders	Various	Various	Various	Voluntary	Various (3, 6-24 months)	Unspecified	Unspecified	Unspecified
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Vijayaraghavan, et al. [79]	2015	United States	Observational	Community setting(s) and psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	4,663	No control	Unspecified	30 days	Unspecified	Unspecified	Diagnosis, service use, and sociodemographic variables
Von Wyl, et al. [6]	2013	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Discharge planning; Outpatient follow-up; Patient education	160	Usual care	Unspecified	3, 12 months	Unspecified	Unspecified	Unspecified
Wong [80]	2015	China	Observational	Hospital(s)	Adults (aged 65 and over)	Mental health disorders	Outpatient follow-up	368	No control	Unspecified	1, 3, 6, 12, 18, 24 months	Unspecified	Unspecified	Sociodemographic variables
Xiao, et al. [81]	2015	China	Observational	Psychiatric hospital(s)	Adults	Schizophrenia	Outpatient follow-up	876	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified
Yates, et al. [82]	2010	United States	Non-controlled intervention	Psychiatric hospital(s)	Adults (justice-involved)	Mental health and substance use disorders	Patient education	145	No control	Unspecified	6-60 months	Unspecified	Unspecified	Unspecified
Zisman-Ilani, et al. [83]	2018	Israel	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Discharge planning	101	Usual care	Unspecified	6-12 months	Unspecified	Unspecified	Unspecified

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Zuehlke, et al. [84]	2016	United States	Quality improvement	Hospital(s)	Adults (military veterans)	Mental health disorders	Care coordination; Discharge planning	352 patients, 27 staff	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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For peer review only

Table 3. Summary of findings from the 67 articles included in the scoping review.

Domain	Summary of findings
Readmission time interval	<ul style="list-style-type: none"> Wide variation from seven days to 60 months Most prevalent were one and 12 months, reported by 32.8% and 43.3% of the included articles, respectively
Unnecessary readmission definition	<ul style="list-style-type: none"> Only one article made explicit the criteria that was applied to designating a readmission as unnecessary (i.e., preventable/avoidable)
Case-mix adjustment approach	<ul style="list-style-type: none"> 73.1% of the articles did not specify risk adjustments that were made Most prevalently adjusted variables were clinical (including diagnosis; 17.9%), service use (19.4%), and sociodemographic (20.9%)
Study setting	<ul style="list-style-type: none"> 71.6% of the articles reported on studies conducted in the setting of one or more psychiatric hospitals 14.9% reported on studies conducted at general hospitals/systems
Target population	<ul style="list-style-type: none"> 25.4% of the articles reported on studies considering their population's substance use diagnoses 9.0% reported on studies of military veterans
Sample size and comparisons conducted	<ul style="list-style-type: none"> Wide variation among studies reporting (23 to 60,254 participants) 40.3% and 29.9% of the articles reported on studies examining comparisons to usual care and having no comparisons, respectively
Voluntariness of readmissions	<ul style="list-style-type: none"> 73.1% of the articles did not state whether they were differentiating between voluntary and involuntary readmissions 17.9% stated including both voluntary and involuntary readmissions
Care transition processes	<ul style="list-style-type: none"> 65.7% and 35.8% of the articles were on care transition processes involving outpatient follow-up and patient education, respectively (these and other process categories are defined in the main text)

Findings regarding the three research questions

Readmission time interval. We found wide variation in the readmission time intervals used by included studies, ranging from seven days to 60 months. The most prevalent intervals were one month (including intervals specified as 28 or 30 days) and 12 months, used by 22 and 29 included studies (32.8% and 43.3%), respectively. Twenty studies (29.9%) used more than one readmission time interval (e.g., 12 and 24 months), and eight studies (11.9%) used a unique interval that was not used by other included studies (e.g., 210 days). Studies using the unit of “month” for the readmission time interval did not address the variability of the number of days included in a month depending on the time of the calendar year.

Unnecessary readmission definition. Each of our included studies, per our inclusion criteria mentioned above, was a study conducted in the context of some care transition process that the study examined for potential association with unnecessary psychiatric readmissions (i.e., readmissions that should be minimized). Only two included studies, however, reported within a single article [29], specified a criterion by which they excluded a readmission from being considered unnecessary – namely, when the

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3 readmission was deemed a component of their planned care transition process. Otherwise, included
4 studies did not make explicit the criteria that they applied to designating a readmission as unnecessary.
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6 *Case-mix adjustment approach.* Forty-nine of the included studies (73.1%) did not specify risk
7 adjustments that they made in calculating readmission rates. The most prevalent variables for which
8 adjustments were specified were clinical (including diagnosis), service use, and sociodemographic,
9 specified by 12, 13, and 14 included studies (17.9%, 19.4%, and 20.9%), respectively. Thirteen studies
10 (19.4%) specified adjustments for more than one type of variable (e.g., service use and
11 sociodemographic). Adjustments for geographic area and insurance type variables were specified by two
12 and three included studies (3.0% and 4.5%), respectively, and health care site variables and
13 homelessness variables were specified as having been adjusted for by one included study (1.5%) each.
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16 **Additional findings from the review**

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18 *Study setting.* Forty-eight of the included studies (71.6%) were conducted in the setting of one or more
19 freestanding psychiatric hospitals (nine of which also involved community settings), while 10 (14.9%)
20 were conducted at general hospitals or health care systems offering inpatient psychiatric services. Three
21 studies (4.5%) were conducted in community settings only (e.g., not specific to or managed by one or
22 more hospitals or health care systems), and psychiatric prison units and residential programs were the
23 focus of one included study (1.5%) each.
24
25

26 *Target population.* Each of our included studies, per our inclusion criteria, concerned the adult mental
27 health population. Seventeen studies (25.4%) specified taking into consideration their population's
28 substance use diagnoses, while one and two studies (1.5% and 3.0%) specified considering their
29 population's medical diagnoses and both substance use and medical diagnoses, respectively. Seventeen
30 studies (25.4%) focused specifically on one or more mental health disorder type (e.g., depressive
31 disorders, psychotic disorders). Six, three, and three studies (9.0%, 4.5%, and 4.5%) were on military
32 veterans, Medicaid enrollees, and male individuals, respectively. Individuals with experience of
33 homelessness and justice-involved individuals were the focus of two studies (3.0%) each, and one study
34 (1.5%) focused on individuals aged 65 and over.
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37 *Sample size and comparisons conducted.* Sample size among the included studies varied widely, ranging
38 from 23 to 60,254 participants among the studies that specified a sample size. Of the thirteen studies
39 (19.4%) that did not specify sample sizes, seven were literature reviews and two were study protocols.
40 Twenty-seven studies (40.3%) examined comparisons to usual care, while twenty studies (29.9%) did not
41 have comparison groups.
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44 *Voluntariness of readmissions.* Forty-eight studies (71.6%) did not specify whether they were
45 differentiating between voluntary and involuntary readmissions. Of the remaining 19 studies (28.4%), 12
46 studies specified considering both voluntary and involuntary readmissions, while four and three studies
47 considered only voluntary and involuntary readmissions, respectively.
48
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50 *Care transition processes.* Guided by Burke and colleagues' Ideal Transition in Care (ITC) framework [85],
51 we assigned our included studies' associated care transition processes to six categories:

- 52 • *Care coordination* [e.g., among different provider disciplines, interprofessional treatment

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3 teams, and/or clinics], aligned to ITC's "coordinating care among team members" component
- 4 • *Community liaison* [e.g., arranging for community-based case management services and/or
 - 5 enlisting help of social/community/informal supports], aligned to ITC's "enlisting help of social
 - 6 and community supports" component
 - 7
 - 8 • *Discharge planning* [e.g., collaborative preparation with the patient and their family], aligned to
 - 9 ITC's "discharge planning" component
 - 10
 - 11 • *Information provision* [e.g., reminders (e.g. via telephone and/or postcards) to attend
 - 12 upcoming appointments], aligned to ITC's "complete communication of information" and
 - 13 "availability, timeliness, clarity, and organization of information" components
 - 14
 - 15 • *Outpatient follow-up* [e.g., including telephone check-ins, home-visits, peer support, and crisis
 - 16 teams, handled primarily by the hospital or health care system rather than by community
 - 17 programs], aligned to ITC's "outpatient follow-up" component
 - 18
 - 19 • *Patient education* [e.g., for self-management via individual/family/group psychoeducation,
 - 20 regarding disorder-specific therapy, and/or use of crisis cards], aligned to ITC's "educating
 - 21 patients to promote self-management" component

(Note: Care transition processes exhibiting ITC's "medication safety" and "monitoring and managing symptoms" components were categorized as either *outpatient follow-up* or *patient education*, depending on whether the safety and management component of the process was conducted during outpatient follow-up or for patient education, respectively. ITC's "advance care planning" component was not exhibited by our included studies' care transition processes.)

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25 Forty-four studies (65.7%)' care transition processes exhibited *outpatient follow-up*, 24 (35.8%)
26 exhibited *patient education*, and 11 (16.4%) exhibited both *outpatient follow-up* and *patient education*.
27 The category of *information provision* was least prevalent and exhibited by care transition processes of
28 two included studies (3.0%). Twenty-six studies (38.8%)' care transition processes exhibited more than
29 one of the six categories.
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31
32 Notably, there were no perceptible trends or emergent themes in associations between the findings
33 regarding the three research questions (i.e., readmission time interval, unnecessary readmission
34 definition, and case-mix adjustment approach) and the included studies' setting, target population,
35 sample size, comparisons conducted, voluntariness of readmissions, or categories of care transition
36 processes.
37

38 39 40 41 **DISCUSSION**

42
43 As health care systems increasingly focus on enhancing inpatient to outpatient mental health care
44 transitions, care transition interventions in support of this effort are being actively observed, devised,
45 and tested. Unnecessary psychiatric readmissions is a commonly measured outcome for these
46 investigations. However, conducting valid comparisons across different investigations is only possible if
47 either (i) the measurement is approached in a standardized way or (ii) deviations in approaches are
48 made explicit. Our scoping review thus focused on examining how peer-reviewed published studies on
49 care transition interventions have approached measuring unnecessary psychiatric readmissions.
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52 The 67 articles included in our review varied widely in their reported readmission time intervals used.
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3 Only one article reported a criterion for not considering a readmission as unnecessary, and a majority of
4 the articles did not specify risks that they adjusted for in calculating unnecessary psychiatric readmission
5 rates. Each of (i) the time interval used, (ii) readmissions that are considered unnecessary (i.e.,
6 preventable) versus necessary (i.e., not an indication of improvable care quality), and (iii) risks that are
7 accounted for are key specifications for calculating the readmission rate as an outcome. Hence, the
8 limited details with which these specifications are reported is a noteworthy gap identified by this
9 scoping review, and one that can hinder both the replicability of conducted studies and adaptations of
10 study methods by future investigations.
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13 Variation in definitions used, or even variation in the level of measurement details reported, would be
14 less of a concern if there were patterns to the variation that indicate different specifications' prevalence
15 among subgroups of investigations (e.g., for different diagnoses, for different study settings, for
16 different types of care transition interventions). For instance, if these patterns were present, there may
17 be clinically appropriate reasons (even if not reported in detail) to guide future investigations' decisions
18 for which specifications of time interval, unnecessary criteria, and risk adjustments to use when
19 measuring unnecessary psychiatric readmissions. However, as noted above, this scoping review
20 identified no perceptible trends in associations between the specifications and study characteristics.
21 This gap in knowledge makes it difficult for future studies of care transition interventions to make
22 informed decisions about how to measure unnecessary psychiatric readmissions in light of their specific
23 study's characteristics.
24
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26 These findings point to several directions in which future research can proceed to address the identified
27 gaps. One direction is to establish a framework that studies can standardly use to specify and report
28 their approaches to measuring unnecessary psychiatric readmissions. Such a framework is imperative
29 for subsequent development of a precise and shared taxonomy, which studies can use to describe their
30 approaches so that their similarities and differences can be clearly understood. A second direction is to
31 devise enhanced guidelines regarding readmission intervals, definitions of unnecessary, and risk
32 adjustments that are especially relevant for specific study contexts (e.g., particular target populations
33 and/or types of intervention). Both clinical and measurement expertise ought to be reflected in the
34 development of such guidelines. A third direction is to conduct empirical data-based investigations into
35 how sensitive research findings are to specific choices of intervals, definitions, and adjustments that are
36 used for readmissions measurement. For example, if conclusions of studies using the measure are
37 altered when using one definition of unnecessary versus another, the aforementioned framework
38 and guidelines should focus on requiring studies to justify their choice of definition.
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42 Four limitations must be noted regarding this scoping review. First, the review does not assess the
43 appropriateness of the unnecessary psychiatric readmissions measurement approaches used by the
44 included studies (e.g., whether a study's measurement approach was adequate in light of the study's
45 research objectives). However, this closely aligns to the purpose of scoping reviews to (i) identify a
46 current state of knowledge in the literature, (ii) elucidate any gaps, and (iii) establish a new research
47 agenda. Thus, the purpose of our scoping review was not to collate empirical evidence regarding which
48 measurement approaches are appropriate for which types of studies concerned with care transition
49 interventions. The main motivation for conducting this review is rather to make explicit the work that is
50 still needed to establish clearly defined and comparable measurement approaches, so that studies of
51 care transition interventions that report unnecessary psychiatric readmissions as an outcome can be
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3 appropriately compared alongside one another.
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6 Second, there are alternative categorizations possible for data of each of our extracted domains (e.g.,
7 “serious mental illnesses” can be further specified into individual diagnoses), which can impact how our
8 review’s findings are interpreted. We decided on the categorizations that we used by balancing two
9 considerations: (i) Where possible, we adhered closely to the terminologies used by the included studies
10 themselves in referring to the categories for which we were extracting data. (ii) We sought close
11 feedback through our consultation process on the broadness versus specificity of our categorizations in
12 order to allow the audience to comprehend our findings at a high level and also seek desired additional
13 information by accessing our cited included studies.
14

15
16 Third, limiting the included studies to those concerning care transition interventions (as recommended
17 by peer reviewers of our protocol to ensure feasibility of our review, given the widespread use of
18 readmissions as a measure) could have led to findings that are less widely applicable to studies that
19 measure unnecessary psychiatric readmissions but are not conducted in the context of care transition
20 interventions. Further, understanding how those other studies trend in their approaches to measuring
21 unnecessary psychiatric readmissions, similarly to or differently from our included studies, will be
22 important for establishing widely usable, accepted, and comparable approaches to this measurement. It
23 will be important for us and others to be mindful of the care transition focus of our search when
24 building on this review in future research.
25

