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TITLE

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

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ABSTRACT

Introduction: Low-value care can lead to patient harm, misdirected clinician time and wastage of finite healthcare resources. Despite worldwide endeavours, de-implementing low-value care has proved challenging. Multifaceted, context and barrier-specific interventions are essential for successful de-implementation. The aim of this literature review is to summarise the evidence regarding barriers to, enablers of and strategies for de-implementation of low-value care in emergency medicine practice.

Methods and analysis: A mixed methods scoping review using the Arksey and O'Malley framework will be conducted. MEDLINE, CINAHL, EMBASE, EMCare, Scopus and grey literature will be searched from inception. Primary studies will be included. Study selection, data collection and data analysis will be performed by two independent reviewers. Barriers, enablers, and strategies will be mapped to the domains of the Theoretical Domains Framework. NVivo software will be used to inform qualitative data analysis. Mixed Methods Appraisal Tool will be used for quality assessment. PRISMA extension for Scoping Reviews framework will be used to present results.

Ethics and dissemination: Ethics approval is not required for this scoping review. This review will generate an evidence summary regarding barriers to, enablers of, and strategies for de-implementation of low-value care in emergency medicine practice. This review will facilitate discussions about de-implementation with relevant stakeholders including healthcare providers, consumers, and managers. These discussions are expected to inform the design and conduct of planned future projects to identify context-specific barriers and enablers then co-design, implement and evaluate barrier-specific interventions.

Keywords: low-value care, de-implementation, barriers, enablers, strategies, emergency medicine, review.

ARTICLE SUMMARY

Strengths and limitations of this study

- This scoping review will yield a comprehensive summary of barriers, enablers and strategies influencing de-implementation of low-value care in emergency medicine practice.
- The use of the Theoretical Domains Framework to analyse barriers and enablers is a strength as this has been associated with increased systematic uptake and success of de-implementation interventions and strategies.
- The use of mixed-methods approach is a strength as this will yield an integrated evidence synthesis to inform future practice, policy, and research.
- This review will have limited relevance to settings other than emergency medicine as de-implementation is influenced by contextual and cultural factors.

INTRODUCTION

Low-value care refers to health care interventions which confer little or no benefit, impose a risk of harm that exceeds benefit or incur a cost disproportionate to benefit[1]. Low-value care can lead to patient harm, misdirected clinician time and wastage of finite healthcare resources[2]. Studies from North America have estimated that at least 5-19 % of all interventions are low-value care, incurring annual expenditure of A$99.6 –138.9 billion[3,4]. Analysis of prevalence and trends of low-value care in New South Wales, Australia estimated inpatient costs of A$49.9 - $99.3million to the public hospital system in 2016-2017[5].

To address low-value care, the American Board of Internal Medicine launched the Choosing Wisely campaign in 2012, aiming to engage physicians and patients in conversations regarding unnecessary tests, treatments, and procedures[6]. The campaign has now been embraced by over 25 countries across six continents where major health professional colleges, societies and associations have developed evidence-based recommendations to reduce low-value care[7]. Despite the campaign gaining traction globally, de-implementing low-value care has proved complex and challenging[8-11]. Evidence suggests emphasizing financial benefits of addressing low-value care could result in clinician disengagement and community distrust[7]. However, elucidating harms of low-value care and translating the recommendations into measurable outcomes may garner clinician support and may facilitate meaningful engagement with

clinicians and community[10,11]. Furthermore, clinician and community engagement could be enhanced by systematic exploration of barriers and enablers associated with de-implementing low-value care[12].

Barriers and enablers to de-implementing low-value care should be considered at the level of patients, providers, teams, organizations, economics, and politics[12]. Identification of barriers and enablers is essential for designing effective, efficient, sustainable, targeted and context-specific interventions to de-implement low-value care[12]. A study conducted in the Netherlands found that provider-level factors accounted for 39% of all barriers and enablers, highlighting the need to address multilevel factors to achieve sustainable cultural change[12]. An Australian study reported that prevalence of low-value care was not associated with patient demographics, patient volumes, hospital peer grouping or hospital geolocation[13]. This study concluded that exploration of clinician knowledge, attitudes, and beliefs about low-value care is an important area of future research[13].

Several literature reviews have further explored barriers, enablers, and interventions for de-implementation of low-value care[12,14-22]. Van Dulmen et al demonstrated that situation-specific knowledge of barriers and enablers is essential for designing tailored de-implementation strategies[12]. A systematic review conducted by Wang et al concluded that addressing specific patient, clinician and system-level barriers is necessary for successful de-implementation of low-value breast cancer surgery[14]. Significantly, de-implementation was perceived as challenging and controversial for healthcare staff who experienced anxiety, disempowerment, distrust, and feelings of being dismissed and disrespected[15]. In addition, this review reported that engaging clinicians to lead change, using rigorous outcome data, and transparent decision-making could facilitate de-implementation[15]. Multifaceted interventions have been consistently reported to have the greatest potential to reduce low-value care[16-19]. Furthermore, reviews have noted that such interventions are more likely to be effective when they target tests individually[17], involve shared decision making[20], modify clinician environments[21] and address contextual factors[18]. Identification of barriers, enablers and optimal strategies that are likely to have maximum impact have been highlighted as areas requiring further research[22].

As part of the ongoing global efforts to address low-value care, leading professional organizations in emergency medicine have developed recommendations to reduce commonly performed tests including coagulation studies[23], urine cultures[24,25], blood cultures[23] , cranial

Computed Tomography (CT) in syncope[26], cranial CT in head trauma[23], cervical CT in neck trauma[23], Ankle X-Ray in ankle trauma[27], Duplex lower extremity ultrasound in suspected Deep Vein Thrombosis[27], CT Pulmonary Angiography in suspected pulmonary embolism[27] and CT Kidney-Ureters-Bladder in suspected renal colic[23]. However, literature is limited regarding barriers and enablers of de-implementation of low-value care in emergency medicine practice. Recent research in Australia has found that targeted, theory-informed interventions can be effective in de-implementing low-value healthcare for infant bronchiolitis[28,29]. De-implementation of low-value care presents a unique challenge to emergency clinicians making rapid, accurate decisions about critically ill patients in overcrowded, time-pressured, and information-poor environments[30]. Identification of context-specific barriers and enablers is essential to inform the design of targeted interventions to de-implement low-value care in emergency medicine practice. There are no current literature reviews of factors affecting de-implementation of low-value care in emergency medicine practice. The proposed literature review aims to address this knowledge gap. The objectives of this literature review are to systematically evaluate and synthesise the literature regarding de-implementation of low-value care in emergency medicine practice, identify evidence gaps and advance policy, practice, and research. A scoping review is the most appropriate type of literature review to achieve these objectives[31].

The proposed scoping review is unique in its focus on factors influencing de-implementation of low-value care in emergency medicine practice, its mixed-methods approach, and the use of the Theoretical Domains Framework (TDF). A mixed-methods approach will be employed as this scoping review will be analysing data, integrating findings, and drawing inferences from quantitative, qualitative and mixed-methods studies[32].This scoping review will be informed and underpinned by the TDF as use of theoretical principles to guide understanding has been found to increase systematic uptake and success of interventions, strategies, and policies[33]. The TDF is a multi-level, well operationalized, implementation science framework with 128 constructs and 14 domains derived from 33 behavioural change theories[34,35]. The TDF has several strengths that make it a suitable choice to inform this review. Firstly, the overlapping domains across multiple theories of behavioural change will enable comprehensive identification and mapping of potential barriers, enablers, and strategies[34-36]. Secondly, the TDF has been successfully applied to multiple studies in emergency medicine settings including a study of de-implementation of low-value care in infant bronchiolitis[28], a process evaluation of Canadian CT Head Rule trial[37] and a qualitative study of factors influencing mild

traumatic brain injury[37]. Finally, a TDF-informed scoping review can guide the subsequent choice of appropriate behaviour change theories to develop, implement and evaluate interventions to de-implement low-value care[36].