26
27 Fourth, there may exist unnecessary psychiatric readmissions measurement approaches that individual
28 health care organizations use to assess their care transition interventions, which have not been publicly
29 shared through the mechanism of peer-reviewed journal articles that are indexed by the databases
30 included in our review. Other grey literature and non-English articles may also describe approaches that
31 we did not include. As our research moves forward from this review to examine the evidence for
32 appropriate measurement approaches, we will specifically plan for soliciting expert knowledge (as we
33 have done through this scoping review’s consultation process) from a wide range of health care
34 researchers, practitioners, industry leaders, and certainly individuals experiencing psychiatric
35 readmissions to maximize our opportunity to learn of additional potential measurement approaches
36 existent in the field.
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41 **CONCLUSIONS**

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43 Findings from this scoping review enable an increased understanding of how peer-reviewed published
44 studies on care transition interventions have approached measuring unnecessary psychiatric
45 readmissions. The articles included in our review varied widely in their reported readmission time
46 intervals used, and they provided limited details regarding which readmissions they considered
47 unnecessary and which risks they accounted for in their measurement. For studies of care transition
48 interventions that report unnecessary psychiatric readmissions as an outcome to be replicable,
49 adaptable, and appropriately comparable alongside one another, recommended steps for the field
50 include (i) establishing a framework that studies can standardly use to specify and report their
51 approaches to measuring unnecessary psychiatric readmissions, (ii) devising enhanced guidelines
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3 regarding readmission intervals, definitions of unnecessary, and risk adjustments that are especially
4 relevant for specific study contexts (e.g., particular target populations and/or types of intervention), and
5 (iii) conducting empirical data-based investigations into how sensitive research findings are to specific
6 choices of intervals, definitions, and adjustments that are used for measurement.
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11 **Acknowledgements:** We would like to thank Michelle Doering, MLIS, Bernard Becker Medical Library,
12 Washington University School of Medicine, for creating systematic search strategies. We would also like
13 to thank A. Rani Elwy, PhD, at the Alpert Medical School of Brown University and the Edith Nourse
14 Rogers Memorial Veterans Hospital, for connecting our team to health services researchers with
15 expertise in readmissions measurement.
16

17 **Author contributions:** BK and CPW developed the scoping review protocol, with close guidance from
18 EKP on the review's conceptualization. CPW led the development of the search strategy and refined the
19 data extraction domains together with BK and CBW. BK and CPW conducted the study selection through
20 results collation steps. BK led the preparation of the manuscript draft, and CPW, CBW, and EKP provided
21 critical revisions to the manuscript's intellectual content. All authors read and approved the final
22 manuscript.
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25 **Funding:** The preparation of this manuscript was supported in part by the Implementation Research
26 Institute (IRI), at the George Warren Brown School of Social Work, Washington University in St. Louis;
27 through an award from the National Institute of Mental Health (5R25MH08091607), National Institute
28 on Drug Abuse, and VA HSR&D QUERI.
29
30

31 **Competing interests:** The authors declare that they have no competing interests.
32

33 **Data availability statement:** The presented research is a literature review of published data; there are
34 no additional unpublished data.
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39 REFERENCES

- 40
41 1 Kurdyak P, Vigod SN, Newman A, et al. Impact of physician follow-up care on psychiatric readmission
42 rates in a population-based sample of patients with schizophrenia. *Psychiatr Serv* 2018;69.
43 doi:10.1176/appi.ps.201600507
44
45 2 Shaffer SL, Hutchison SL, Ayers AM, et al. Brief critical time intervention to reduce psychiatric
46 rehospitalization. *Psychiatr Serv* 2015;66. doi:10.1176/appi.ps.201400362
47
48 3 Driessen M, Schulz P, Jander S, et al. Effectiveness of inpatient versus outpatient complex treatment
49 programs in depressive disorders: A quasi-experimental study under naturalistic conditions. *BMC*
50 *Psychiatry* 2019;19. doi:10.1186/s12888-019-2371-5
51
52
53
54

- 1
2
3 4 First Step Behavioral Health. Inpatient vs Outpatient Treatment. 1st Step Behav. Heal.
4 2020.<https://firststepbh.com/blog/inpatient-vs-outpatient/> (accessed 5 Jul 2020).
5
6
7 5 Guzman-Parra J, Moreno-Küstner B, Rivas F, et al. Needs, Perceived Support, and Hospital
8 Readmissions in Patients with Severe Mental Illness. *Community Ment Health J* 2018;54.
9 doi:10.1007/s10597-017-0095-x
10
11 6 Von Wyl A, Heim G, Rüschi N, et al. Network coordination following discharge from psychiatric
12 inpatient treatment: A study protocol. *BMC Psychiatry* 2013;13. doi:10.1186/1471-244X-13-220
13
14 7 Rosen CS, Tiet QQ, Harris AHS, et al. Telephone monitoring and support after discharge from
15 residential PTSD treatment: A randomized controlled trial. *Psychiatr Serv* 2013;64.
16 doi:10.1176/appi.ps.201200142
17
18 8 Hutchison SL, Flanagan J V., Karpov I, et al. Care Management Intervention to Decrease Psychiatric and
19 Substance Use Disorder Readmissions in Medicaid-Enrolled Adults. *J Behav Heal Serv Res* 2019;46.
20 doi:10.1007/s11414-018-9614-y
21
22 9 American Hospital Association. Examining the Drivers of Readmissions and Reducing Unnecessary
23 Readmissions for Better Patient Care. 2011.[https://www.aha.org/guidesreports/2018-02-09-examining-](https://www.aha.org/guidesreports/2018-02-09-examining-drivers-readmissions-and-reducing-unnecessary-readmissions)
24 [drivers-readmissions-and-reducing-unnecessary-readmissions](https://www.aha.org/guidesreports/2018-02-09-examining-drivers-readmissions-and-reducing-unnecessary-readmissions) (accessed 25 Sep 2020).
25
26
27 10 Upadhyay S, Stephenson AL, Smith DG. Readmission Rates and Their Impact on Hospital Financial
28 Performance: A Study of Washington Hospitals. *Inq (United States)* 2019;56.
29 doi:10.1177/0046958019860386
30
31 11 Agency for Healthcare Research and Quality. Hospital Readmissions.
32 <https://www.ahrq.gov/topics/hospital-readmissions.html> (accessed 25 Sep 2020).
33
34
35 12 Bailey MK, Weiss AJ, Barrett ML, et al. Characteristics of 30-Day All-Cause Hospital Readmissions,
36 2010–2016: Statistical Brief #248. 2006.
37
38 13 Klein S. In Focus: Preventing Unnecessary Hospital Readmissions.
39 [https://www.commonwealthfund.org/publications/newsletter-article/focus-preventing-unnecessary-](https://www.commonwealthfund.org/publications/newsletter-article/focus-preventing-unnecessary-hospital-readmissions)
40 [hospital-readmissions](https://www.commonwealthfund.org/publications/newsletter-article/focus-preventing-unnecessary-hospital-readmissions) (accessed 25 Sep 2020).
41
42
43 14 3M Health Information Systems. Potentially Preventable Readmissions Classification System:
44 Methodology Overview. 2012. [https://multimedia.3m.com/mws/media/10426100/resources-and-](https://multimedia.3m.com/mws/media/10426100/resources-and-references-his-2015.pdf)
45 [references-his-2015.pdf](https://multimedia.3m.com/mws/media/10426100/resources-and-references-his-2015.pdf)
46
47
48 15 Levac D, Colquhoun H, O'Brien KK. Scoping studies: Advancing the methodology. *Implement Sci*
49 *Published Online First*: 2010. doi:10.1186/1748-5908-5-69
50
51 16 Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. *Int J Soc Res Methodol*
52 *Theory Pract Published Online First*: 2005. doi:10.1080/1364557032000119616
53
54

- 1
2
3
4 17 Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and
5 explanation. *Ann. Intern. Med.* 2018. doi:10.7326/M18-0850
6
7 18 Kim B, Weatherly C, Wolk CB, et al. Measurement of unnecessary psychiatric readmissions: a scoping
8 review protocol. *BMJ Open* 2019;9. doi:10.1136/bmjopen-2019-030696
9
10 19 Goldfield NI, McCullough EC, Hughes JS, et al. Identifying potentially preventable readmissions.
11 *Health Care Financ Rev* 2008;30.
12
13 20 Microsoft Excel. 2020. <https://products.office.com/en-us/excel> (accessed 16 Aug 2020).
14
15 21 Gavrilets S, Auerbach J, Van Vugt M. Convergence to consensus in heterogeneous groups and the
16 emergence of informal leadership. *Sci Rep* 2016;6. doi:10.1038/srep29704
17
18 22 Baeza FLC, da Rocha NS, Fleck MP de A. Readmission in psychiatry inpatients within a year of
19 discharge: The role of symptoms at discharge and post-discharge care in a Brazilian sample. *Gen Hosp*
20 *Psychiatry* 2018;51. doi:10.1016/j.genhosppsy.2017.11.008
21
22 23 Berekatani M, Maracy MR, Rajabi F, et al. Aftercare services for patients with severe mental disorder:
23 A randomized controlled trial. *J Res Med Sci* 2014;19.
24
25 24 Barker V, Taylor M, Kader I, et al. Impact of crisis resolution and home treatment services on user
26 experience and admission to psychiatric hospital. *Psychiatrist* 2011;35. doi:10.1192/pb.bp.110.031344
27
28 25 Bastiampillai TJ, Bidargaddi NP, Dhillon RS, et al. Implications of bed reduction in an acute psychiatric
29 service. *Med J Aust* 2010;193. doi:10.5694/j.1326-5377.2010.tb03963.x
30
31 26 Bernet AC. Predictors of psychiatric readmission among veterans at high risk of suicide: The impact of
32 post-discharge aftercare. *Arch. Psychiatr. Nurs.* 2013;27. doi:10.1016/j.apnu.2013.07.001
33
34 27 Bonsack C, Golay P, Manetti SG, et al. Linking primary and secondary care after psychiatric
35 hospitalization: Comparison between transitional case management setting and routine care for
36 common mental disorders. *Front Psychiatry* 2016;7. doi:10.3389/fpsy.2016.00096
37
38 28 Botha UA, Coetzee M, Koen L, et al. An Attempt to Stem the Tide: Exploring the Effect of a 90-Day
39 Transitional Care Intervention on Readmissions to an Acute Male Psychiatric Unit in South Africa. *Arch*
40 *Psychiatr Nurs* 2018;32. doi:10.1016/j.apnu.2017.12.002
41
42 29 Burns T, Rugkåsa J, Yeeles K, et al. Coercion in mental health: a trial of the effectiveness of
43 community treatment orders and an investigation of informal coercion in community mental health
44 care. *Program Grants Appl Res* 2016;4. doi:10.3310/pgfar04210
45
46 30 Bursac R, Raffa L, Solimo A, et al. Boundary-Spanning Care: Reducing Psychiatric Rehospitalization
47 and Self-Injury in a Jail Population. *J Correct Heal Care* 2018;24. doi:10.1177/1078345818792055
48
49
50
51
52
53
54

- 1
2
3
4 31 Callaly T, Hyland M, Trauer T, et al. Readmission to an acute psychiatric unit within 28 days of
5 discharge: Identifying those at risk. *Aust Heal Rev* 2010;34. doi:10.1071/AH08721
6
7 32 Chen R, Zhu X, Capitão LP, et al. Psychoeducation for psychiatric inpatients following remission of a
8 manic episode in bipolar I disorder: A randomized controlled trial. *Bipolar Disord* 2019;21.
9 doi:10.1111/bdi.12642
10
11 33 Clibbens N, Harrop D, Blackett S. Early discharge in acute mental health: A rapid literature review. *Int.*
12 *J. Ment. Health Nurs.* 2018;27. doi:10.1111/inm.12515
13
14 34 Currie LB, Patterson ML, Moniruzzaman A, et al. Continuity of Care among People Experiencing
15 Homelessness and Mental Illness: Does Community Follow-up Reduce Rehospitalization? *Health Serv*
16 *Res* 2018;53. doi:10.1111/1475-6773.12992
17
18 35 Dixon L, Goldberg R, Iannone V, et al. Use of a critical time intervention to promote continuity of care
19 after psychiatric inpatient hospitalization. *Psychiatr Serv* 2009;60. doi:10.1176/ps.2009.60.4.451
20
21 36 Donisi V, Tedeschi F, Wahlbeck K, et al. Pre-discharge factors predicting readmissions of psychiatric
22 patients: A systematic review of the literature. *BMC Psychiatry* 2016;16. doi:10.1186/s12888-016-1114-0
23
24 37 Faurholt-Jepsen M, Frost M, Martiny K, et al. Reducing the rate and duration of Re- ADMISsions
25 among patients with unipolar disorder and bipolar disorder using smartphone-based monitoring and
26 treatment - the RADMIS trials: Study protocol for two randomized controlled trials. *Trials* 2017;18.
27 doi:10.1186/s13063-017-2015-3
28
29 38 Fullerton CA, Lin H, O'Brien PL, et al. Intermediate services after behavioral health hospitalization:
30 Effect on rehospitalization and emergency department visits. *Psychiatr Serv* 2016;67.
31 doi:10.1176/appi.ps.201500267
32
33 39 Giacco D, Conneely M, Masoud T, et al. Interventions for involuntary psychiatric inpatients: A
34 systematic review. *Eur. Psychiatry.* 2018;54. doi:10.1016/j.eurpsy.2018.07.005
35
36 40 Gouzoulis-Mayfrank E, König S, Koebke S, et al. Trans-Sector Integrated Treatment in Psychosis and
37 Addiction. *Dtsch Aerzteblatt Online* Published Online First: 2015. doi:10.3238/arztebl.2015.0683
38
39 41 Grinshpoon A, Lerner Y, Hornik-Lurie T, et al. Post-discharge contact with mental health clinics and
40 psychiatric readmission: A 6-month follow-up study. *Isr J Psychiatry Relat Sci* 2011;48.
41
42 42 Habit NF, Johnson E, Edlund BJ. Appointment reminders to decrease 30-day readmission rates to
43 inpatient psychiatric hospitals. *Prof Case Manag* 2018;23. doi:10.1097/NCM.000000000000248
44
45 43 Hanrahan NP, Solomon P, Hurford MO. A Pilot Randomized Control Trial: Testing a Transitional Care
46 Model for Acute Psychiatric Conditions. *J Am Psychiatr Nurses Assoc* 2014;20.
47 doi:10.1177/1078390314552190
48
49
50
51
52
53
54