METHODS AND ANALYSIS:

This scoping review will be conducted in alignment with the enhanced Arksey and O'Malley framework [31,39-42]. The review protocol has been registered with Open Science Framework Registry(osf.io/bp8fa).

Identification of research question

'What is known from existing literature about barriers to, enablers of and strategies for de-implementation of low-value care in emergency medicine practice'?

Identification of relevant studies

Primary observational and interventional studies which employed qualitative, quantitative, or mixed-methods approaches to explore barriers, enablers, and strategies for de-implementation of low-value care in emergency medicine practice will be included. Low-value care will be defined as tests, treatments, and procedures that, according to best available evidence, have little or no benefit or impose harms that outweigh any likely benefits or incur costs that are disproportionate to any benefits (Scott et al) [1]. De-implementation will be defined as an active process of reducing low-value care by stopping or changing an existing practice (Dulmen et al)[12]. Barriers will be defined as factors that decrease the likelihood of introduction and sustainability of de-implementation of low-value care[43]. Enablers will be defined as factors that increase the likelihood of introduction and sustainability of de-implementation of low-value care[44]. Strategies will be defined as actions that introduce and sustain de-implementation of low-value care[45]. Animal studies will be excluded. A complete list of eligibility criteria is presented in Table 1.

Study selection

MEDLINE, CINAHL, EMBASE, EMCare and Scopus will be searched from inception using synonyms of the words "low-value", "de-implementation" and "emergency medicine" to identify published literature. The database search strategy will include a combination of relevant keywords, Medical Subject Heading terms, Boolean operators, and wildcards

Table 1 Eligibility criteria

PICOTS criteria	Inclusion criteria	Exclusion Criteria (Rationale)
Population	Human studies involving emergency healthcare providers, consumers or managers	Animal studies (not relevant to clinical practice)
Intervention/Exposure	De-implementation of low-value care	
Comparator	Controlled and uncontrolled studies will be included	
Outcome	Barriers or enablers or strategies or interventions	
Timeframe	All reported timeframes will be included	
Setting	Emergency department	
Design	Primary quantitative, qualitative and mixed-methods studies.	Reviews, protocols, perspectives, comment, opinions, editorials, letters to editors, news articles, books, chapters, policies, and guidelines (Not primary sources of data)
Quality or risk of bias	Studies will be included regardless of quality.	
Sample size	Studies will be included regardless of sample size	
Publication status	Studies will be included regardless of publication status	
Time period	Studies from inception to the date of search will be included	
Language	Studies will be included regardless of their language of publication.	

(truncation and question mark to account for plural words and spelling variations respectively). The search will be refined through an iterative process in consultation with an experienced medical librarian. Table 2 lists the proposed search terms. Grey literature will be identified by searching Grey Matters tool from the Canadian Association for Drugs and Technologies in Health[47], Google Scholar and Choosing Wisely websites as well as contacting content experts. After elimination of duplicates, two reviewers will independently perform title and abstract screening of retrieved results to identify potentially eligible articles followed by a full text review to determine eligible studies. Disagreements between the two initial reviewers will be discussed with and resolved by a third reviewer. Reference lists of included articles and relevant excluded articles will be screened to identify additional eligible articles. All articles that undergo a full text review will be assigned a unique identification number to enable accurate tracking of the included and excluded articles throughout the review process. Endnote 20.0 will be used to manage references[48].

Table 2 Search concepts and terms

Concept	**Synonyms**
Low-value care	health services misuse OR medical overuse OR unnecessary procedures OR inappropriate prescribing OR potentially inappropriate medication list OR health services overuse OR health services overutilization OR low-value OR low value OR unnecessary test OR unnecessary medication OR unnecessary surgery OR choosing wisely OR overdiagnosis OR overmedication OR overtreatment OR unwanted medical care OR medical reversal
De-implementation[60]	deprescriptions OR de-implement OR deimplement OR disinvest OR deadopt OR de-adopt OR disadopt OR decrease OR discontinue OR defund OR decommission OR decline OR delist OR reverse OR reject OR reallocate OR relinquish OR re-appraise OR re-prioritize OR redeploy OR abandon OR reassess OR replace OR reduce OR stop OR withdraw
Emergency medicine	emergency physician OR emergency clinician OR emergency care provider OR emergency care specialist OR emergency medicine physician OR emergency medicine specialist OR emergency

	specialist OR emergentologist OR health personnel OR health care personnel OR health facilities OR health care facility OR emergency department OR ED OR casualty department OR accident and emergency OR emergency medicine OR hospital emergency service OR emergency room OR emergency unit OR emergency ward OR emergency outpatient unit OR emergency service

Data charting

Two reviewers will independently chart data from included studies using a standardized data collection form (Microsoft Excel,2022) using an iterative process of data collection and refinement of the data collection form. Following data collection for 10% of included studies, the reviewers will meet to determine whether the data collection approach is consistent with the review objectives and whether relevant additional data variables need to be included. Data variables of interest and values are listed in Table 3. Two reviewers will independently sift and sort the collected data. Any disagreements will be discussed with and resolved by a third reviewer. Authors of included studies will be contacted for further data or clarification if indicated.

Table 3 Data variables and values

Data variable	**Values**
Author, Year of publication, Country of origin	
Aims and Objectives	Identification of barriers/enablers, evaluation of strategy/intervention to de-implement low-value care
Design	Quantitative, Qualitative, Mixed-Methods
Setting	Emergency Department
Type of low-value care	Test, Treatment, Procedure

Stream, Specialty, Experience, Gender and Sample size of participants	Medical/ Nursing/ Allied health streams, Medical/Surgical/ Psychiatric/ Paediatric/ General Practice Specialties and subspecialties, Experience in years, Male/Female/Other
Use of theories, frameworks, or models of behavioural change	
Methodology and Methods of data collection	Methodology: Randomized/Cohort/Case-control/Cross-sectional/ Descriptive (Quantitative), Descriptive/ Grounded theory/ Ethnography/Action Research/Delphi/Case study/Phenomenology (Qualitative), Convergent/Sequential/Embedded/Multi-phase (Mixed-methods) Methods: Surveys, questionnaires, interviews, focus groups, observation, key informants, other validated tools.
Findings/Results	Barriers, Enablers, Strategies/Interventions, Degree of agreement between participants about barriers/enablers, Process measures of intervention including feasibility/relevance/ acceptability/ penetration/ uptake/ fidelity, Outcome measures of intervention including effectiveness, cost-effectiveness/safety/quality/ sustainability.
Relevant additional variables	
Identified gaps in evidence	

Collating, Summarizing and Reporting results

Data will be subjected to quantitative and qualitative analyses by two independent reviewers. The analyses will be structured around the barriers, enablers, and strategies of de-implementation of low-value care in emergency medicine practice. The quantitative analysis

will involve a numerical analysis of extent, nature and distribution of studies included in the review as well as the barriers, enablers, and strategies identified in the studies. The qualitative analysis will involve a content analysis of the identified barriers, enablers, and strategies which will be mapped into the 14 domains of the TDF shown in Table 4. As the domains of the TDF are not mutually exclusive, barriers, enablers and strategies will be mapped to all relevant domains of the TDF. Any disagreements will be discussed with and resolved by a third reviewer. NVivo data management software will be used to inform the qualitative data analysis[49].

Table 4. Domains and definitions of the Theoretical Domains Framework (Adapted from Cane et al[61] under creative commons attribution licence CC BY 2.0)

Domain	Definition
1. Knowledge	An awareness of the existence of something
2. Skills	An ability or proficiency acquired through practice
3. Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting
4. Beliefs about capabilities	Acceptance of the truth, reality or validity about an ability, talent, or facility that a person can put to constructive use
5. Optimism	The confidence that things will happen for the best or that desired goals will be attained
6. Beliefs about Consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation
7. Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
8. Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way
9. Goals	Mental representations of outcomes or end states that an individual wants to achieve
10. Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives

11. Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour
12. Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours
13. Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
14. Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions

Quality assessment of included studies will be performed by two independent reviewers using the Mixed Methods Appraisal Tool, [50-53] a validated tool for assessing methodological quality of quantitative, qualitative, and mixed-method studies (Figure 1). Inter-reviewer reliability of study selection and data charting will be calculated using proportion of agreement between coders, Cohen's kappa[54] and prevalence and bias adjusted kappa[55].

Results of the review will be presented using the PRISMA extension for Scoping Reviews framework[56]. The results of the search strategy will be summarised in a PRISMA flow diagram. Search strategies for individual databases will be summarized and presented in a tabular format. The results of the quantitative analysis will be presented as frequencies and proportions in a tabular summary of research methods, geographic location, types, numbers and range of barriers/enablers/strategies, degree of agreement about barriers and enablers, effectiveness of implementation process and effectiveness of strategies. The results of the qualitative analysis will be presented as a tabular summary of barriers, enablers and strategies mapped to the domains of the TDF. The results from the quantitative and qualitative analyses will be synthesised and integrated using the JBI convergent integrated approach[57](Figure 2). The results will be discussed in the context of current literature and in alignment to the review objectives. The results of quality assessment of included studies will be presented as a tabular summary and their implications on the applicability of the review findings will be discussed.

Limitations of the scoping review as well as implications for policy, practice and research will be discussed.

Stakeholder Consultation

This review represents the first phase of a multi-phase project at Townsville University Hospital, a tertiary referral hospital in Queensland, Australia. This regionally located hospital has a catchment of 670,000 people[58] and an annual emergency department census of 91,997 for 2020-21[59]. Emergency healthcare providers, emergency healthcare consumers and healthcare managers at Townsville University Hospital, will be the major stakeholders in the findings of this review. Stakeholder consultation will take place after the completion of this review. The results of the literature review will be used to inform consultations with emergency healthcare providers during subsequent phases of this project exploring barriers to, enablers of and strategies for de-implementation of low value care at Townsville University Hospital Emergency Department. The results of this review will inform the design of a study exploring healthcare consumer perspectives about de-implementation of low-value care. The data from emergency healthcare provider and consumer consultations will be collected, analysed, and reported separately. The findings of this review will inform discussions with healthcare managers about systemic changes that can support emergency healthcare providers in de-implementation of low-value care.

PATIENT AND PUBLIC INVOLVEMENT

Patients and public were not involved in the design of this scoping review and will not be involved in its conduct.

ETHICS AND DISSEMINATION

Ethics approval is not required for this scoping review of literature. The findings of this review are expected to contribute to the rapidly growing evidence base about de-implementation of low-value care as well as inform emergency medicine practitioners about potential barriers, enablers, and strategies. This review will inform subsequent planned projects at Townsville University Hospital. These projects are expected to identify context-specific barriers/enablers to de-implementation of low-value care, co-design barrier-specific interventions, implement the interventions and evaluate the interventions in sequential phases. As participants in these projects, healthcare providers at Townsville University Hospital Emergency Department will

be an integral part of the knowledge translation process. Healthcare consumers at Townsville University Hospital are also anticipated to be a part of the knowledge translation process by enabling de-implementation via shared decision-making with emergency healthcare providers. The findings of this review will inform discussions with healthcare managers at Townsville University Hospital about the systemic changes that can support emergency healthcare providers to de-implement low-value care. The findings of this review as well as the subsequent projects will enhance the evidence base of emergency medicine. Findings will be disseminated via conference presentations, peer-reviewed publications, and discussions with formal and informal research networks of the reviewers.

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Author contributions

VG conceived and designed the study and drafted the protocol. All other co-authors critically reviewed and approved the final draft.

Competing interests

None declared.

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Data Statement

Technical appendix, statistical code and dataset will be available from the Dryad repository.

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Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?				
	S2. Do the collected data allow to address the research questions?				
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?				
	1.2. Are the qualitative data collection methods adequate to address the research question?				
	1.3. Are the findings adequately derived from the data?				
	1.4. Is the interpretation of results sufficiently substantiated by data?				
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?				
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?				
	2.2. Are the groups comparable at baseline?				
	2.3. Are there complete outcome data?				
	2.4. Are outcome assessors blinded to the intervention provided?				
	2.5 Did the participants adhere to the assigned intervention?				
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?				
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?				
	3.3. Are there complete outcome data?				
	3.4. Are the confounders accounted for in the design and analysis?				
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?				
	4.2. Is the sample representative of the target population?				
	4.3. Are the measurements appropriate?				
	4.4. Is the risk of nonresponse bias low?				
	4.5. Is the statistical analysis appropriate to answer the research question?				
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?				
	5.2. Are the different components of the study effectively integrated to answer the research question?				
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

Figure 1. Mixed-Methods Appraisal Tool (Reprinted from Hong et al[52], free to use public work as per http://mixedmethodsappraisaltoolpublic.pbworks.com/w/page/71030694/FAQ)