- 1
2
3
4 44 Hegedüs A, Kozel B, Fankhauser N, et al. Outcomes and feasibility of the short transitional
5 intervention in psychiatry in improving the transition from inpatient treatment to the community: A
6 pilot study. *Int J Ment Health Nurs* 2018;27. doi:10.1111/inm.12338
7
- 8
9 45 Hengartner MP, Passalacqua S, Andreae A, et al. The role of perceived social support after psychiatric
10 hospitalisation: Post hoc analysis of a randomised controlled trial testing the effectiveness of a
11 transitional intervention. *Int J Soc Psychiatry* 2017;63. doi:10.1177/0020764017700664
12
- 13 46 Hengartner MP, Passalacqua S, Heim G, et al. The post-discharge network coordination programme:
14 A randomized controlled trial to evaluate the efficacy of an intervention aimed at reducing
15 rehospitalizations and improving mental health. *Front Psychiatry* 2016;7. doi:10.3389/fpsy.2016.00027
16
- 17 47 Hennemann S, Farnsteiner S, Sander L. Internet- and mobile-based aftercare and relapse prevention
18 in mental disorders: A systematic review and recommendations for future research. *Internet Interv.*
19 2018;14. doi:10.1016/j.invent.2018.09.001
20
- 21 48 Kidd SA, Virdee G, Mihalakakos G, et al. The Welcome Basket Revisited: Testing the Feasibility of a
22 Brief Peer Support Intervention to Facilitate Transition from Hospital to Community. *Psychiatr Rehabil J*
23 2016;39. doi:10.1037/prj0000235
24
- 25 49 Kim HM, Pfeiffer P, Ganoczy D, et al. Intensity of outpatient monitoring after discharge and
26 psychiatric rehospitalization of veterans with depression. *Psychiatr Serv* 2011;62.
27 doi:10.1176/ps.62.11.pss6211_1346
28
- 29 50 Kisely SR, Campbell LA, O'Reilly R. Compulsory community and involuntary outpatient treatment for
30 people with severe mental disorders. *Cochrane Database Syst. Rev.* 2017;2017.
31 doi:10.1002/14651858.CD004408.pub5
32
- 33 51 Kolbasovsky A. Reducing 30-day inpatient psychiatric recidivism and associated costs through
34 intensive case management. *Prof Case Manag* 2009;14. doi:10.1097/NCM.0b013e31819e026a
35
- 36 52 Lay B, Drack T, Bleiker M, et al. Preventing compulsory admission to psychiatric inpatient care:
37 Perceived coercion, empowerment, and self-reported mental health functioning after 12 months of
38 preventive monitoring. *Front Psychiatry* 2015;6. doi:10.3389/fpsy.2015.00161
39
- 40 53 Lay B, Salize HJ, Dressing H, et al. Preventing compulsory admission to psychiatric inpatient care
41 through psycho-education and crisis focused monitoring. *BMC Psychiatry* 2012;12. doi:10.1186/1471-
42 244X-12-136
43
- 44 54 Lee CC, Liem SK, Leung J, et al. From deinstitutionalization to recovery-oriented assertive community
45 treatment in Hong Kong: What we have achieved. *Psychiatry Res* 2015;228.
46 doi:10.1016/j.psychres.2015.05.106
47
- 48 55 Liem SK, Lee CC. Effectiveness of assertive community treatment in hong kong among patients with
49
50
51
52
53
54

1
2
3 frequent hospital admissions. *Psychiatr Serv* 2013;64. doi:10.1176/appi.ps.201200421

4
5 56 Mattei G, Raisi F, Burattini M, et al. Effectiveness and acceptability of psycho-education group
6 intervention for people hospitalized in psychiatric wards and nurses. *J Psychopathol* 2017;23.

7
8
9 57 McDonagh JG, Haren WB, Valvano M, et al. Cultural Change: Implementation of a Recovery Program
10 in a Veterans Health Administration Medical Center Inpatient Unit. *J Am Psychiatr Nurses Assoc* 2019;25.
11 doi:10.1177/1078390318786024

12
13 58 Nubukpo P, Girard M, Sengelen JM, et al. A prospective hospital study of alcohol use disorders,
14 comorbid psychiatric conditions and withdrawal prognosis. *Ann Gen Psychiatry* 2016;15.
15 doi:10.1186/s12991-016-0111-5

16
17
18 59 Ortiz G. Predictors of 30-day postdischarge readmission to a multistate national sample of state
19 psychiatric hospitals. *J Healthc Qual* 2019;41. doi:10.1097/JHQ.0000000000000162

20
21 60 Passley-Clarke J. Implementation of Recovery Education on an Inpatient Psychiatric Unit. *J Am*
22 *Psychiatr Nurses Assoc* 2019;25. doi:10.1177/1078390318810413

23
24 61 Pérez GAC, Bernal LAR, Silva JB, et al. Sociodemographic and clinical factors associated with dual
25 disorders in a psychiatric hospital. *Salud Ment* 2017;40. doi:10.17711/SM.0185-3325.2017.036

26
27
28 62 Prochaska JJ, Hall SE, Delucchi K, et al. Efficacy of initiating tobacco dependence treatment in
29 inpatient psychiatry: A randomized controlled trial. *Am J Public Health* 2014;104.
30 doi:10.2105/AJPH.2013.301403

31
32 63 Rabovsky K, Trombini M, Allemann D, et al. Efficacy of bifocal diagnosis-independent group
33 psychoeducation in severe psychiatric disorders: Results from a randomized controlled trial. *Eur Arch*
34 *Psychiatry Clin Neurosci* 2012;262. doi:10.1007/s00406-012-0291-1

35
36
37 64 Roos E, Bjerkeset O, Steinsbekk A. Health care utilization and cost after discharge from a mental
38 health hospital; An RCT comparing community residential aftercare and treatment as usual. *BMC*
39 *Psychiatry* 2018;18. doi:10.1186/s12888-018-1941-2

40
41 65 Rothbard AB, Chhatre S, Zubritsky C, et al. Effectiveness of a high end users program for persons with
42 psychiatric disorders. *Community Ment Health J* 2012;48. doi:10.1007/s10597-012-9479-0

43
44
45 66 Rowley E, Wright N, Waring J, et al. Protocol for an exploration of knowledge sharing for improved
46 discharge from a mental health ward. *BMJ Open* 2014;4. doi:10.1136/bmjopen-2014-005176

47
48 67 Shimada T, Nishi A, Yoshida T, et al. Factors Influencing Rehospitalisation of Patients with
49 Schizophrenia in Japan: A 1-year Longitudinal Study. *Hong Kong J Occup Ther* 2016;28.
50 doi:10.1016/j.hkjot.2016.10.002

51
52 68 Simpson A, Flood C, Rowe J, et al. Results of a pilot randomised controlled trial to measure the clinical
53

1
2
3 and cost effectiveness of peer support in increasing hope and quality of life in mental health patients
4 discharged from hospital in the UK. BMC Psychiatry 2014;14. doi:10.1186/1471-244X-14-30
5

6
7 69 Sledge WH, Lawless M, Sells D, et al. Effectiveness of peer support in reducing readmissions of
8 persons with multiple psychiatric hospitalizations. Psychiatr Serv 2011;62.
9 doi:10.1176/ps.62.5.pss6205_0541
10

11
12 70 Sloan PA, Asghar-Ali A, Teague A, et al. Psychiatric hospitalists and continuity of care: A comparison
13 of two models. J Psychiatr Pract 2010;16. doi:10.1097/01.pra.0000375713.85454.8f
14

15
16 71 Taylor C, Holsinger B, Flanagan J V., et al. Effectiveness of a Brief Care Management Intervention for
17 Reducing Psychiatric Hospitalization Readmissions. J Behav Heal Serv Res 2016;43. doi:10.1007/s11414-
18 014-9400-4
19

20
21 72 Thambyrajah V, Hendriks M, Mahendran R. Evaluating a case management service in a tertiary
22 psychiatric hospital in Singapore. Ann Acad Med Singapore 2014;43.
23

24
25 73 Thomas KA, Rickwood D. Clinical and cost-Effectiveness of acute and subacute residential mental
26 health services: A systematic review. Psychiatr. Serv. 2013;64. doi:10.1176/appi.ps.201200427
27

28
29 74 Tomita A, Lukens EP, Herman DB. Mediation analysis of critical time intervention for persons living
30 with serious mental illnesses: Assessing the role of family relations in reducing psychiatric
31 rehospitalization. Psychiatr Rehabil J 2014;37. doi:10.1037/prj0000015
32

33
34 75 Tomko J, Ahmed N, Mukherjee K, et al. Evaluation of a Discharge Medication Service on an Acute
35 Psychiatric Unit. Hosp Pharm 2013;48. doi:10.1310/hpj4804-314
36

37
38 76 Välimäki M, Kannisto KA, Vahlberg T, et al. Short text messages to encourage adherence to
39 medication and follow-up for people with psychosis (mobile.net): Randomized controlled trial in Finland.
40 J Med Internet Res 2017;19. doi:10.2196/jmir.7028
41

42
43 77 Videbech P, Deleuran A. The Danish depression database. Clin. Epidemiol. 2016;8.
44 doi:10.2147/CLEP.S100298
45

46
47 78 Vigod SN, Kurdyak PA, Dennis CL, et al. Transitional interventions to reduce early psychiatric
48 readmissions in adults: Systematic review. Br. J. Psychiatry. 2013;202. doi:10.1192/bjp.bp.112.115030
49

50
51 79 Vijayaraghavan M, Messer K, Xu Z, et al. Psychiatric readmissions in a community-based sample of
52 patients with mental disorders. Psychiatr Serv 2015;66. doi:10.1176/appi.ps.201400092
53

54
55 80 Wong CYT. Predictors of psychiatric rehospitalization among elderly patients. F1000Research
56 2015;4:1–14. doi:10.12688/f1000research.7135.1
57

58
59 81 Xiao J, Mi W, Li L, et al. High relapse rate and poor medication adherence in the chinese population
60 with schizophrenia: Results from an observational survey in the people's Republic of China.
61

1
2
3 Neuropsychiatr Dis Treat 2015;11. doi:10.2147/NDT.S72367
4

5 82 Yates KF, Kunz M, Khan A, et al. Psychiatric patients with histories of aggression and crime five years
6 after discharge from a cognitive-behavioral program. J Forensic Psychiatry Psychol 2010;21.
7 doi:10.1080/14789940903174238
8

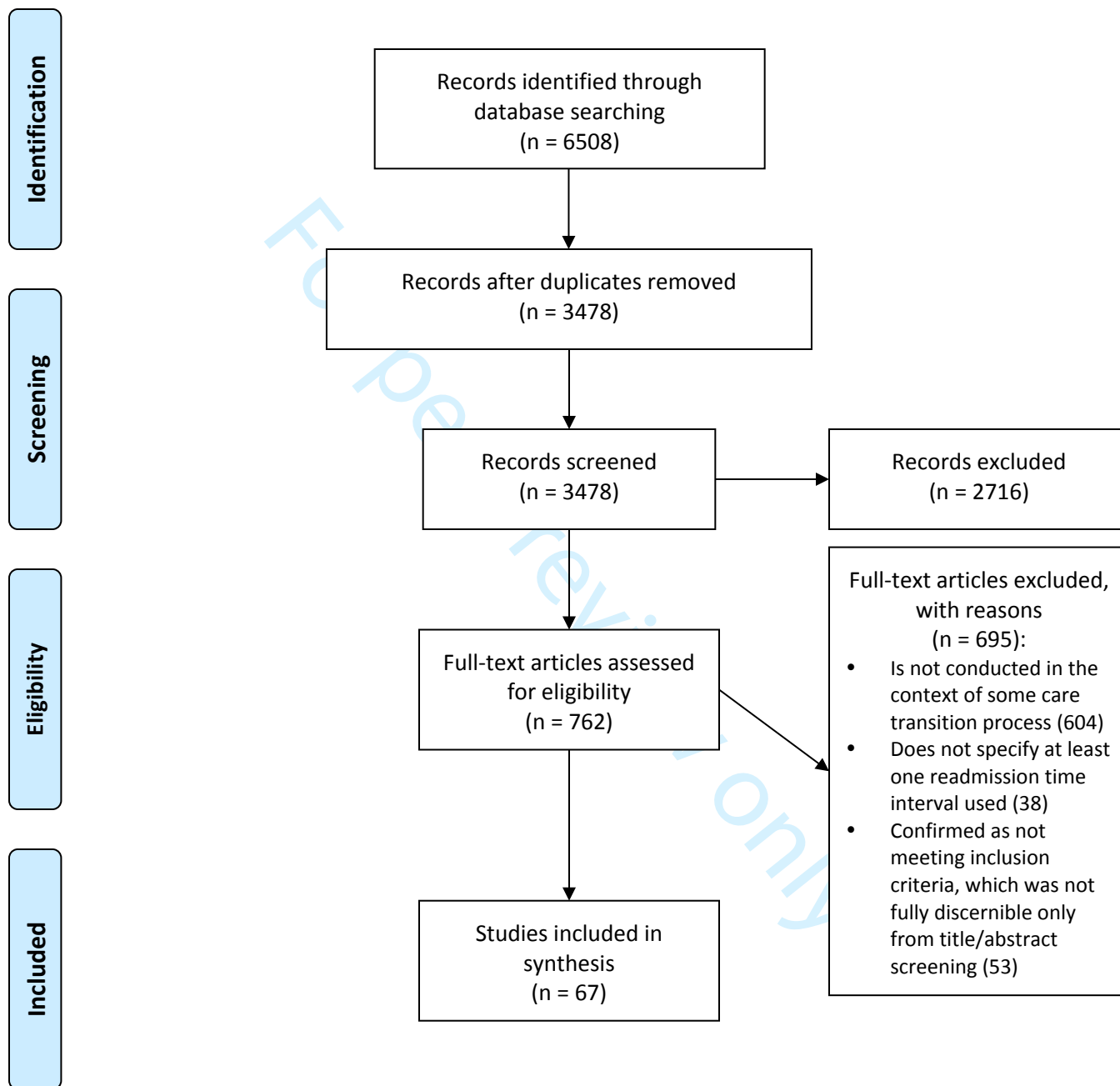
9
10 83 Zisman-Ilani Y, Roe D, Elwyn G, et al. Shared Decision Making for Psychiatric Rehabilitation Services
11 Before Discharge from Psychiatric Hospitals. Health Commun 2019;34.
12 doi:10.1080/10410236.2018.1431018
13

14 84 Zuehlke JB, Kotecki RM, Kern S, et al. Brief report: Transformation to a Recovery-Oriented Model of
15 Care on a Veterans Administration Inpatient Unit. Psychiatr Rehabil J 2016;39. doi:10.1037/prj0000198
16

17 85 Burke RE, Kripalani S, Vasilevskis EE, et al. Moving beyond readmission penalties: Creating an ideal
18 process to improve transitional care. J Hosp Med 2013;8. doi:10.1002/jhm.1990
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
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PRISMA 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.

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Supplementary File 1

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	4
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	4
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	4-5
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A



SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	6
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	7-19
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	7-19
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	20-22
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	22-23
Limitations	20	Discuss the limitations of the scoping review process.	23-24
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	24-25
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	25

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: 10.7326/M18-0850.



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BMJ Open

Measurement of unnecessary psychiatric readmissions in the context of care transition interventions: a scoping review

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-045364.R1
Article Type:	Original research
Date Submitted by the Author:	21-Dec-2020
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Primary Subject Heading:	Health services research
Secondary Subject Heading:	Mental health
Keywords:	MENTAL HEALTH, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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3 **Measurement of unnecessary psychiatric readmissions in the context of care transition interventions:**
4 **a scoping review**
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41 Word count: 3,998
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47 Keywords: hospital readmission, administrative data, care transition, patient discharge, mental health
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ABSTRACT

Objective: The objective of this study was to examine how published studies of inpatient to outpatient mental healthcare transition processes have approached measuring unnecessary psychiatric readmissions.

Design: Scoping review using Levac et al.'s enhancement to Arksey and O'Malley's framework for conducting scoping reviews.

Data sources: Medline (Ovid), Embase (Ovid), PsycINFO, CINAHL, Cochrane, and ISI Web of Science article databases were searched from 1 January 2009 through 28 February 2019.

Eligibility criteria for selecting studies: We included studies that (i) are about care transition processes associated with unnecessary psychiatric readmissions and (ii) specify use of at least one readmission time interval (i.e., the time period since previous discharge from inpatient care, within which a hospitalization can be considered a readmission).

Data extraction and synthesis: We assessed review findings through tabular and content analyses of the data extracted from included articles.

Results: Our database search yielded 3478 unique articles, 67 of which were included in our scoping review. The included articles varied widely in their reported readmission time intervals used. They provided limited details regarding which readmissions they considered unnecessary and which risks they accounted for in their measurement. There were no perceptible trends in associations between the variation in these findings and the included studies' characteristics (e.g., target population, type of care transition intervention).

Conclusions: The limited specification with which studies report their approach to unnecessary psychiatric readmissions measurement is a noteworthy gap identified by this scoping review, and one that can hinder both the replicability of conducted studies and adaptations of study methods by future investigations. Recommendations stemming from this review include (i) establishing a framework for reporting the measurement approach, (ii) devising enhanced guidelines regarding which approaches to use in which circumstances, and (iii) examining how sensitive research findings are to the choice of the approach.

ARTICLE SUMMARY

Strengths and limitations of this study

- Closely following Levac and colleagues' established methodological framework for conducting scoping reviews, this study performed a comprehensive search of how unnecessary psychiatric readmissions are measured by studies concerned with inpatient to outpatient mental healthcare transitions.
- Aligning to the purpose of scoping reviews to identify current gaps in knowledge and establish

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3 a new research agenda, this review does not assess the effectiveness of the approaches
4 mentioned by the included studies in measuring unnecessary psychiatric readmissions.
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- 6 • There may exist other approaches to unnecessary psychiatric readmissions measurement used
7 (i) by studies not concerned with care transitions or (ii) within individual health care
8 organizations, which have not been publicly shared through the mechanism of peer-reviewed
9 journal articles that are indexed by the databases included in our review.
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- 11 • This scoping review is a critical step towards enabling the field to evaluate various care
12 transition interventions' comparative effects on unnecessary psychiatric readmission rates.
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15 16 17 18 19 **BACKGROUND**

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21 Care transition for individuals being discharged from inpatient mental healthcare to outpatient settings
22 is a growing focus for many healthcare delivery systems [1,2]. Drivers of this increased interest include
23 inpatient treatment's high-resource requirements [3] (especially for longer and repeated inpatient
24 stays), as well as individuals being able to better maintain family, work, educational, and other
25 responsibilities alongside outpatient treatment [4]. Studies of inpatient to outpatient mental healthcare
26 transition processes, both observational [1,5] and interventional [2,6], are thus on the rise, and many of
27 them use the rate of post-discharge readmissions as an individual-level outcome measure to assess the
28 quality of transition [7,8]. Readmission rate associated with a care setting is its proportion of individuals
29 who are rehospitalized within a certain time period since their previous hospitalization.
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32 Defining readmission rate requires, at minimum, (i) specification of the time period (i.e., readmission
33 time interval), (ii) classification of 're'-hospitalization (i.e., related to the previous hospitalization and
34 therefore possibly unnecessary or preventable, as opposed to an unrelated hospitalization due to a new
35 care need), and (iii) cases that should be included/excluded from consideration. These specifications are
36 becoming more important now than ever, as health care policy makers, payers, and professional groups
37 are increasingly paying attention to accurately identifying unnecessary readmissions and better
38 incentivizing their prevention [9–13]. However, it is unclear whether and how the increasingly prevalent
39 studies of inpatient to outpatient mental healthcare transitions are defining each of these aspects of the
40 measure.
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43 Also unclear is whether there is a shared understanding by the field regarding which definition is
44 appropriate for which mental healthcare circumstances. 3M Health Information Systems' Potentially
45 Preventable Readmissions Classification System [14] offers a widely used proprietary methodology for
46 measuring readmissions. It is difficult to glean from its publicly available information, however, what
47 constitutes a meaningful readmission time interval and any mental health-specific considerations that
48 need to be made when measuring unnecessary psychiatric readmissions.
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51 Without established approaches to measuring unnecessary psychiatric readmissions (which, if not
52 uniform, ought to at least be made explicit as to how they relate to or differ from one another), various
53 transitional interventions using the measure cannot be adequately assessed alongside one another.
54 Establishing widely usable, accepted, and comparable approaches to this measurement means setting
55 clear definitional parameters as to what constitutes an unnecessary psychiatric admission. Thus, as a
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3 first step towards being able to evaluate the interventions' comparative effects on unnecessary
4 psychiatric readmission rates, we conducted a scoping review of peer-reviewed literature to delineate
5 the current landscape of how published studies have approached measuring unnecessary psychiatric
6 readmissions.
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12 **METHODS**

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14 We structured the scoping review according to Levac and colleagues' enhancement [15] to Arksey and
15 O'Malley's six-stage methodological framework for conducting scoping reviews [16]. The framework's
16 stages are (i) defining the research question, (ii) identifying relevant literature, (iii) study selection, (iv)
17 data extraction, (v) collating, summarizing, and reporting the results, and (vi) consultation process and
18 engagement of knowledge users. We aligned to the Preferred Reporting Items for Systematic Reviews
19 and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) [17] (online Supplementary
20 File 1). Our team previously published a study protocol paper detailing the methods for this review [18];
21 briefly, they are summarized below.
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24 **Stage 1: Defining the research question**

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26 Aligning the notion of 'unnecessary readmission' to Goldfield and colleagues' [19] concept of 'potentially
27 preventable readmission' (defined as a subsequent admission that occurs within the readmission time
28 interval and is clinically related to a prior admission), the scoping review aimed to answer the following
29 questions:
30

- 31 1. What durations are used as the unnecessary psychiatric readmission time interval?
 - 32 2. What criteria are applied to designating a psychiatric readmission as unnecessary?
 - 33 3. What risks are adjusted for in calculating unnecessary psychiatric readmission rates?
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36 **Stage 2: Identifying relevant literature**

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38 We conducted a comprehensive review of the existing literature and evidence base to systematically
39 examine what is known about measuring unnecessary psychiatric readmissions. Working with our
40 institutions' librarians with extensive experience in building systematic and comprehensive search
41 strategies, we iteratively developed our search strategy. In particular, we refined our search strategy to
42 include terms that are often used interchangeably. For example, in addition to 'readmission,' our initial
43 preliminary searches based on early iterations of the strategy helped us identify related terms to
44 include, such as unnecessary hospitalisation, inappropriate hospitalisation, unplanned admission, and
45 unscheduled admission. We harvested search terms using benchmark article terms and subject
46 headings, titles and abstracts of key articles, dictionaries, and synonyms and subject headings within
47 Embase and PubMed's MeSH database. We used Boolean logic and proximity operators to combine and
48 refine the search terms. The search strategy was initially formulated for Medline (Ovid) (Table 1), then
49 further tailored as appropriate for use with Embase (Ovid), PsycINFO, CINAHL, Cochrane, and ISI Web of
50 Science article databases. These sources include relevant journals within the fields of medicine, health
51 services, and the social sciences and were selected to capture a comprehensive sample of literature.
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Table 1. Medline (Ovid) search strategy.

Search term/line number	Conceptual term of interest	Search term entered into Ovid-Medline	Number of hits
1	Mental disorders	psychiatric.ti. OR "mental disorder".ti. OR "mental disorders".ti. OR "mental illness".ti. OR "mentally ill".ti.	83986
2	Inpatient psychiatric settings	Exp "Psychiatric hospitals"/ OR Exp "hospital Psychiatric Department"/ OR "Psychiatric treatment center".mp. OR "Psychiatric Hospital".mp. OR "psychiatric unit".mp. OR "psychiatric units".mp. OR "Mental Institution".mp. OR "Mental Hospital".mp. OR "Psychiatric Department".mp. OR "Psychiatric treatment centers".mp. OR "Psychiatric Hospitals".mp. OR "Mental Institutions".mp. OR "Mental Hospitals".mp. OR "Psychiatric Departments".mp. OR "Psychiatric Ward".mp. OR "psychiatric inpatient".mp. OR "psychiatric inpatients".mp.	41507
3	Inpatient psychiatric admission	"psychiatric hospitalization".mp. OR "psychiatric hospitalizations".mp. OR "psychiatric readmission".mp. OR "psychiatric readmissions".mp. OR "psychiatric rehospitalization".mp. OR "psychiatric rehospitalizations".mp. OR "psychiatric admission".mp. OR "psychiatric admissions".mp	2905
5		1 or 2 or 3	110553
6	Patient Readmission	Exp "Patient Readmission"/	14332
7	Readmission	Readmission*.mp. OR readmitted.ti.	28315
8	Rehospitalization	Rehospitali*.mp.	5515
9	Unnecessary admissions	"Unnecessary admission".mp. OR "preventable hospitalizations".mp. OR "preventable hospitalization".mp.	315
10		6 or 7 or 8 or 9	31946
11		5 and 10	1747

Stage 3: Study selection

We screened peer-reviewed articles published in English from January 2009 through February 2019. We set the review time frame to start in 2009, so that it follows the 2008 publication of Goldfield and colleagues' [19] concept of 'potentially preventable readmission,' to which we align our notion of 'unnecessary readmission.' We set the review time frame to end in February 2019, as we initiated our review tasks in March 2019. We included an article if it (i) concerns the adult mental health population, (ii) measures psychiatric readmission rates, (iii) is set in a healthcare context, (iv) is conducted in (and explicitly mentions) the context of some care transition process that is either already being carried out (for non-intervention studies) or is being tested as an intervention (for intervention studies), and (v) specifies at least one readmission time interval used. We excluded editorials and other articles that report on individual viewpoints. For each of the title/abstract and full-text screening phases, the criteria were initially applied to 10% of articles to be screened, where two screeners (CPW and BK) first independently screened, then compared with one another their individual decisions on, whether each

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3 article meets the criteria. For articles for which the individual decisions differed, the screeners held
4 discussions to reach consensus. The resulting shared understanding of the criteria was applied to
5 screening the remaining articles, for which CPW and BK each served as the primary screener for a
6 distinct half of the articles. For articles that the primary screener deemed as needing additional
7 discussion, the non-primary screener among CPW or BK served as the secondary screener, and
8 discussions were held to reach consensus.
9

10 11 **Stage 4: Data extraction**

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13 Data extraction from articles to be included in the scoping review used an Excel [20]-based template.
14 The template was piloted on 10% of articles to be reviewed, where CPW served as the primary data
15 extractor for half of the articles, and BK served as the secondary extractor, reviewing the same articles
16 to verify and augment the extraction. The other half of the articles had BK as the primary data extractor
17 and CPW as the secondary extractor. Articles for which the primary and secondary data extractors did
18 not agree on the extracted content were discussed to reach consensus. The resulting shared
19 understanding of the approach to data extraction was applied to the remaining articles, for which CPW
20 and BK each served as the primary extractor for a distinct half of the articles. For articles that the
21 primary extractor deemed as needing additional discussion, the non-primary extractor among CPW or
22 BK served as the secondary extractor, and discussions were held to reach consensus.
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25 26 **Stage 5: Collating, summarizing, and reporting the results**

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28 Aligning to the specific questions that our scoping review aimed to answer (listed under the Stage 1:
29 Defining the Research Question section), we summarized findings along the dimensions of (i)
30 readmission time interval, (ii) unnecessary readmission definition, and (iii) case-mix adjustment
31 approach used by our reviewed articles. We also assessed the extracted data for any prevalent trends in
32 study characteristics across our reviewed articles, and independently reviewed the data to identify any
33 emergent themes. We used constant comparison combined with consensus-building discussions [21] to
34 finalize notable trends and themes to be reported.
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37 38 **Stage 6: Consultation process and engagement of knowledge users**

39 We closely engaged our multidisciplinary research colleagues and partnered healthcare system
40 representatives for each of Stages 1 through 5 above. These individuals we consulted have clinical and
41 administrative expertise in mental healthcare services, as well as in how the services are structured and
42 integrated to be delivered across different levels of the mental health care system. They included front-
43 line practitioners, leadership of local, regional and national care networks, and health services
44 researchers with expertise in care transitions and admissions data.
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47 48 **Patient and public involvement**

49 Our consultants included patient representatives who helped shape the research team's study steps.
50 These representatives came to be involved with our work through the first author's research centre
51 (Center for Healthcare Organization and Implementation Research (CHOIR), a Department of Veterans
52 Affairs Health Services Research and Development Center of Innovation)'s established Veterans
53 Engagement Research Group (VERG). VERG is a CHOIR-based community that is explicitly chartered to
54 engage veterans and their family members as active partners in research through communication
55 regarding opportunities to be involved, codevelopment of research ideas and collaboration on tasks. The
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3 representatives played a key role in helping us understand the current status of readmissions and
4 formulating the questions that our scoping review focused on answering. They were consulted on
5 developing the criteria for study selection and disseminating our findings to the larger healthcare
6 community beyond the scientific community.
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11 **RESULTS**

12 **Characteristics of reviewed articles**

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16 The database searches identified 3478 unique articles (Figure 1). Through screening the title and
17 abstract for each of these articles, 762 were designated for full-text screening. The full-text screening
18 found 67 articles to include in the review, containing information related to measurement of
19 unnecessary psychiatric readmissions in the context of some inpatient to outpatient care transition
20 process [1,2,6,8,22–84]. Included studies were conducted in 19 different countries – Australia, Brazil,
21 Canada, China, Colombia, Denmark, Finland, France, Germany, Iran, Israel, Italy, Japan, Norway,
22 Singapore, South Africa, Switzerland, the United Kingdom, and the United States. Table 2 lists the
23 characteristics of each included article. Table 3 presents a summary of findings from the included
24 articles. The articles spanned original research to systematic reviews, and methods used included
25 quantitative, qualitative, and mixed-methods approaches. Seventeen of these articles reported on a
26 randomized controlled trial of a care transition intervention.
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30 <Figure 1. Flow chart of the scoping review.>
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Table 2. Characteristics of articles included in the scoping review.