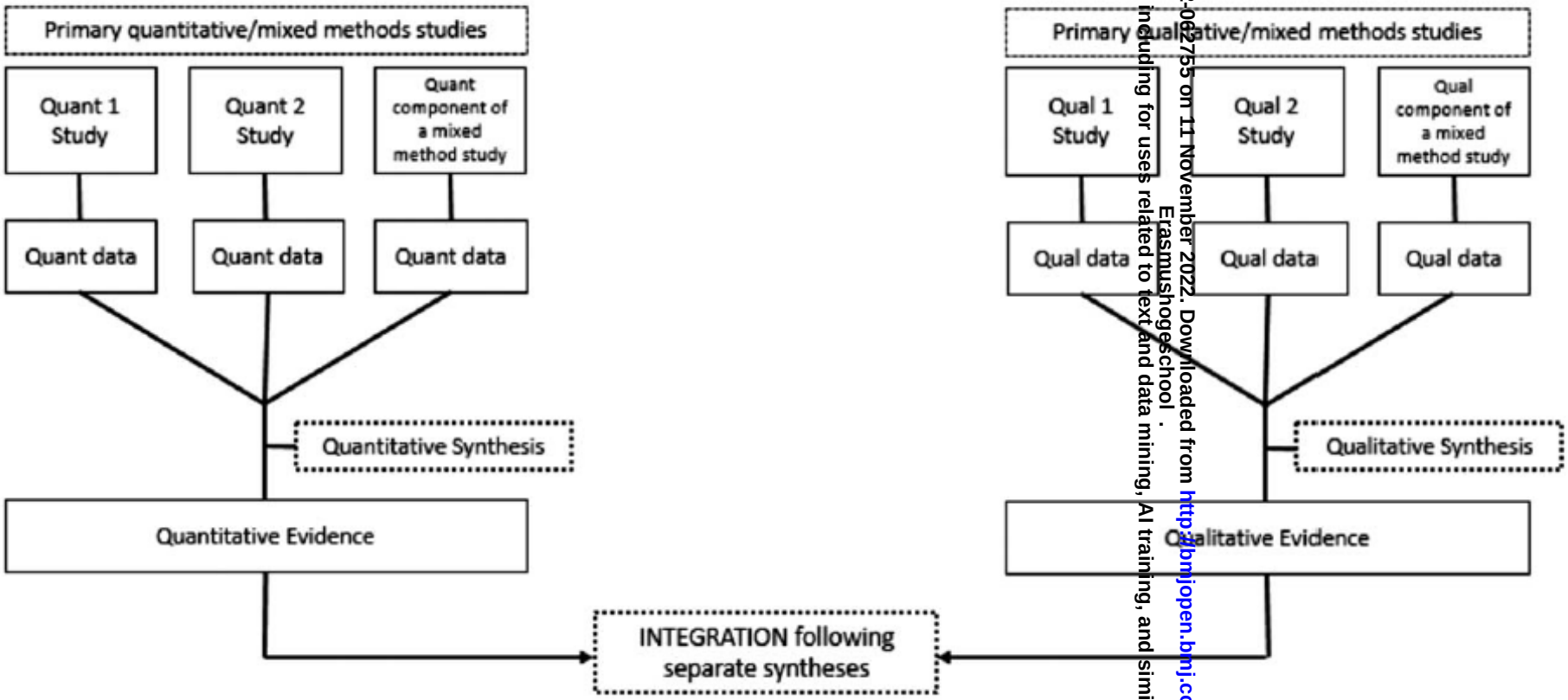

Figure 2. JBI convergent segregated approach for synthesising evidence from qualitative, quantitative, and mixed methods studies (Reprinted from Stern et al[59] with permission from Wolters Kluwers Health Inc)

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

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.	3-4
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.	5
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.	6
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.	6
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.	6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Not applicable
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	7
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.	7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	12(Table 1)

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
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).	8
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	8
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.	Not applicable
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not applicable
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable
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.	Not applicable
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not applicable
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.	Not applicable
Limitations	20	Discuss the limitations of the scoping review process.	Not applicable
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.	Not applicable
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.	6

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).

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

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

BMJ Open

Identification of barriers, enablers, and interventions to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

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TITLE

Identification of barriers, enablers, and interventions to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

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ABSTRACT

Introduction: Low-value care can lead to patient harm, misdirected clinician time and wastage of finite healthcare resources. Despite worldwide endeavours, de-implementing low-value care has proved challenging. Multifaceted, context and barrier-specific interventions are essential for successful de-implementation. The aim of this literature review is to summarise the evidence about barriers to, enablers of, and interventions for de-implementation of low-value care in emergency medicine practice.

Methods and analysis: A mixed methods scoping review using the Arksey and O'Malley framework will be conducted. MEDLINE, CINAHL, EMBASE, EMCare, Scopus and grey literature will be searched from inception. Primary studies will be included. Barriers, enablers, and interventions will be mapped to the domains of the Theoretical Domains Framework. Study selection, data collection and quality assessment will be performed by two independent reviewers. NVivo software will be used for qualitative data analysis. Mixed Methods Appraisal Tool will be used for quality assessment. PRISMA extension for Scoping Reviews framework will be used to present results.

Ethics and dissemination: Ethics approval is not required for this scoping review. This review will generate an evidence summary regarding barriers to, enablers of, and interventions for de-implementation of low-value care in emergency medicine practice. This review will facilitate discussions about de-implementation with relevant stakeholders including healthcare providers, consumers, and managers. These discussions are expected to inform the design and conduct of planned future projects to identify context-specific barriers and enablers then co-design, implement and evaluate barrier-specific interventions.

Keywords: low-value care, de-implementation, barriers, enablers, interventions, emergency medicine, review.

ARTICLE SUMMARY

Strengths and limitations of this study

- This scoping review will yield a comprehensive summary of barriers, enablers and interventions influencing de-implementation of low-value care in emergency medicine practice.
- The use of the Theoretical Domains Framework to analyse the barriers and enablers is a strength as this has been associated with increased systematic uptake and success of de-implementation interventions and interventions.
- The use of mixed-methods approach is a strength as this will yield an integrated evidence synthesis to inform future practice, policy, and research.
- This review will have limited relevance to settings other than emergency medicine as de-implementation is influenced by contextual and cultural factors.

INTRODUCTION

Low-value care refers to health care interventions which confer little or no benefit, impose a risk of harm that exceeds benefit or incur a cost disproportionate to benefit.[1] Low-value care can lead to patient harm, misdirected clinician time and wastage of finite healthcare resources.[2] Studies from North America have estimated that at least 5-19 % of all interventions are low-value care, incurring annual expenditure of A$99.6 –138.9 billion.[3 4] Analysis of prevalence and trends of low-value care in New South Wales, Australia estimated inpatient costs of A$49.9 - $99.3million to the public hospital system in 2016-2017.[5]

To address low-value care, the American Board of Internal Medicine launched the Choosing Wisely campaign in 2012, aiming to engage physicians and patients in conversations regarding unnecessary tests, treatments, and procedures.[6] Despite the campaign gaining traction globally, de-implementing low-value care has proved complex and challenging.[7-10] Evidence suggests emphasizing financial benefits of addressing low-value care could result in clinician disengagement and community distrust.[11] On the other hand, elucidating harms of low-value care and translating the recommendations into measurable outcomes may facilitate engagement.[9 10] Clinician and community engagement could be further enhanced by systematic exploration of determinants- also called barriers and enablers- of de-implementation of low-value care.[12]

Several literature reviews have explored barriers, enablers, and interventions for de-implementation of low-value care.[12-22] Van Dulmen et al demonstrated that situation-specific knowledge of barriers and enablers is essential for designing tailored de-implementation interventions.[12] A systematic review conducted by Wang et al concluded that addressing patient, clinician and system-level barriers is necessary for successful de-implementation of low-value breast cancer surgery.[13] De-implementation was perceived as challenging and controversial by healthcare staff who experienced anxiety, disempowerment, distrust, and feelings of being dismissed and disrespected.[14] Change led by frontline clinicians, rigorous outcome data, and transparent decision-making could strengthen de-implementation endeavours.[14] Multifaceted interventions have the greatest potential to reduce low-value care[15-18] when interventions target tests individually[16], involve patients in decision making[19], modify clinician environments[20], address contextual factors[17] and are informed by behavioural change theories.[21] Identification of barriers and enablers as well as development of effective interventions have been highlighted as areas of de-implementation of low-value care that merit further research.[22]

As part of global efforts to address low-value care, leading emergency medicine organizations have developed recommendations to reduce coagulation studies[23], urine cultures[24 25], blood cultures[23] , cranial Computed Tomography (CT) in syncope[26], cranial CT in head trauma[23], cervical CT in neck trauma[23], ankle radiographs in ankle trauma[27], duplex lower extremity ultrasound in suspected deep vein thrombosis[27], CT Pulmonary Angiography in suspected pulmonary embolism[27] and CT Kidney-Ureters-Bladder in suspected renal colic.[23] However, barriers, enablers, and interventions for de-implementation of low-value care in emergency medicine practice have not been summarised in a literature review. The proposed literature review intends to address this knowledge gap. Such a review is necessary to better inform emergency clinicians who face unique challenges of overcrowding[28], diagnostic uncertainty[29], limited-information[30], ambulant patient population, high staff turnover and time constraints.[31 32] Such a review will also contribute to de-implementation endeavours in emergency departments providing healthcare to a significant proportion of the national population in United States of America(130million visits/year)[33], United Kingdom(17.4million ED visits/year)[34], Canada(11.7million ED visits/year)[35] and Australia(8.8million ED visits/year).[36] The objective of this review is to examine the extent, range, and nature of research activity by systematically evaluating and

synthesising the literature about de-implementation of low-value care in emergency medicine practice. A scoping review methodology will be employed as this objective aligns with the accepted definition and purpose of a scoping review.[37-39]

METHODS AND ANALYSIS

This scoping review will be conducted in alignment with the enhanced Arksey and O'Malley framework[37 40-43] employing a mixed methods approach and the Theoretical Domains Framework. The review is expected to take 12 months (November 1, 2021 - October 31, 2022). The protocol has been registered with Open Science Framework Registry(osf.io/bp8fa).