Author(s)	Publication year	Country	Design	Healthcare context and setting	Study/target population	Diagnoses and comorbidities	Care transition process category	Sample size	Control	Voluntariness of re/admissions	Readmission time interval	Criteria for designating a readmission as unnecessary	Criteria for excluding a readmission from being considered unnecessary	Risk adjustments in calculating readmission rates
Baeza, et al. [22]	2018	Brazil	Observational	Hospital(s)	Adults	Mental health disorders	Outpatient follow-up	401	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified
Barekatin, et al. [23]	2014	Iran	Randomized controlled trial	Hospital(s)	Adults	Bipolar I and schizophrenia/schizoaffective disorders	Outpatient follow-up; Patient education	123	Usual care	Unspecified	12 months	Unspecified	Unspecified	Unspecified
Barker, et al. [24]	2011	United Kingdom	Observational	Community setting(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	Unspecified	Historical control(s)	Both involuntary and voluntary	7 days - 12 months	Unspecified	Unspecified	Unspecified
Bastiampillai, et al. [25]	2010	Australia	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up	Unspecified	Historical control(s)	Unspecified	28 days	Unspecified	Unspecified	Unspecified
Bernet [26]	2013	United States	Observational	Healthcare system(s)	Adults (military veterans)	Mental health and substance use disorders	Outpatient follow-up	124	No control	Unspecified	12 months	Unspecified	Unspecified	Sociodemographic variables

1 2 3 4 5 6 7 8 9 10	Bonsack, et al. [27]	2016	Switzerland	Randomized controlled trial	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Care coordination; Community liaison; Discharge planning; Outpatient follow-up; Patient education	102	Usual care	Unspecified	12 months	Unspecified	Unspecified	Clinical and sociodemographic variables
11 12 13 14 15 16 17	Botha, et al. [28]	2018	South Africa	Quasi-experimental	Psychiatric hospital(s)	Adults (male)	Serious mental illnesses	Outpatient follow-up; Patient education	120	Patients who had been discharged on non-recruitment days during the same time- period	Unspecified	90 days	Unspecified	Unspecified	Unspecified
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35	Burns, et al. [29]	2016	United Kingdom	Randomized controlled trial	Community setting(s) and psychiatric hospital(s)	Adults	Psychotic disorders	Outpatient follow-up	333 (Study 1 of 2); 330 (Study 2 of 2)	Patients without community treatment orders	Both involuntary and voluntary	12 months (Study 1 of 2); 36 months (Study 2 of 2)	Unspecified	Recall to hospital of a patient on a community treatment order (CTO), as this is understood as being part of the CTO process rather than an outcome (if a recall ended in the CTO being revoked, then considered a readmission, calculated from the first day of the recall)	Unspecified

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1	Bursac, et al. [30]	2018	United States	Quasi-experimental	Psychiatric prison unit(s)	Adults (male and justice-involved)	Mental health disorders	Care coordination; Community liaison; Discharge planning; Patient education	30	Patients who are frequently rehospitalized and participants themselves pre-intervention	Involuntary	15 days	Unspecified	Unspecified	Unspecified
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7	Callaly, et al. [31]	2010	Australia	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	115	No control	Unspecified	28 days	Unspecified	Unspecified	Unspecified
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12	Chen, et al. [32]	2019	China	Randomized controlled trial	Psychiatric hospital(s)	Adults	Bipolar I disorder	Patient education	140	Usual care	Unspecified	12 months	Unspecified	Unspecified	Service use variables
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18	Clibbens, et al. [33]	2018	Various (predominantly middle- to high-income countries)	Rapid review	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Discharge planning	Various	Various	Unspecified	Various (28, 30 days)	Unspecified	Unspecified	Unspecified
19															
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23	Currie, et al. [34]	2018	Canada	Observational	Community setting(s) and psychiatric hospital(s)	Adults (with experience of homelessness)	Mental health disorders	Outpatient follow-up	497	No control	Unspecified	2, 6, 12 months	Unspecified	Unspecified	Service use and sociodemographic variables
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27															
28															
29	Dixon, et al. [35]	2009	United States	Randomized controlled trial	Healthcare system(s)	Adults (military veterans)	Serious mental illnesses	Community liaison; Discharge planning; Outpatient follow-up; Patient education	135	Usual care	Unspecified	6 months	Unspecified	Unspecified	Health care site variables
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1 2 3 4 5 6 7 8 9 10	Donisi, et al. [36]	2016	Various (Australia, Canada, Colombia, Egypt, Germany, Ireland, Israel, Japan, Malaysia, New Zealand, Saudi Arabia, Taiwan, United Kingdom, United States)	Systematic review	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Various	Various	Various	Both involuntary and voluntary	Various (30 days; 1-12 months; more than 1 year)	Unspecified	Unspecified	Various variables (including clinical, service use, and sociodemographic)
11 12 13 14 15 16 17 18	Faurholt-Jepsen, et al. [37]	2017	Denmark	Randomized controlled trial	Psychiatric hospital(s)	Adults	Unipolar and bipolar disorders	Patient education	To be determined (study not completed at time of publication)	Usual care	Unspecified	3, 6 months	Unspecified	Unspecified	Service use and sociodemographic variables
19 20 21 22 23 24	Fullerton, et al. [38]	2016	United States	Observational	Various	Adults (Medicaid enrollees)	Mental health, substance use, and medical disorders	Outpatient follow-up	32,037	Patients with similar propensity scores who did not receive intermediate services	Unspecified	90 days	Unspecified	Unspecified	Unspecified
25 26 27 28 29	Giacco, et al. [39]	2018	Various (Australia, Japan, Switzerland, United Kingdom)	Systematic review	Psychiatric hospital(s)	Adults	Mental health disorders	Various	Various	Various	Both involuntary and voluntary	Various (12 months; 12, 24 months; unspecified)	Unspecified	Unspecified	Unspecified
30 31 32 33 34 35 36 37	Gouzoulis-Mayfrank, et al. [40]	2015	Germany	Randomized controlled trial	Psychiatric hospital(s)	Adults	Schizophrenia/schizophreniform/schizoaffective and substance use disorders	Outpatient follow-up; Patient education	100	Usual care	Voluntary	3, 6, 12 months	Unspecified	Unspecified	Unspecified

1	Grinshpoon, et al. [41]	2011	Israel	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	908	No control	Unspecified	180 days	Unspecified	Unspecified	Various variables
2															
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6	Habit, et al. [42]	2018	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Information provision	Unspecified	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
7															
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9	Hanrahan, et al. [43]	2014	United States	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and major medical (e.g., diabetes, asthma, cancer) disorders	Outpatient follow-up; Patient education	40	Usual care	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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11															
12															
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14															
15	Hegedüs, et al. [44]	2018	Switzerland	Pilot/Exploratory	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Patient education	29	Usual care	Unspecified	7 days	Unspecified	Unspecified	Unspecified
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21	Hengartner, et al. [45]	2017	Switzerland	Secondary analysis following a randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Community liaison; Discharge planning; Outpatient follow-up	151	Usual care	Both involuntary and voluntary	12 months	Unspecified	Unspecified	Unspecified
22															
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25															
26	Hengartner, et al. [46]	2016	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Community liaison	151	Usual care	Unspecified	3, 12 months	Unspecified	Unspecified	Unspecified
27															
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32	Hennemann, et al. [47]	2018	Various (Finland, Germany, Hungary, Netherlands, Sweden)	Systematic review	Various	Adults	Mental health disorders	Patient education	Various	Various	Unspecified	Various (4, 9, 12, 18, 24 months)	Unspecified	Unspecified	Unspecified
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1 2 3 4 5 6 7	Hutchison, et al. [8]	2019	United States	Observational	Psychiatric hospital(s)	Adults (Medicaid enrollees)	Mental health and substance use disorders	Community liaison; Outpatient follow-up	1,724	Usual care	Unspecified	30 days	Unspecified	Unspecified	Diagnosis, geographic area, service use, and sociodemographic variables
8 9 10 11 12 13 14 15 16 17 18 19	Kidd, et al. [48]	2016	Canada	Quasi-experimental	Psychiatric hospital(s)	Adults	Serious mental illnesses	Community liaison; Outpatient follow-up	23	No control	Unspecified	1, 6 months	Unspecified	Unspecified	Unspecified
20 21 22 23 24 25 26 27	Kim, et al. [49]	2011	United States	Observational	Hospital(s)	Adults (military veterans)	Mental health and substance use disorders	Outpatient follow-up	53,363	No control	Unspecified	84 days (other than study period)	Unspecified	Unspecified	Diagnosis, insurance type, service use, and sociodemographic variables
28 29 30 31	Kisely, et al. [50]	2014	Various (United Kingdom, United States)	Systematic review	Community setting(s)	Adults	Serious mental illnesses	Outpatient follow-up	Various	Usual care	Unspecified	Various (11-12, 12 months)	Unspecified	Unspecified	Unspecified
32 33 34 35 36 37	Kolbasovsky [51]	2009	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up; Patient education	652	Historical control(s)	Unspecified	30 days	Unspecified	Unspecified	Diagnosis, insurance type, service use, and sociodemographic variables

1	Kurdyak, et al. [1]	2018	Canada	Observational	Psychiatric hospital(s)	Adults	Schizophrenia	Outpatient follow-up	19,132	No physician follow-up	Unspecified	210 days	Unspecified	Unspecified	Clinical, geographic area, service use, and sociodemographic variables
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9	Lay, et al. [52]	2015	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Patient education; Outpatient follow-up	238	Usual care	Involuntary	12 months	Unspecified	Unspecified	Unspecified
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15	Lay, et al. [53]	2012	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education; Outpatient follow-up	To be determined (study not completed at time of publication)	Usual care	Both involuntary and voluntary	12, 24 months	Unspecified	Unspecified	Unspecified
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22	Lee, et al. [54]	2015	China	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	210	Usual care	Unspecified	6, 12, 18 months	Unspecified	Unspecified	Unspecified
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32	Liem, et al. [55]	2013	China	Systematic review	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	140	Usual care	Unspecified	12, 24 months	Unspecified	Unspecified	Unspecified
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1 2 3 4 5 6 7 8	Mattei, et al. [56]	2017	Italy	Observational	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Patient education	52	Not taking part in any psychoeducational groups / rehabilitation activities	Both involuntary and voluntary	6 months	Unspecified	Unspecified	Unspecified
9 10 11 12 13 14 15 16 17 18 19	McDonagh, et al. [57]	2018	United States	Quasi-experimental	Hospital(s)	Adults (military veterans)	Mental health disorders	Care coordination; Patient education	Unspecified	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
20 21 22 23 24 25 26	Nubukpo, et al. [58]	2016	France	Observational	Psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	330	No control	Unspecified	24 months	Unspecified	Unspecified	Unspecified
27 28 29	Ortiz [59]	2018	United States	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Care coordination; Outpatient follow-up	60,254	No control	Both involuntary and voluntary	30 days	Unspecified	Unspecified	Diagnosis and service use variables
30 31 32	Passley-Clarke [60]	2018	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education	216 patients, 2 staff	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
33 34 35 36 37	Perez, et al. [61]	2017	Colombia	Observational	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	224	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified

1	Prochaska, et al. [62]	2014	United States	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education	224	Usual care	Both involuntary and voluntary	3, 6, 12, 18 months	Unspecified	Unspecified	Clinical variables
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5	Rabovsky, et al. [63]	2012	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Patient education	87	Open social activity group	Unspecified	12 months	Unspecified	Unspecified	Unspecified
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8	Roos, et al. [64]	2018	Norway	Randomized controlled trial	Community setting(s) and psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up	41	Usual care	Voluntary	12 months	Unspecified	Unspecified	Unspecified
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12	Rothbard, et al. [65]	2012	United States	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	176	Usual care	Involuntary	12 months	Unspecified	Unspecified	Clinical, diagnosis, insurance type, service use, and sociodemographic variables
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18	Rowley, et al. [66]	2014	United Kingdom	Pilot/Exploratory	Psychiatric hospital(s)	Adults (male)	Mental health, substance use, and medical disorders	Care coordination; Discharge planning	50 staff	No control	Unspecified	1 month	Unspecified	Unspecified	Unspecified
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22	Shaffer, et al. [2]	2015	United States	Quasi-experimental	Community setting(s)	Adults	Mental health disorders	Community liaison; Outpatient follow-up	149	Historical control(s)	Unspecified	30, 31-180 days	Unspecified	Unspecified	Diagnosis, service use, and sociodemographic variables
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31	Shimada, et al. [67]	2016	Japan	Non-controlled intervention	Psychiatric hospital(s)	Adults	Schizophrenia	Outpatient follow-up	44	Group occupational therapy only	Unspecified	12 months	Unspecified	Unspecified	Unspecified
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1 2 3 4 5 6 7	Simpson, et al. [68]	2014	United Kingdom	Pilot/Exploratory	Psychiatric hospital(s)	Adults	Mental health disorders	Outpatient follow-up	46	Usual care	Unspecified	1, 3 months	Unspecified	Unspecified	Unspecified
8 9 10 11 12 13 14 15 16 17 18 19 20	Sledge, et al. [69]	2011	United States	Randomized controlled trial	Psychiatric hospital(s)	Adults	Serious mental illnesses	Outpatient follow-up	74	Usual care	Unspecified	9 months	Unspecified	Unspecified	Unspecified
21 22 23 24	Sloan, et al. [70]	2010	United States	Quasi-experimental	Hospital(s)	Adults (military veterans)	Mental health and substance use disorders	Outpatient follow-up	1,409	Patients discharged while in the continuity of care model	Unspecified	30 days	Unspecified	Unspecified	Unspecified
25 26 27 28 29 30 31 32 33 34 35 36	Taylor, et al. [71]	2016	United States	Observational	Psychiatric hospital(s)	Adults (Medicaid enrollees)	Mental health disorders	Patient education	195	Usual care	Both involuntary and voluntary	30 days	Unspecified	Unspecified	Homelessness, service use, and sociodemographic variables
37 38 39 40	Thambyrajah, et al. [72]	2014	Singapore	Observational	Various	Adults	Mental health disorders	Community liaison	88	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified

1	Thomas, et al. [73]	2013	Various (United Kingdom, United States)	Systematic review	Various	Adults	Mental health disorders	Outpatient follow-up	Various	Various	Voluntary	Various (12, 37-42 months)	Unspecified	Unspecified	Unspecified
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5	Tomita, et al. [74]	2014	United States	Secondary analysis following a randomized controlled trial	Residential program(s)	Adults (with experience of homelessness)	Serious mental illnesses	Community liaison	150	Usual care	Unspecified	13.5-18 months	Unspecified	Unspecified	Unspecified
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12	Tomko, et al. [75]	2013	United States	Observational	Hospital(s)	Adults	Mental health and substance use disorders	Patient education; Outpatient follow-up	504	Patients excluded from the discharge medication service (e.g., due to being a part of other treatment teams)	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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22	Valimaki, et al. [76]	2017	Finland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Psychotic disorders	Information provision; Patient education	1,139	Usual care	Both involuntary and voluntary	12 months	Unspecified	Unspecified	Unspecified
23															
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26	Videbech [77]	2016	Denmark	Research database construction	Community setting(s) and psychiatric hospital(s)	Adults	Depressive disorders	Outpatient follow-up	54,001	Not applicable (study is on constructing a research database)	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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31	Vigod, et al. [78]	2013	Various (United States, other high-income countries)	Systematic review	Various	Adults	Mental health disorders	Various	Various	Various	Voluntary	Various (3, 6-24 months)	Unspecified	Unspecified	Unspecified
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Vijayaraghavan, et al. [79]	2015	United States	Observational	Community setting(s) and psychiatric hospital(s)	Adults	Mental health and substance use disorders	Outpatient follow-up	4,663	No control	Unspecified	30 days	Unspecified	Unspecified	Diagnosis, service use, and sociodemographic variables
Von Wyl, et al. [6]	2013	Switzerland	Randomized controlled trial	Psychiatric hospital(s)	Adults	Mental health disorders	Community liaison; Discharge planning; Outpatient follow-up; Patient education	160	Usual care	Unspecified	3, 12 months	Unspecified	Unspecified	Unspecified
Wong [80]	2015	China	Observational	Hospital(s)	Adults (aged 65 and over)	Mental health disorders	Outpatient follow-up	368	No control	Unspecified	1, 3, 6, 12, 18, 24 months	Unspecified	Unspecified	Sociodemographic variables
Xiao, et al. [81]	2015	China	Observational	Psychiatric hospital(s)	Adults	Schizophrenia	Outpatient follow-up	876	No control	Unspecified	12 months	Unspecified	Unspecified	Unspecified
Yates, et al. [82]	2010	United States	Non-controlled intervention	Psychiatric hospital(s)	Adults (justice-involved)	Mental health and substance use disorders	Patient education	145	No control	Unspecified	6-60 months	Unspecified	Unspecified	Unspecified
Zisman-Ilani, et al. [83]	2018	Israel	Quasi-experimental	Psychiatric hospital(s)	Adults	Mental health disorders	Discharge planning	101	Usual care	Unspecified	6-12 months	Unspecified	Unspecified	Unspecified

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Zuehlke, et al. [84]	2016	United States	Quality improvement	Hospital(s)	Adults (military veterans)	Mental health disorders	Care coordination; Discharge planning	352 patients, 27 staff	No control	Unspecified	30 days	Unspecified	Unspecified	Unspecified
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For peer review only

Table 3. Summary of findings from the 67 articles included in the scoping review.

Domain	Summary of findings
Readmission time interval	<ul style="list-style-type: none"> • Wide variation from seven days to 60 months • Most prevalent were one and 12 months, reported by 32.8% and 43.3% of the included articles, respectively
Unnecessary readmission definition	<ul style="list-style-type: none"> • Only one article made explicit the criteria that was applied to designating a readmission as unnecessary (i.e., preventable/avoidable)
Case-mix adjustment approach	<ul style="list-style-type: none"> • 73.1% of the articles did not specify risk adjustments that were made • Most prevalently adjusted variables were clinical (including diagnosis; 17.9%), service use (19.4%), and sociodemographic (20.9%)
Study setting	<ul style="list-style-type: none"> • 71.6% of the articles reported on studies conducted in the setting of one or more psychiatric hospitals • 14.9% reported on studies conducted at general hospitals/systems
Target population	<ul style="list-style-type: none"> • 25.4% of the articles reported on studies considering their population's substance use diagnoses • 9.0% reported on studies of military veterans
Sample size and comparisons conducted	<ul style="list-style-type: none"> • Wide variation among studies reporting (23 to 60,254 participants) • 40.3% and 29.9% of the articles reported on studies examining comparisons to usual care and having no comparisons, respectively
Voluntariness of readmissions	<ul style="list-style-type: none"> • 73.1% of the articles did not state whether they were differentiating between voluntary and involuntary readmissions • 17.9% stated including both voluntary and involuntary readmissions
Care transition processes	<ul style="list-style-type: none"> • 65.7% and 35.8% of the articles were on care transition processes involving outpatient follow-up and patient education, respectively (these and other process categories are defined in the main text)

Findings regarding the three research questions

Readmission time interval. We found wide variation in the readmission time intervals used by included studies, ranging from seven days to 60 months. The most prevalent intervals were one month (including intervals specified as 28 or 30 days) and 12 months, used by 22 and 29 included studies (32.8% and 43.3%), respectively. Twenty studies (29.9%) used more than one readmission time interval (e.g., 12 and 24 months), and eight studies (11.9%) used a unique interval that was not used by other included studies (e.g., 210 days). Studies using the unit of “month” for the readmission time interval did not address the variability of the number of days included in a month depending on the time of the calendar year.

Unnecessary readmission definition. Each of our included studies, per our inclusion criteria mentioned above, was a study conducted in the context of some care transition process that the study examined for potential association with unnecessary psychiatric readmissions (i.e., readmissions that should be minimized). Only two included studies, however, reported within a single article [29], specified a criterion by which they excluded a readmission from being considered unnecessary – namely, when the

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3 readmission was deemed a component of their planned care transition process. Otherwise, included
4 studies did not make explicit the criteria that they applied to designating a readmission as unnecessary.
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6 *Case-mix adjustment approach.* Forty-nine of the included studies (73.1%) did not specify risk
7 adjustments that they made in calculating readmission rates. The most prevalent variables for which
8 adjustments were specified were clinical (including diagnosis), service use, and sociodemographic,
9 specified by 12, 13, and 14 included studies (17.9%, 19.4%, and 20.9%), respectively. Thirteen studies
10 (19.4%) specified adjustments for more than one type of variable (e.g., service use and
11 sociodemographic). Adjustments for geographic area and insurance type variables were specified by two
12 and three included studies (3.0% and 4.5%), respectively, and health care site variables and
13 homelessness variables were specified as having been adjusted for by one included study (1.5%) each.
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16 **Additional findings from the review**

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18 *Study setting.* Forty-eight of the included studies (71.6%) were conducted in the setting of one or more
19 freestanding psychiatric hospitals (nine of which also involved community settings), while 10 (14.9%)
20 were conducted at general hospitals or health care systems offering inpatient psychiatric services. Three
21 studies (4.5%) were conducted in community settings only (e.g., not specific to or managed by one or
22 more hospitals or health care systems), and psychiatric prison units and residential programs were the
23 focus of one included study (1.5%) each.
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26 *Target population.* Each of our included studies, per our inclusion criteria, concerned the adult mental
27 health population. Seventeen studies (25.4%) specified taking into consideration their population's
28 substance use diagnoses, while one and two studies (1.5% and 3.0%) specified considering their
29 population's medical diagnoses and both substance use and medical diagnoses, respectively. Seventeen
30 studies (25.4%) focused specifically on one or more mental health disorder type (e.g., depressive
31 disorders, psychotic disorders). Six, three, and three studies (9.0%, 4.5%, and 4.5%) were on military
32 veterans, Medicaid enrollees, and male individuals, respectively. Individuals with experience of
33 homelessness and justice-involved individuals were the focus of two studies (3.0%) each, and one study
34 (1.5%) focused on individuals aged 65 and over.
35
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37 *Sample size and comparisons conducted.* Sample size among the included studies varied widely, ranging
38 from 23 to 60,254 participants among the studies that specified a sample size. Of the thirteen studies
39 (19.4%) that did not specify sample sizes, seven were literature reviews and two were study protocols.
40 Twenty-seven studies (40.3%) examined comparisons to usual care, while twenty studies (29.9%) did not
41 have comparison groups.
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44 *Voluntariness of readmissions.* Forty-eight studies (71.6%) did not specify whether they were
45 differentiating between voluntary and involuntary readmissions. Of the remaining 19 studies (28.4%), 12
46 studies specified considering both voluntary and involuntary readmissions, while four and three studies
47 considered only voluntary and involuntary readmissions, respectively.
48
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50 *Care transition processes.* Guided by Burke and colleagues' Ideal Transition in Care (ITC) framework [85],
51 we assigned our included studies' associated care transition processes to six categories:

- 52 • *Care coordination* [e.g., among different provider disciplines, interprofessional treatment

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3 teams, and/or clinics], aligned to ITC's "coordinating care among team members" component
- 4 • *Community liaison* [e.g., arranging for community-based case management services and/or
 - 5 enlisting help of social/community/informal supports], aligned to ITC's "enlisting help of social
 - 6 and community supports" component
 - 7
 - 8 • *Discharge planning* [e.g., collaborative preparation with the patient and their family], aligned to
 - 9 ITC's "discharge planning" component
 - 10
 - 11 • *Information provision* [e.g., reminders (e.g. via telephone and/or postcards) to attend
 - 12 upcoming appointments], aligned to ITC's "complete communication of information" and
 - 13 "availability, timeliness, clarity, and organization of information" components
 - 14
 - 15 • *Outpatient follow-up* [e.g., including telephone check-ins, home-visits, peer support, and crisis
 - 16 teams, handled primarily by the hospital or health care system rather than by community
 - 17 programs (in order to differentiate from care transition processes that are categorized as
 - 18 community liaison)], aligned to ITC's "outpatient follow-up" component
 - 19
 - 20 • *Patient education* [e.g., for self-management via individual/family/group psychoeducation,
 - 21 regarding disorder-specific therapy, and/or use of crisis cards], aligned to ITC's "educating
 - 22 patients to promote self-management" component

(Note: Care transition processes exhibiting ITC's "medication safety" and "monitoring and managing symptoms" components were categorized as either *outpatient follow-up* or *patient education*, depending on whether the safety and management component of the process was conducted during outpatient follow-up or for patient education, respectively. ITC's "advance care planning" component was not exhibited by our included studies' care transition processes.)

Forty-four studies (65.7%)' care transition processes exhibited *outpatient follow-up*, 24 (35.8%) exhibited *patient education*, and 11 (16.4%) exhibited both *outpatient follow-up* and *patient education*. The category of *information provision* was least prevalent and exhibited by care transition processes of two included studies (3.0%). Twenty-six studies (38.8%)' care transition processes exhibited more than one of the six categories.

Notably, there were no perceptible trends or emergent themes in associations between the findings regarding the three research questions (i.e., readmission time interval, unnecessary readmission definition, and case-mix adjustment approach) and the included studies' setting, target population, sample size, comparisons conducted, voluntariness of readmissions, or categories of care transition processes.

DISCUSSION

As health care systems increasingly focus on enhancing inpatient to outpatient mental health care transitions, care transition interventions in support of this effort are being actively observed, devised, and tested. Unnecessary psychiatric readmissions is a commonly measured outcome for these investigations. However, conducting valid comparisons across different investigations is only possible if either (i) the measurement is approached in a standardized way or (ii) deviations in approaches are made explicit. Our scoping review thus focused on examining how peer-reviewed published studies on care transition interventions have approached measuring unnecessary psychiatric readmissions.

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4 The 67 articles included in our review varied widely in their reported readmission time intervals used.
5 Only one article reported a criterion for not considering a readmission as unnecessary, and a majority of
6 the articles did not specify risks that they adjusted for in calculating unnecessary psychiatric readmission
7 rates. Each of (i) the time interval used, (ii) readmissions that are considered unnecessary (i.e.,
8 preventable) versus necessary (i.e., not an indication of improvable care quality), and (iii) risks that are
9 accounted for are key specifications for calculating the readmission rate as an outcome. Hence, the
10 limited details with which these specifications are reported is a noteworthy gap identified by this
11 scoping review, and one that can hinder both the replicability of conducted studies and adaptations of
12 study methods by future investigations.
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16 Variation in definitions used, or even variation in the level of measurement details reported, would be
17 less of a concern if there were patterns to the variation that indicate different specifications' prevalence
18 among subgroups of investigations (e.g., for different diagnoses, for different study settings, for
19 different types of care transition interventions, for different lengths of inpatient stay). For instance, if
20 these patterns were present, there may be clinically appropriate reasons (even if not reported in detail)
21 to guide future investigations' decisions for which specifications of time interval, unnecessary
22 criteria, and risk adjustments to use when measuring unnecessary psychiatric readmissions. However, as
23 noted above, this scoping review identified no perceptible trends in associations between the
24 specifications and study characteristics. This gap in knowledge makes it difficult for future studies of
25 care transition interventions to make informed decisions about how to measure unnecessary psychiatric
26 readmissions in light of their specific study's characteristics.
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29 These findings point to several directions in which future research can proceed to address the identified
30 gaps. One direction is to establish a framework that studies can standardly use to specify and report
31 their approaches to measuring unnecessary psychiatric readmissions. Such a framework is imperative
32 for subsequent development of a precise and shared taxonomy, which studies can use to describe their
33 approaches so that their similarities and differences can be clearly understood. A second direction is to
34 devise enhanced guidelines regarding readmission intervals, definitions of unnecessary, and risk
35 adjustments that are especially relevant for specific study contexts (e.g., particular target populations,
36 types of intervention, and/or lengths of inpatient stay). Both clinical and measurement expertise ought
37 to be reflected in the development of such guidelines. Especially when applied to studying the impact of
38 an intervention on readmissions, the guidelines can be extended to encompass important additional
39 requirements regarding the intervention process, such as including intervention fidelity and the handling
40 of the timing of implementing key intervention components (e.g., time interval measurement should be
41 appropriately adjusted in cases for which readmission is part of the intervention design). A third
42 direction is to conduct empirical data-based investigations into how sensitive research findings are to
43 specific choices of intervals, definitions, and adjustments that are used for readmissions measurement.
44 For example, if conclusions of studies using the measure are altered when using one definition of
45 unnecessary versus another, the aforementioned framework and guidelines should focus on
46 requiring studies to justify their choice of definition.
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50 Four limitations must be noted regarding this scoping review. First, the review does not assess the
51 appropriateness of the unnecessary psychiatric readmissions measurement approaches used by the
52 included studies (e.g., whether a study's measurement approach was adequate in light of the study's
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3 research objectives). However, this closely aligns to the purpose of scoping reviews to (i) identify a
4 current state of knowledge in the literature, (ii) elucidate any gaps, and (iii) establish a new research
5 agenda. Thus, the purpose of our scoping review was not to collate empirical evidence regarding which
6 measurement approaches are appropriate for which types of studies concerned with care transition
7 interventions. The main motivation for conducting this review is rather to make explicit the work that is
8 still needed to establish clearly defined and comparable measurement approaches, so that studies of
9 care transition interventions that report unnecessary psychiatric readmissions as an outcome can be
10 appropriately compared alongside one another.
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13 Second, there are alternative categorizations possible for data of each of our extracted domains (e.g.,
14 “serious mental illnesses” can be further specified into individual diagnoses), which can impact how our
15 review’s findings are interpreted. We decided on the categorizations that we used by balancing two
16 considerations: (i) Where possible, we adhered closely to the terminologies used by the included studies
17 themselves in referring to the categories for which we were extracting data. (ii) We sought close
18 feedback through our consultation process on the broadness versus specificity of our categorizations in
19 order to allow the audience to comprehend our findings at a high level and also seek desired additional
20 information by accessing our cited included studies.
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23 Third, limiting the included studies to those concerning care transition interventions (as recommended
24 by peer reviewers of our protocol to ensure feasibility of our review, given the widespread use of
25 readmissions as a measure) could have led to findings that are less widely applicable to studies that
26 measure unnecessary psychiatric readmissions but are not conducted in the context of care transition
27 interventions. Additional reviews of such studies can be expected to identify, to varying extents, similar
28 issues of studies using different definitions of unnecessary psychiatric readmissions and reporting
29 limited details surrounding their choice of definition. Our recommendations above for future work
30 (establishing a reporting framework, devising guidelines for measuring unnecessary readmissions, and
31 investigating the sensitivity of research findings to varied specifications of the readmissions measure)
32 can in turn be applicable to psychiatric readmissions beyond those that are considered in the context of
33 care transition interventions. Further, understanding how those other studies trend in their approaches
34 to measuring unnecessary psychiatric readmissions, similarly to or differently from our included studies,
35 will be important for establishing widely usable, accepted, and comparable approaches to this
36 measurement. It will be important for us and others to be mindful of the care transition focus of our
37 search when building on this review in future research.
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41 Fourth, there may exist unnecessary psychiatric readmissions measurement approaches that individual
42 health care organizations use to assess their care transition interventions, which have not been publicly
43 shared through the mechanism of peer-reviewed journal articles that are indexed by the databases
44 included in our review. Other grey literature and non-English articles may also describe approaches that
45 we did not include. As our research moves forward from this review to examine the evidence for
46 appropriate measurement approaches, we will specifically plan for soliciting expert knowledge (as we
47 have done through this scoping review’s consultation process) from a wide range of health care
48 researchers, practitioners, industry leaders, and certainly individuals experiencing psychiatric
49 readmissions to maximize our opportunity to learn of additional potential measurement approaches
50 existent in the field.
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CONCLUSIONS

Findings from this scoping review enable an increased understanding of how peer-reviewed published studies on care transition interventions have approached measuring unnecessary psychiatric readmissions. The articles included in our review varied widely in their reported readmission time intervals used, and they provided limited details regarding which readmissions they considered unnecessary and which risks they accounted for in their measurement. For studies of care transition interventions that report unnecessary psychiatric readmissions as an outcome to be replicable, adaptable, and appropriately comparable alongside one another, recommended steps for the field include (i) establishing a framework that studies can standardly use to specify and report their approaches to measuring unnecessary psychiatric readmissions, (ii) devising enhanced guidelines regarding readmission intervals, definitions of unnecessariness, and risk adjustments that are especially relevant for specific study contexts (e.g., particular target populations and/or types of intervention), and (iii) conducting empirical data-based investigations into how sensitive research findings are to specific choices of intervals, definitions, and adjustments that are used for measurement.

Acknowledgements: We would like to thank Michelle Doering, MLIS, Bernard Becker Medical Library, Washington University School of Medicine, for creating systematic search strategies. We would also like to thank A. Rani Elwy, PhD, at the Alpert Medical School of Brown University and the Edith Nourse Rogers Memorial Veterans Hospital, for connecting our team to health services researchers with expertise in readmissions measurement.

Author contributions: BK and CPW developed the scoping review protocol, with close guidance from EKP on the review's conceptualization. CPW led the development of the search strategy and refined the data extraction domains together with BK and CBW. BK and CPW conducted the study selection through results collation steps. BK led the preparation of the manuscript draft, and CPW, CBW, and EKP provided critical revisions to the manuscript's intellectual content. All authors read and approved the final manuscript.

Funding: This work was supported by National Institute of Mental Health, National Institute on Drug Abuse, and VA HSR&D QUERI (grant number 5R25MH08091607).

Competing interests: The authors declare that they have no competing interests.

Data availability statement: The presented research is a literature review of published data; there are no additional unpublished data.

REFERENCES

- 1 Kurdyak P, Vigod SN, Newman A, et al. Impact of physician follow-up care on psychiatric readmission rates in a population-based sample of patients with schizophrenia. *Psychiatr Serv* 2018;69. doi:10.1176/appi.ps.201600507
- 2 Shaffer SL, Hutchison SL, Ayers AM, et al. Brief critical time intervention to reduce psychiatric rehospitalization. *Psychiatr Serv* 2015;66. doi:10.1176/appi.ps.201400362
- 3 Driessen M, Schulz P, Jander S, et al. Effectiveness of inpatient versus outpatient complex treatment programs in depressive disorders: A quasi-experimental study under naturalistic conditions. *BMC Psychiatry* 2019;19. doi:10.1186/s12888-019-2371-5
- 4 First Step Behavioral Health. Inpatient vs Outpatient Treatment. 1st Step Behav. Heal. 2020. <https://firststepbh.com/blog/inpatient-vs-outpatient/> (accessed 5 Jul 2020).
- 5 Guzman-Parra J, Moreno-Küstner B, Rivas F, et al. Needs, Perceived Support, and Hospital Readmissions in Patients with Severe Mental Illness. *Community Ment Health J* 2018;54. doi:10.1007/s10597-017-0095-x
- 6 Von Wyl A, Heim G, Rüschi N, et al. Network coordination following discharge from psychiatric inpatient treatment: A study protocol. *BMC Psychiatry* 2013;13. doi:10.1186/1471-244X-13-220
- 7 Rosen CS, Tiet QQ, Harris AHS, et al. Telephone monitoring and support after discharge from residential PTSD treatment: A randomized controlled trial. *Psychiatr Serv* 2013;64. doi:10.1176/appi.ps.201200142
- 8 Hutchison SL, Flanagan J V., Karpov I, et al. Care Management Intervention to Decrease Psychiatric and Substance Use Disorder Readmissions in Medicaid-Enrolled Adults. *J Behav Heal Serv Res* 2019;46. doi:10.1007/s11414-018-9614-y
- 9 American Hospital Association. Examining the Drivers of Readmissions and Reducing Unnecessary Readmissions for Better Patient Care. 2011. <https://www.aha.org/guidesreports/2018-02-09-examining-drivers-readmissions-and-reducing-unnecessary-readmissions> (accessed 25 Sep 2020).
- 10 Upadhyay S, Stephenson AL, Smith DG. Readmission Rates and Their Impact on Hospital Financial Performance: A Study of Washington Hospitals. *Inq (United States)* 2019;56. doi:10.1177/0046958019860386
- 11 Agency for Healthcare Research and Quality. Hospital Readmissions. <https://www.ahrq.gov/topics/hospital-readmissions.html> (accessed 25 Sep 2020).
- 12 Bailey MK, Weiss AJ, Barrett ML, et al. Characteristics of 30-Day All-Cause Hospital Readmissions, 2010–2016: Statistical Brief #248. 2006.

- 1
2
3
4 13 Klein S. In Focus: Preventing Unnecessary Hospital Readmissions.
5 [https://www.commonwealthfund.org/publications/newsletter-article/focus-preventing-unnecessary-](https://www.commonwealthfund.org/publications/newsletter-article/focus-preventing-unnecessary-hospital-readmissions)
6 [hospital-readmissions](https://www.commonwealthfund.org/publications/newsletter-article/focus-preventing-unnecessary-hospital-readmissions) (accessed 25 Sep 2020).
7
- 8
9 14 3M Health Information Systems. Potentially Preventable Readmissions Classification System:
10 Methodology Overview. 2012. [https://multimedia.3m.com/mws/media/10426100/resources-and-](https://multimedia.3m.com/mws/media/10426100/resources-and-references-his-2015.pdf)
11 [references-his-2015.pdf](https://multimedia.3m.com/mws/media/10426100/resources-and-references-his-2015.pdf)
12
- 13 15 Levac D, Colquhoun H, O'Brien KK. Scoping studies: Advancing the methodology. *Implement Sci*
14 Published Online First: 2010. doi:10.1186/1748-5908-5-69
15
- 16 16 Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. *Int J Soc Res Methodol*
17 *Theory Pract* Published Online First: 2005. doi:10.1080/1364557032000119616
18
- 19 17 Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and
20 explanation. *Ann. Intern. Med.* 2018. doi:10.7326/M18-0850
21
22
- 23 18 Kim B, Weatherly C, Wolk CB, et al. Measurement of unnecessary psychiatric readmissions: a scoping
24 review protocol. *BMJ Open* 2019;9. doi:10.1136/bmjopen-2019-030696
25
- 26 19 Goldfield NI, McCullough EC, Hughes JS, et al. Identifying potentially preventable readmissions.
27 *Health Care Financ Rev* 2008;30.
28
- 29 20 Microsoft Excel. 2020. <https://products.office.com/en-us/excel> (accessed 16 Aug 2020).
30
31
- 32 21 Gavrillets S, Auerbach J, Van Vugt M. Convergence to consensus in heterogeneous groups and the
33 emergence of informal leadership. *Sci Rep* 2016;6. doi:10.1038/srep29704
34
- 35 22 Baeza FLC, da Rocha NS, Fleck MP de A. Readmission in psychiatry inpatients within a year of
36 discharge: The role of symptoms at discharge and post-discharge care in a Brazilian sample. *Gen Hosp*
37 *Psychiatry* 2018;51. doi:10.1016/j.genhosppsy.2017.11.008
38
39
- 40 23 Barekattain M, Maracy MR, Rajabi F, et al. Aftercare services for patients with severe mental disorder:
41 A randomized controlled trial. *J Res Med Sci* 2014;19.
42
- 43 24 Barker V, Taylor M, Kader I, et al. Impact of crisis resolution and home treatment services on user
44 experience and admission to psychiatric hospital. *Psychiatrist* 2011;35. doi:10.1192/pb.bp.110.031344
45
46
- 47 25 Bastiampillai TJ, Bidargaddi NP, Dhillon RS, et al. Implications of bed reduction in an acute psychiatric
48 service. *Med J Aust* 2010;193. doi:10.5694/j.1326-5377.2010.tb03963.x
49
- 50 26 Bernet AC. Predictors of psychiatric readmission among veterans at high risk of suicide: The impact of
51 post-discharge aftercare. *Arch. Psychiatr. Nurs.* 2013;27. doi:10.1016/j.apnu.2013.07.001
52
53
54
55
56
57
58
59
60

- 1
2
3 27 Bonsack C, Golay P, Manetti SG, et al. Linking primary and secondary care after psychiatric
4 hospitalization: Comparison between transitional case management setting and routine care for
5 common mental disorders. *Front Psychiatry* 2016;7. doi:10.3389/fpsy.2016.00096
6
7
8 28 Botha UA, Coetzee M, Koen L, et al. An Attempt to Stem the Tide: Exploring the Effect of a 90-Day
9 Transitional Care Intervention on Readmissions to an Acute Male Psychiatric Unit in South Africa. *Arch*
10 *Psychiatr Nurs* 2018;32. doi:10.1016/j.apnu.2017.12.002
11
12 29 Burns T, Rugkåsa J, Yeeles K, et al. Coercion in mental health: a trial of the effectiveness of
13 community treatment orders and an investigation of informal coercion in community mental health
14 care. *Program Grants Appl Res* 2016;4. doi:10.3310/pgfar04210
15
16 30 Bursac R, Raffa L, Solimo A, et al. Boundary-Spanning Care: Reducing Psychiatric Rehospitalization
17 and Self-Injury in a Jail Population. *J Correct Heal Care* 2018;24. doi:10.1177/1078345818792055
18
19 31 Callaly T, Hyland M, Trauer T, et al. Readmission to an acute psychiatric unit within 28 days of
20 discharge: Identifying those at risk. *Aust Heal Rev* 2010;34. doi:10.1071/AH08721
21
22 32 Chen R, Zhu X, Capitão LP, et al. Psychoeducation for psychiatric inpatients following remission of a
23 manic episode in bipolar I disorder: A randomized controlled trial. *Bipolar Disord* 2019;21.
24 doi:10.1111/bdi.12642
25
26 33 Clibbens N, Harrop D, Blackett S. Early discharge in acute mental health: A rapid literature review. *Int.*
27 *J. Ment. Health Nurs.* 2018;27. doi:10.1111/inm.12515
28
29 34 Currie LB, Patterson ML, Moniruzzaman A, et al. Continuity of Care among People Experiencing
30 Homelessness and Mental Illness: Does Community Follow-up Reduce Rehospitalization? *Health Serv*
31 *Res* 2018;53. doi:10.1111/1475-6773.12992
32
33 35 Dixon L, Goldberg R, Iannone V, et al. Use of a critical time intervention to promote continuity of care
34 after psychiatric inpatient hospitalization. *Psychiatr Serv* 2009;60. doi:10.1176/ps.2009.60.4.451
35
36 36 Donisi V, Tedeschi F, Wahlbeck K, et al. Pre-discharge factors predicting readmissions of psychiatric
37 patients: A systematic review of the literature. *BMC Psychiatry* 2016;16. doi:10.1186/s12888-016-1114-0
38
39 37 Faurholt-Jepsen M, Frost M, Martiny K, et al. Reducing the rate and duration of Re- ADMISsions
40 among patients with unipolar disorder and bipolar disorder using smartphone-based monitoring and
41 treatment - the RADMIS trials: Study protocol for two randomized controlled trials. *Trials* 2017;18.
42 doi:10.1186/s13063-017-2015-3
43
44 38 Fullerton CA, Lin H, O'Brien PL, et al. Intermediate services after behavioral health hospitalization:
45 Effect on rehospitalization and emergency department visits. *Psychiatr Serv* 2016;67.
46 doi:10.1176/appi.ps.201500267
47
48 39 Giacco D, Conneely M, Masoud T, et al. Interventions for involuntary psychiatric inpatients: A
49
50
51
52
53
54