A mixed-methods approach will be employed as this scoping review will integrate and synthesise data, from quantitative, qualitative and mixed-methods studies.[44] This scoping review will be informed and underpinned by the Theoretical Domains Framework (TDF) as use of theoretical principles to guide understanding has been found to increase systematic uptake and success of interventions, interventions, and policies.[45] The TDF is a multi-level, well operationalized, implementation science framework with 128 constructs and 14 domains derived from 33 behavioural change theories.[46 47] The TDF has several strengths that make it a suitable choice to inform this review. Firstly, the overlapping domains across multiple theories of behavioural change will enable comprehensive identification and mapping of potential barriers, enablers, and interventions for de-implementation of low-value care [46-48] in emergency medicine practice. Secondly, the TDF has a predominant focus at individual-level factors[47] which will enable accurate mapping of barriers, enablers, and interventions at the level of emergency health-care provider. Thirdly, the TDF has been successfully applied to multiple studies in emergency medicine settings including a process evaluation of Canadian CT Head Rule trial [49], a qualitative study of factors influencing mild traumatic brain injury[50] and a study of de-implementing low-value care in infant bronchiolitis.[51] Finally, a TDF-informed scoping review can guide the subsequent choice of appropriate behaviour change theories to develop, implement and evaluate interventions to change behaviour[48] of emergency healthcare providers. The scoping review framework is detailed below.

Identification of research question

'What is known from existing literature about healthcare provider-level barriers to, enablers of and interventions for de-implementation of low-value care in emergency medicine practice'?

Identification of relevant studies

Primary observational and interventional studies which employed qualitative, quantitative, or mixed-methods approaches to explore barriers, enablers, and interventions for de-implementation of low-value care in emergency medicine practice will be included. Low-value care will be defined as tests, treatments and procedures that, according to best available evidence, have little or no benefit or impose harms that outweigh any likely benefits or incur costs that are disproportionate to any benefits.[1] De-implementation will be defined as an active process of reducing low-value care by stopping or changing an existing practice.[12] Barriers will be defined as factors that decrease the likelihood of introduction and sustainability of de-implementation of low-value care[52]. Enablers will be defined as factors that increase the likelihood of introduction and sustainability of de-implementation of low-value care.[53] Interventions will be defined as actions that introduce and sustain de-implementation of low-value care.[54] Animal studies and quantitative studies with a sample size less than 30 will be excluded.[55] No date or language limits will be applied to enable accurate mapping of the growth of emergency medicine literature about de-implementation of low-value care over time and ensure inclusion of all relevant studies. A complete list of eligibility criteria is presented in Table 1.

Table 1 Eligibility criteria

PICOTS criteria	Inclusion criteria	Exclusion criteria (Rationale)
Population	Human studies involving emergency health care providers, consumers or managers	Animal studies (not relevant to clinical practice)
Intervention/Exposure	De-implementation of low-value care	
Comparator	Usual/Standard practice	
Outcome	Barriers or enablers or interventions to de-implement low-value care	
Timeframe	All reported timeframes will be included	
Setting	Emergency department	
Design	Primary quantitative, qualitative and mixed-methods studies.	Reviews, protocols, perspectives, comment, opinions, editorials, letters to editors, news articles, books, chapters, policies, and guidelines (Not primary sources of data)
Quality or risk of bias	Studies will be included regardless of quality.	
Sample size	Studies will be included regardless of sample size	
Publication status	Studies will be included regardless of publication status	
Time period	Studies from inception to a maximum of two months prior to submission for publication will be included	
Language	Studies will be included regardless of their language of publication.	

Study selection

MEDLINE, CINAHL, EMBASE, EMCare and Scopus will be searched from inception to a maximum of two months prior to submission for publication. The search will be structured around three concepts: low-value, de-implementation and emergency medicine. The database search strategy will include a combination of relevant keywords, Medical Subject Heading terms, Boolean operators, and wildcards (truncation and question mark to account for plural words and spelling variations respectively). The search will be refined through an iterative process in consultation with an experienced medical librarian. Table 2 lists the proposed search terms. Grey literature will be identified through Grey Matters tool from the Canadian Association for Drugs and Technologies in Health[56], Google Scholar, relevant websites (Choosing Wisely, NICE, Lown Institute, Right Care Alliance) and content experts. After elimination of duplicates, two reviewers will independently perform title and abstract screening of retrieved results to identify potentially eligible articles followed by a full text review to determine eligible studies. Disagreements between the two initial reviewers will be discussed with and resolved by a third reviewer. Reference lists of included articles and relevant excluded articles will be screened to identify additional eligible articles. All articles that undergo a full text review will be assigned a unique identification number to enable accurate tracking of the included and excluded articles throughout the review process. Google Translate will be used to translate non-English articles. Endnote 20.0 will be used to manage references.[57]

Table 2 Search concepts and terms

Concept	Synonyms
Low-value care	health services misuse OR medical overuse OR unnecessary procedures OR inappropriate prescribing OR potentially inappropriate medication list OR health services overuse OR health services overutilization OR low-value OR low value OR unnecessary test OR unnecessary medication OR unnecessary surgery OR choosing wisely OR overdiagnosis OR overmedication OR overtreatment OR unwanted medical care OR medical reversal
De-implementation [58]	deprescriptions OR de-implement OR deimplement OR disinvest OR deadopt OR de-adopt OR disadopt OR decrease OR discontinue OR defund OR decommission OR decline OR

	delist OR reverse OR reject OR reallocate OR relinquish OR re-appraise OR re-prioritize OR redeploy OR abandon OR reassess OR replace OR reduce OR stop OR withdraw
Emergency Medicine	emergency physician OR emergency clinician OR emergency care provider OR emergency care specialist OR emergency medicine physician OR emergency medicine specialist OR emergency specialist OR emergentologist OR health personnel OR health care personnel OR health facilities OR health care facility OR emergency department OR ED OR casualty department OR accident and emergency OR emergency medicine OR hospital emergency service OR emergency room OR emergency unit OR emergency ward OR emergency outpatient unit or emergency service

Data charting

Two reviewers will independently chart data from included studies using a standardized data collection form (Microsoft Excel,2022[59]) using an iterative process of data collection and refinement of the data collection form. Following data collection for 10% of included studies, the reviewers will meet to determine whether the data collection approach is consistent with the review objectives and whether relevant additional data variables need to be included. Data variables of interest and values are listed in Table 3. Two reviewers will independently sift and sort the collected data. Any disagreements will be discussed with and resolved by a third reviewer. Authors of included studies will be contacted for further data or clarification if indicated.