1
2
3 systematic review. *Eur. Psychiatry*. 2018;54. doi:10.1016/j.eurpsy.2018.07.005
4

5 40 Gouzoulis-Mayfrank E, König S, Koebke S, et al. Trans-Sector Integrated Treatment in Psychosis and
6 Addiction. *Dtsch Aerzteblatt Online* Published Online First: 2015. doi:10.3238/arztebl.2015.0683
7

8 41 Grinshpoon A, Lerner Y, Hornik-Lurie T, et al. Post-discharge contact with mental health clinics and
9 psychiatric readmission: A 6-month follow-up study. *Isr J Psychiatry Relat Sci* 2011;48.
10

11 42 Habit NF, Johnson E, Edlund BJ. Appointment reminders to decrease 30-day readmission rates to
12 inpatient psychiatric hospitals. *Prof Case Manag* 2018;23. doi:10.1097/NCM.000000000000248
13

14 43 Hanrahan NP, Solomon P, Hurford MO. A Pilot Randomized Control Trial: Testing a Transitional Care
15 Model for Acute Psychiatric Conditions. *J Am Psychiatr Nurses Assoc* 2014;20.
16 doi:10.1177/1078390314552190
17

18 44 Hegedüs A, Kozel B, Fankhauser N, et al. Outcomes and feasibility of the short transitional
19 intervention in psychiatry in improving the transition from inpatient treatment to the community: A
20 pilot study. *Int J Ment Health Nurs* 2018;27. doi:10.1111/inm.12338
21

22 45 Hengartner MP, Passalacqua S, Andreae A, et al. The role of perceived social support after psychiatric
23 hospitalisation: Post hoc analysis of a randomised controlled trial testing the effectiveness of a
24 transitional intervention. *Int J Soc Psychiatry* 2017;63. doi:10.1177/0020764017700664
25

26 46 Hengartner MP, Passalacqua S, Heim G, et al. The post-discharge network coordination programme:
27 A randomized controlled trial to evaluate the efficacy of an intervention aimed at reducing
28 rehospitalizations and improving mental health. *Front Psychiatry* 2016;7. doi:10.3389/fpsy.2016.00027
29

30 47 Hennemann S, Farnsteiner S, Sander L. Internet- and mobile-based aftercare and relapse prevention
31 in mental disorders: A systematic review and recommendations for future research. *Internet Interv*.
32 2018;14. doi:10.1016/j.invent.2018.09.001
33

34 48 Kidd SA, Virdee G, Mihalakakos G, et al. The Welcome Basket Revisited: Testing the Feasibility of a
35 Brief Peer Support Intervention to Facilitate Transition from Hospital to Community. *Psychiatr Rehabil J*
36 2016;39. doi:10.1037/prj0000235
37

38 49 Kim HM, Pfeiffer P, Ganoczy D, et al. Intensity of outpatient monitoring after discharge and
39 psychiatric rehospitalization of veterans with depression. *Psychiatr Serv* 2011;62.
40 doi:10.1176/ps.62.11.pss6211_1346
41

42 50 Kisely SR, Campbell LA, O'Reilly R. Compulsory community and involuntary outpatient treatment for
43 people with severe mental disorders. *Cochrane Database Syst. Rev.* 2017;2017.
44 doi:10.1002/14651858.CD004408.pub5
45

46 51 Kolbasovsky A. Reducing 30-day inpatient psychiatric recidivism and associated costs through
47 intensive case management. *Prof Case Manag* 2009;14. doi:10.1097/NCM.0b013e31819e026a
48

- 1
2
3
4 52 Lay B, Drack T, Bleiker M, et al. Preventing compulsory admission to psychiatric inpatient care:
5 Perceived coercion, empowerment, and self-reported mental health functioning after 12 months of
6 preventive monitoring. *Front Psychiatry* 2015;6. doi:10.3389/fpsy.2015.00161
7
- 8
9 53 Lay B, Salize HJ, Dressing H, et al. Preventing compulsory admission to psychiatric inpatient care
10 through psycho-education and crisis focused monitoring. *BMC Psychiatry* 2012;12. doi:10.1186/1471-
11 244X-12-136
12
- 13 54 Lee CC, Liem SK, Leung J, et al. From deinstitutionalization to recovery-oriented assertive community
14 treatment in Hong Kong: What we have achieved. *Psychiatry Res* 2015;228.
15 doi:10.1016/j.psychres.2015.05.106
16
- 17 55 Liem SK, Lee CC. Effectiveness of assertive community treatment in hong kong among patients with
18 frequent hospital amissions. *Psychiatr Serv* 2013;64. doi:10.1176/appi.ps.201200421
19
- 20 56 Mattei G, Raisi F, Burattini M, et al. Effectiveness and acceptability of psycho-education group
21 intervention for people hospitalized in psychiatric wards and nurses. *J Psychopathol* 2017;23.
22
- 23 57 McDonagh JG, Haren WB, Valvano M, et al. Cultural Change: Implementation of a Recovery Program
24 in a Veterans Health Administration Medical Center Inpatient Unit. *J Am Psychiatr Nurses Assoc* 2019;25.
25 doi:10.1177/1078390318786024
26
- 27 58 Nubukpo P, Girard M, Sengelen JM, et al. A prospective hospital study of alcohol use disorders,
28 comorbid psychiatric conditions and withdrawal prognosis. *Ann Gen Psychiatry* 2016;15.
29 doi:10.1186/s12991-016-0111-5
30
- 31 59 Ortiz G. Predictors of 30-day postdischarge readmission to a multistate national sample of state
32 psychiatric hospitals. *J Healthc Qual* 2019;41. doi:10.1097/JHQ.0000000000000162
33
- 34 60 Passley-Clarke J. Implementation of Recovery Education on an Inpatient Psychiatric Unit. *J Am*
35 *Psychiatr Nurses Assoc* 2019;25. doi:10.1177/1078390318810413
36
- 37 61 Pérez GAC, Bernal LAR, Silva JB, et al. Sociodemographic and clinical factors associated with dual
38 disorders in a psychiatric hospital. *Salud Ment* 2017;40. doi:10.17711/SM.0185-3325.2017.036
39
- 40 62 Prochaska JJ, Hall SE, Delucchi K, et al. Efficacy of initiating tobacco dependence treatment in
41 inpatient psychiatry: A randomized controlled trial. *Am J Public Health* 2014;104.
42 doi:10.2105/AJPH.2013.301403
43
- 44 63 Rabovsky K, Trombini M, Allemann D, et al. Efficacy of bifocal diagnosis-independent group
45 psychoeducation in severe psychiatric disorders: Results from a randomized controlled trial. *Eur Arch*
46 *Psychiatry Clin Neurosci* 2012;262. doi:10.1007/s00406-012-0291-1
47
- 48 64 Roos E, Bjerkeset O, Steinsbekk A. Health care utilization and cost after discharge from a mental
49
50
51
52
53

1
2
3 health hospital; An RCT comparing community residential aftercare and treatment as usual. BMC
4 Psychiatry 2018;18. doi:10.1186/s12888-018-1941-2
5

6
7 65 Rothbard AB, Chhatre S, Zubritsky C, et al. Effectiveness of a high end users program for persons with
8 psychiatric disorders. Community Ment Health J 2012;48. doi:10.1007/s10597-012-9479-0
9

10
11 66 Rowley E, Wright N, Waring J, et al. Protocol for an exploration of knowledge sharing for improved
12 discharge from a mental health ward. BMJ Open 2014;4. doi:10.1136/bmjopen-2014-005176

13
14 67 Shimada T, Nishi A, Yoshida T, et al. Factors Influencing Rehospitalisation of Patients with
15 Schizophrenia in Japan: A 1-year Longitudinal Study. Hong Kong J Occup Ther 2016;28.
16 doi:10.1016/j.hkjot.2016.10.002

17
18 68 Simpson A, Flood C, Rowe J, et al. Results of a pilot randomised controlled trial to measure the clinical
19 and cost effectiveness of peer support in increasing hope and quality of life in mental health patients
20 discharged from hospital in the UK. BMC Psychiatry 2014;14. doi:10.1186/1471-244X-14-30
21

22
23 69 Sledge WH, Lawless M, Sells D, et al. Effectiveness of peer support in reducing readmissions of
24 persons with multiple psychiatric hospitalizations. Psychiatr Serv 2011;62.
25 doi:10.1176/ps.62.5.pss6205_0541

26
27 70 Sloan PA, Asghar-Ali A, Teague A, et al. Psychiatric hospitalists and continuity of care: A comparison
28 of two models. J Psychiatr Pract 2010;16. doi:10.1097/01.pra.0000375713.85454.8f
29

30
31 71 Taylor C, Holsinger B, Flanagan J V., et al. Effectiveness of a Brief Care Management Intervention for
32 Reducing Psychiatric Hospitalization Readmissions. J Behav Heal Serv Res 2016;43. doi:10.1007/s11414-
33 014-9400-4

34
35 72 Thambyrajah V, Hendriks M, Mahendran R. Evaluating a case management service in a tertiary
36 psychiatric hospital in Singapore. Ann Acad Med Singapore 2014;43.
37

38
39 73 Thomas KA, Rickwood D. Clinical and cost-Effectiveness of acute and subacute residential mental
40 health services: A systematic review. Psychiatr. Serv. 2013;64. doi:10.1176/appi.ps.201200427

41
42 74 Tomita A, Lukens EP, Herman DB. Mediation analysis of critical time intervention for persons living
43 with serious mental illnesses: Assessing the role of family relations in reducing psychiatric
44 rehospitalization. Psychiatr Rehabil J 2014;37. doi:10.1037/prj0000015

45
46 75 Tomko J, Ahmed N, Mukherjee K, et al. Evaluation of a Discharge Medication Service on an Acute
47 Psychiatric Unit. Hosp Pharm 2013;48. doi:10.1310/hpj4804-314
48

49
50 76 Välimäki M, Kannisto KA, Vahlberg T, et al. Short text messages to encourage adherence to
51 medication and follow-up for people with psychosis (mobile.net): Randomized controlled trial in Finland.
52 J Med Internet Res 2017;19. doi:10.2196/jmir.7028
53

1
2
3 77 Videbech P, Deleuran A. The Danish depression database. *Clin. Epidemiol.* 2016;8.
4 doi:10.2147/CLEP.S100298
5

6 78 Vigod SN, Kurdyak PA, Dennis CL, et al. Transitional interventions to reduce early psychiatric
7 readmissions in adults: Systematic review. *Br. J. Psychiatry.* 2013;202. doi:10.1192/bjp.bp.112.115030
8

9
10 79 Vijayaraghavan M, Messer K, Xu Z, et al. Psychiatric readmissions in a community-based sample of
11 patients with mental disorders. *Psychiatr Serv* 2015;66. doi:10.1176/appi.ps.201400092
12

13 80 Wong CYT. Predictors of psychiatric rehospitalization among elderly patients. *F1000Research*
14 2015;4:1–14. doi:10.12688/f1000research.7135.1
15

16 81 Xiao J, Mi W, Li L, et al. High relapse rate and poor medication adherence in the chinese population
17 with schizophrenia: Results from an observational survey in the people's Republic of China.
18 *Neuropsychiatr Dis Treat* 2015;11. doi:10.2147/NDT.S72367
19

20
21 82 Yates KF, Kunz M, Khan A, et al. Psychiatric patients with histories of aggression and crime five years
22 after discharge from a cognitive-behavioral program. *J Forensic Psychiatry Psychol* 2010;21.
23 doi:10.1080/14789940903174238
24

25 83 Zisman-Ilani Y, Roe D, Elwyn G, et al. Shared Decision Making for Psychiatric Rehabilitation Services
26 Before Discharge from Psychiatric Hospitals. *Health Commun* 2019;34.
27 doi:10.1080/10410236.2018.1431018
28

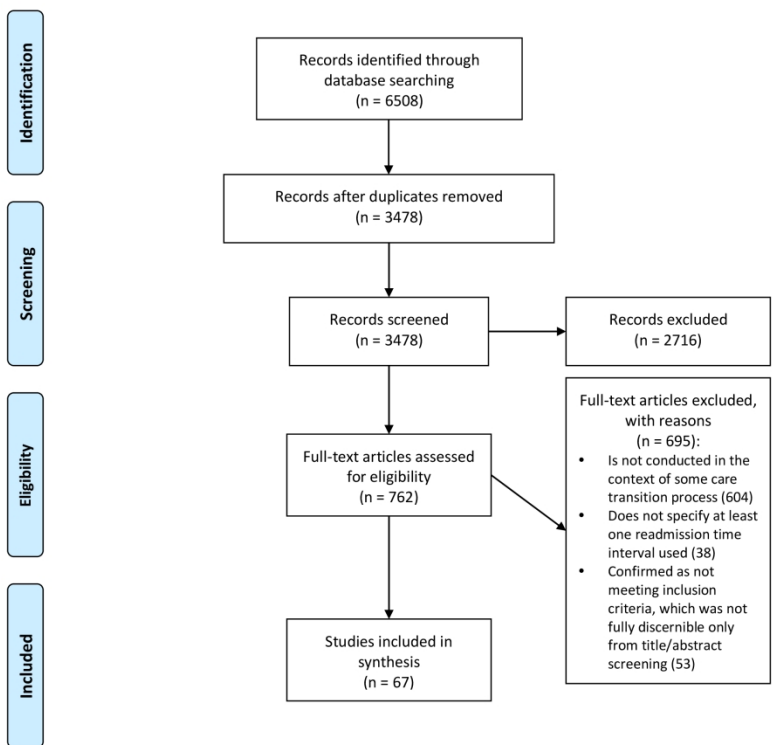
29
30 84 Zuehlke JB, Kotecki RM, Kern S, et al. Brief report: Transformation to a Recovery-Oriented Model of
31 Care on a Veterans Administration Inpatient Unit. *Psychiatr Rehabil J* 2016;39. doi:10.1037/prj0000198
32

33 85 Burke RE, Kripalani S, Vasilevskis EE, et al. Moving beyond readmission penalties: Creating an ideal
34 process to improve transitional care. *J Hosp Med* 2013;8. doi:10.1002/jhm.1990
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
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PRISMA 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.

Flow chart of the scoping review.

215x279mm (300 x 300 DPI)

Supplementary File 1

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	4
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	4
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	4-5
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A



SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8-20
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	8-20
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	21-23
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	23-24
Limitations	20	Discuss the limitations of the scoping review process.	24-25
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	26
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	26

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).