Table 3 Data variables and values

Data variable	**Values**
Author, Year of publication, Country of origin	
Aims and Objectives	Identification of barriers/facilitators, evaluation of de-implementation strategy/intervention

Design	Quantitative, Qualitative, Mixed-Methods
Setting	Emergency Medicine
Type of low-value care	Test, Treatment, Procedure
Stream, specialty, experience, gender and sample size of participants	Medical/ Nursing/ Allied health streams, Medical/Surgical/ Psychiatric/ Paediatric/ General Practice Specialties and subspecialties, Experience in years, Male/Female/Other
Use of theories, frameworks, or models of behavioural change	
Methodology and Methods of data collection	Methodology: Randomized/Cohort/Case-control/Cross-sectional/ Descriptive (Quantitative), Descriptive/ Grounded theory/ Ethnography/Action Research/Delphi/Case study/Phenomenology (Qualitative), Convergent/Sequential/Embedded/Multi-phase (Mixed-methods) Methods: Surveys, questionnaires, interviews, focus groups, observation, key informants, other validated tools.
Findings/Results	Barriers, Enablers, Interventions, Degree of agreement between participants about barriers/enablers, Process measures of intervention including feasibility/relevance/ acceptability/ penetration/ uptake/ fidelity, Outcome measures of intervention including effectiveness, cost-effectiveness/safety/quality/ sustainability.
Relevant additional variables	

Collating, Summarizing and Reporting results

Data will be subjected to quantitative and qualitative analyses. The analyses will be structured around the barriers, enablers, and interventions of de-implementation of low-value care in emergency medicine practice. The quantitative analysis will summarise barriers, enablers, and interventions in terms of trends across time, geography, economies (high income versus low-middle income countries), design (controlled versus uncontrolled studies) and quality (high-quality versus low-quality studies). The qualitative analysis will map barriers, enablers, and interventions to the 14 domains of the Theoretical Domains Framework (TDF) shown in Table 4. The qualitative analysis will involve line-by-line and axial coding followed by thematic analysis of coded data. Themes will be pre-determined and aligned to the domains of the Theoretical Domains Framework. As the domains of the TDF are not mutually exclusive, barriers, enablers and interventions will be mapped to all relevant domains of the TDF. NVivo data management software will be used to facilitate qualitative data analysis.[60]

Table 4. Domains and definitions of the Theoretical Domains Framework (Adapted from Cane et al[61] under creative commons attribution licence CC BY 2.0)

Domain	Definition
1. Knowledge	An awareness of the existence of something
2. Skills	An ability or proficiency acquired through practice
3. Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting
4. Beliefs about capabilities	Acceptance of the truth, reality or validity about an ability, talent, or facility that a person can put to constructive use
5. Optimism	The confidence that things will happen for the best or that desired goals will be attained
6. Beliefs about Consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation
7. Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
8. Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way

9. Goals	Mental representations of outcomes or end states that an individual wants to achieve
10. Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives
11. Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour
12. Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours
13. Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
14. Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions

Quality assessment of included studies will be performed by two independent reviewers using the Mixed Methods Appraisal Tool[62], a validated tool for assessing methodological quality of quantitative, qualitative, and mixed-method studies (Figure 1). Although quality assessment was not part of the original Arksey and O'Malley framework, a lack of quality assessment could make the results of a scoping review challenging to interpret[63] and limit the uptake of findings into policy and practice.[39] Quality assessment will enable the synthesis of the results based on quality of included studies. Quality assessment will thus lend additional rigor to the scoping review methodology.

Inter-reviewer reliability of will be calculated for title/abstract screening and full text review stages using proportion of agreement between coders, Cohen's kappa[64] and prevalence and bias adjusted kappa.[65] These three measures of inter-rater reliability will be reported to ensure transparency of the review process. These measures will not, however, alter the review process as any disagreements between the two independent reviewers during these phases will be resolved by a third reviewer.

Sensitivity and specificity of the search strategy will be evaluated as follows. Sensitivity will be calculated as ratio of the number of included studies indexed in MEDLINE that were retrieved by the search strategy to the number of included studies indexed in MEDLINE.[66] Specificity will be calculated as the ratio of number of included studies indexed in MEDLINE that were retrieved by the search strategy to the number of studies initially retrieved by the search strategy.[66]

Results of the review will be presented using the PRISMA extension for Scoping Reviews (PRISMA-ScR) framework.[67] The results of the search strategy will be summarised in a PRISMA flow diagram. Search strategies for individual databases will be summarized and presented in a tabular format (Supplemental file). The results of the quantitative analysis will be presented as frequencies and proportions in a tabular summary of research methods, geographic location, types, numbers and range of barriers/enablers/interventions, degree of agreement about barriers and enablers, effectiveness of implementation process and effectiveness of interventions. The results of the qualitative analysis will be presented as a tabular summary of barriers, enablers and interventions mapped to the domains of TDF. The results from the quantitative and qualitative analyses will be synthesised and integrated using the JBI convergent integrated approach.[68] The results will be discussed in the context of current literature and in alignment to the review objective. The results of quality assessment of included studies will be presented as a tabular summary and their implications on the applicability of the review findings will be discussed. Limitations of the scoping review as well as implications for policy, practice and research will be discussed.

Stakeholder Consultation

Stakeholder consultation will not be part of this scoping review. However, the findings of this scoping review will be integral to stakeholder consultations that will inform three planned sequential projects to de-implement low-value care in emergency medicine practice. Emergency health care providers, consumers and managers will be the major stakeholders in these projects.

PATIENT AND PUBLIC INVOLVEMENT

Patients and public were not involved in the design of this scoping review and will not be involved in its conduct.

ETHICS AND DISSEMINATION

Ethics approval is not required for this scoping review of literature. The findings of this review are expected to contribute to the rapidly growing evidence base about de-implementation of low-value care as well as inform emergency medicine practitioners about potential barriers, enablers, and interventions. This review will inform subsequent planned projects at Townsville University Hospital, Queensland, Australia. This regionally located hospital has a catchment of 670,000 people[69] and an annual emergency department census of 91,997 for 2020-2021.[70] The planned projects are expected to identify context-specific, barriers and enablers to de-implementation of low-value care, co-design barrier-specific interventions, implement and evaluate the interventions in sequential phases. As participants in these projects, healthcare providers at Townsville University Hospital Emergency Department will be an integral part of the knowledge translation process. Healthcare consumers at Townsville University Hospital are also anticipated to be a part of the knowledge translation process by enabling de-implementation via shared decision-making with emergency healthcare providers. The findings of this review will inform discussions with the Townsville University Hospital managers about the systemic changes that can support healthcare providers to de-implement low-value care. The findings of this review as well as the subsequent projects will enhance the evidence base of emergency medicine. Findings will be disseminated via conference presentations, peer-reviewed publications, and discussions with formal and informal research networks of the reviewers

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Author contributions

VG conceived and designed the study and drafted the manuscript. RE, NM, TSG, ND, MC and KC critically reviewed and approved the final manuscript.

Competing interests

None declared.

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Data Statement

Technical appendix, statistical code and dataset will be available from the Dryad repository.

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Figure legend

Figure 1. Mixed-Methods Appraisal Tool

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?				
	S2. Do the collected data allow to address the research questions?				
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?				
	1.2. Are the qualitative data collection methods adequate to address the research question?				
	1.3. Are the findings adequately derived from the data?				
	1.4. Is the interpretation of results sufficiently substantiated by data?				
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?				
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?				
	2.2. Are the groups comparable at baseline?				
	2.3. Are there complete outcome data?				
	2.4. Are outcome assessors blinded to the intervention provided?				
	2.5 Did the participants adhere to the assigned intervention?				
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?				
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?				
	3.3. Are there complete outcome data?				
	3.4. Are the confounders accounted for in the design and analysis?				
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?				
	4.2. Is the sample representative of the target population?				
	4.3. Are the measurements appropriate?				
	4.4. Is the risk of nonresponse bias low?				
	4.5. Is the statistical analysis appropriate to answer the research question?				
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?				
	5.2. Are the different components of the study effectively integrated to answer the research question?				
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

Figure 1: Mixed-Methods Appraisal Tool (adapted from Hong et al[62])

DATABASE SEARCH STRATEGIES

MEDLINE

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) <1946 to February 18, 2022>(Search on Feb 20,2022)

1 exp Health Services Misuse/ 12443
2 exp Inappropriate Prescribing/ 4188
3 exp Potentially Inappropriate Medication List/ 791
4 (health services overuse or health services overutilization or low-value or low value or choosing wisely or unnecessary surger* or unnecessary medication* or unnecessary test* or overdiagnos* or overmedication or overtreatment or unwanted medical care or medical reversal*).mp. 17396
5 exp Deprescriptions/ 789
6 (de-implement* or deimplement* or disinvest* or deadopt* or de-adopt* or disadopt* or decreas* or discontinu* or defund* or decommission* or declin* or delist* or revers* or reject* or reallocat* or relinquish* or re-apprais* or re-prioriti?* or redeploy* or abandon* or reassess* or replac* or reduc* or stop* or withdraw*).mp. 7376157
7 exp Health Personnel/ 573291
8 exp Health Facilities/ 851882
9 exp Emergency Medicine/ 14966
10 1 or 2 or 3 or 4 32377
11 5 or 6 7376433
12 7 or 8 or 9 1328546
13 10 and 11 and 12 2349

Emcare

Ovid Emcare <1995 to 2022 Week 7>(Search on Feb 20,2022)

1 exp inappropriate prescribing/ 2610
2 exp potentially inappropriate medication/ 838
3 (health services overuse or health services overutilization or low-value or low value, or choosing wisely or unnecessary surger* or unnecessary medication* or unnecessary test* or overdiagnos* or overmedication or overtreatment or unwanted medical care or medical reversal* or health services misuse).mp. 6256
4 exp deprescription/ 286
5 (de-implement* or deimplement* or disinvest* or deadopt* or de-adopt* or disadopt* or decreas* or discontinu* or defund* or decommission* or declin* or delist* or revers* or reject* or reallocat* or relinquish* or re-apprais* or re-prioriti?* or redeploy* or abandon* or reassess* or replac* or reduc* or stop* or withdraw*).mp. 1837484
6 exp health care personnel/ 810480
7 exp health care facility/ 604543
8 exp emergency medicine/ 16333
9 exp emergency ward/ 78367
10 exp emergency physician/ 8586
11 1 or 2 or 3 8819
12 4 or 5 1837600
13 6 or 7 or 8 or 9 or 10 1249902
14 11 and 12 and 13 1375

EMBASE

Embase Session Results

No.	Query	Results
#4	#1 AND #2 AND #3	916
#3	'emergency physician' OR 'emergency ward' OR 'emergency medicine' OR 'emergency health service'	427,610
#2	'de-implement*' OR 'disinvest*' OR 'deadopt*' OR 'decreas*' OR 'discontinu*' OR 'defund*' OR 'decommission*' OR 'declin*' OR 'delist*' OR 'revers*' OR 'reject*' OR 'reallocat*' OR 'relinquish*' OR 're-apprais*' OR 're-prioriti?*' OR 'redeploy*' OR 'abandon*' OR 'reassess*' OR 'replac*' OR 'reduc*' OR 'stop*' OR 'withdraw*'	9,927,479
#1	'low-value' OR 'choosing wisely' OR 'medical overuse'/exp OR 'medical overuse' OR 'overdiagnos*' OR 'overtreatment'/exp OR 'overtreatment' OR 'overmedication'/exp OR 'overmedication' OR 'unwanted medical care' OR 'potentially inappropriate medication'/exp OR 'potentially inappropriate medication' OR 'inappropriate prescribing'/exp OR 'inappropriate prescribing' OR 'medical reversal' OR 'unnecessary test*' OR 'unnecessary medication*' OR 'unnecessary surger*'	40,633

SCOPUS

Scopus Search Sources Lists SciVal ↗

Advanced search

< Basic Search | Advanced | Search tips

Enter query string

{emergency physician*} OR {emergency clinician*} OR {emergency care provider*} OR {emergency care specialist*} OR {emergency medicine physician*} OR {emergency medicine specialist*} OR {emergency specialist*} OR {emergentologist*} OR {emergency department*} OR {ED} OR {casualty department} OR {accident and emergency} OR {emergency medicine} OR {hospital emergency service*} OR {emergency room*} OR {emergency unit*} OR {emergency ward*} OR {emergency outpatient unit*}

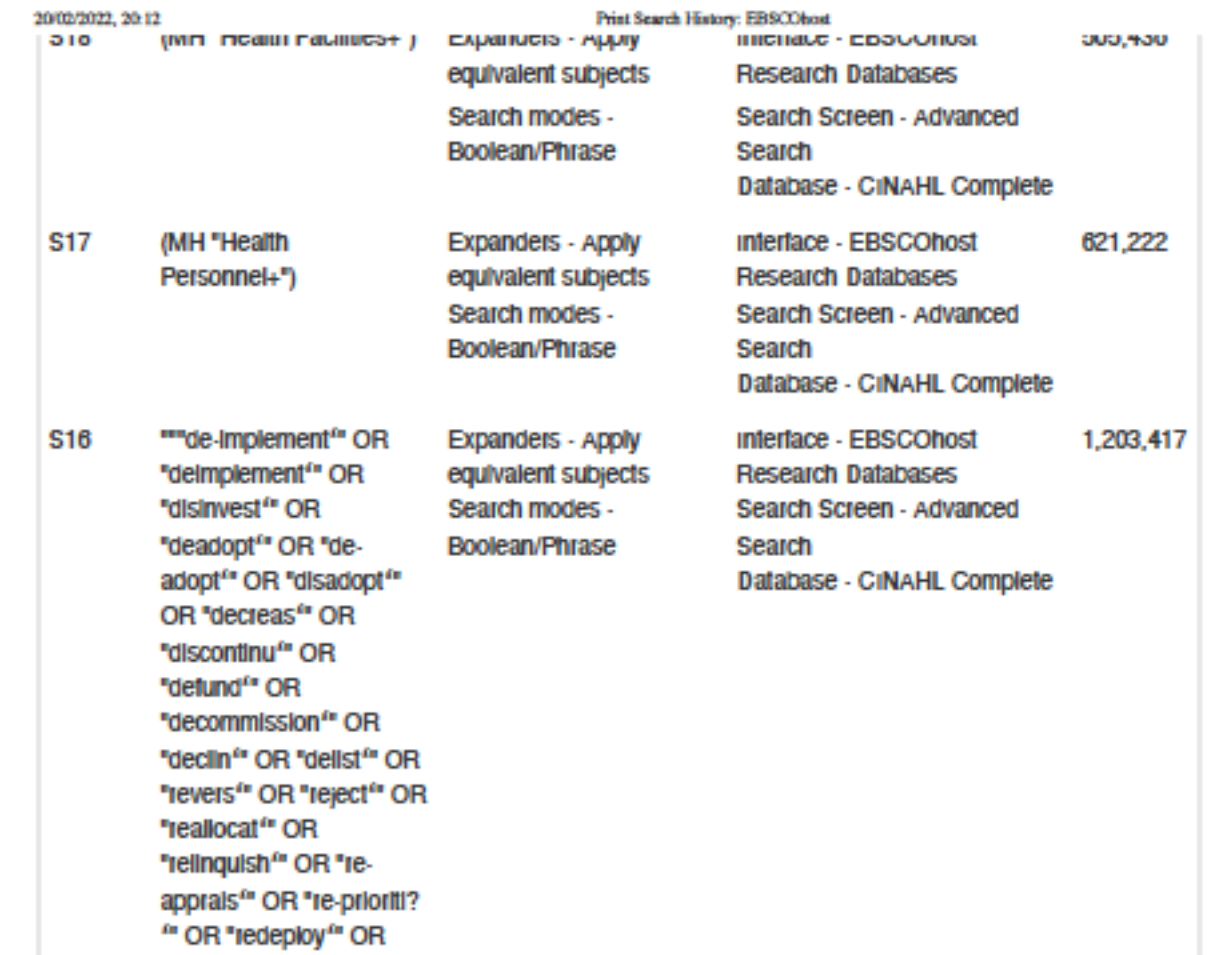
Search history | Combine queries... e.g. #1 AND NOT #3

15	({health services misuse} OR {inappropriate prescribing} OR {potentially inappropriate medication list} OR {health services overuse} OR {health services overutilization} OR {low-value} OR {low value} OR {choosing wisely} OR {unnecessary surger*} OR {unnecessary medication*} OR {unnecessary test*} OR {overdiagnos*} OR {overmedication} OR {overtreatment} OR {unwanted medical View More	3,179 document results
12	{emergency physician*} OR {emergency clinician*} OR {emergency care provider*} OR {emergency care specialist*} OR {emergency medicine physician*} OR {emergency medicine specialist*} OR {emergency specialist*} OR {emergentologist*} OR {emergency department*} OR {ED} OR {casualty department} OR {accident and emergency} OR {emergency medicine} OR {hospital emergency service*} OR {emergency room*} OR {emergency unit*} OR {emergency ward*} OR {emergency outpatient unit*}	3,938,719 document results
7	"deprescri*" OR "de-implement*" OR "deimplement*" OR "disinvest*" OR "deadopt*" OR "de-adopt*" OR "disadopt*" OR "decreas*" OR "discontinu*" OR "defund*" OR "decommission*" OR "declin*" OR "delist*" OR "revers*" OR "reject*" OR "reallocat*" OR "relinquish*" OR "re-apprais*" OR "re-prioriti?*" OR "redeploy*" OR "abandon*" OR "reassess*" OR "replac*"	15,365,210 document results
1	{health services misuse} OR {inappropriate prescribing} OR {potentially inappropriate medication list} OR {health services overuse} OR {health services overutilization} OR {low-value} OR {low value} OR {choosing wisely} OR {unnecessary surger*} OR {unnecessary medication*} OR {unnecessary test*} OR {overdiagnos*} OR {overmedication} OR {overtreatment} OR {unwanted medical care} OR {medical reversal*}	58,471 document results

CINAHL

Sunday, February 20, 2022 10:12:07 AM

#	Query	Limiters/Expanders	Last Run Via	Results
S25	S22 AND S23 AND S24	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,308
S24	S17 OR S18 OR S19 OR S20 OR S21	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,044,208
S23	S15 OR S16	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,203,475
S22	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	13,720
S21	(MH "Physicians, Emergency")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	4,568
S20	(MH "Emergency Service+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	67,785
S19	(MH "Emergency Medicine")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	13,067
S18	(MH "Health Facilities+")	Expanders - Apply	Interface - EBSCOhost	505,428



20/02/2022, 20:12 Print Search History: EBSCOhost

S16	(MH "Health Facilities+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	305,430
S17	(MH "Health Personnel+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	621,222
S16	""de-implement*" OR "deimplement*" OR "disinvest*" OR "deadopt*" OR "de-adopt*" OR "disadopt*" OR "decreas*" OR "discontinu*" OR "defund*" OR "decommission*" OR "declin*" OR "delist*" OR "revers*" OR "reject*" OR "reallocat*" OR "relinquish*" OR "re-apprais*" OR "re-priorit?*" OR "redeploy*" OR "abandon*" OR "reassess*" OR "replac*" OR "reduc*" OR "stop*" OR "withdraw*""	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,203,417
S15	(MH "Deprescribing")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	146
S14	"unnecessary treatment*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	2,361
S13	"unnecessary test*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	482
S12	(MH "Unnecessary	Expanders - Apply	Interface - EBSCOhost	3,809

https://web-a-ebscohost-com.elibrary.jcu.edu.au/ehost/searchhistory/PrintSearchHistory?vid=84&sid=ada07f80-e0e0-4806-83f3-f0e95ad8f5bb%40redis&bquer... 2/4

	Procedures")	equivalent subjects Search modes - Boolean/Phrase	Research Databases Search Screen - Advanced Search Database - CINAHL Complete	
S11	"overmedication"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	60
S10	"overtreatment"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,595
S9	"unwanted medical care"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	4
S8	"medical reversal"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	16
S7	"potentially inappropriate medication list"	Expanders - Apply equivalent subjects Search modes - SmartText Searching	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	4,057
S6	"overdiagnosis"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,493
S5	"choosing wisely"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	770
S4	"low-value health care"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search	38

		Boolean/Phrase	Search Database - CINAHL Complete	
S3	"low value"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	855
S2	(MH "Inappropriate Prescribing")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	3,179
S1	(MH "Health Services Misuse+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	5,906

GREY LITERATURE SEARCH STRATEGIES

Websites

Search terms: “low-value OR “de-implementation” OR “emergency medicine”

Searched websites(URL’s):

Google scholar(https://scholar.google.com/)

Choosing wisely US(https://www.choosingwisely.org/)

Choosing wisely Australia(https://www.choosingwisely.org.au/)

Choosing Wisely Canada(https://choosingwiselycanada.org/)

National Institute for Health and Care Excellence(https://www.nice.org.uk/)

Right care alliance(https://rightcarealliance.org/)

Lown institute(https://lowninstitute.org/)

Canadian Agency for Drugs and Technologies in Health(CADTH) Grey Matters Tool

Search terms: “low-value OR “de-implementation” OR “emergency medicine”

Content experts

Number of content experts contacted: 12(Prof Louise Cullen, Prof Diana Egerton-Warbuton, Prof Gerben Keijzers, Prof Daniel Fatovich, Prof Paul Glasziou, A/Prof Magnolia Cardiona, A/Prof Loai Albarqouni, Dr Emma Tavender, Ms Robyn Linder, Ms Jessica Sheppard, Ms Libby Haskell)

Search strategy: “Seminal works and/or grey literature exploring barriers/enablers/interventions to de-implement low-value care in emergency medicine practice”

Citation searching

Search strategy: Manual search for articles meeting eligibility criteria

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A mixed-methods scoping review informed by the Theoretical Domains Framework

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.	3-4
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.	4
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.	5
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.	6-7
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.	8
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Supplementary file
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	8
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.	9

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A mixed-methods scoping review informed by the Theoretical Domains Framework

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	9-10
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).	12
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	11
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.	N/A
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	N/A
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.	N/A
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	N/A
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.	N/A
Limitations	20	Discuss the limitations of the scoping review process.	N/A
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.	N/A
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.	14

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).

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A mixed-methods scoping review informed by the Theoretical Domains Framework

‡ 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 (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

BMJ Open

Identification of barriers, enablers, and interventions to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2022-062755.R2
Article Type:	Protocol
Date Submitted by the Author:	13-Sep-2022
Complete List of Authors:	Gangathimmaiah, Vinay; Townsville Hospital and Health Service, Emergency Department Evans, Rebecca; James Cook University, College of Medicine and Dentistry and Anton Breinl Research Centre for Health Systems Strengthening Moodley, Nishila; Townsville Hospital Sen Gupta, Tarun; James Cook University Drever, Natalie; James Cook University; Cairns Hospital Cardona, Magnolia; Bond University, Institute for Evidence Based Healthcare; Gold Coast University Hospital, EBP Professorial Unit Carlisle, Karen; James Cook University, College of Medicine and Dentistry
Primary Subject Heading:	Emergency medicine
Secondary Subject Heading:	Research methods, Health services research
Keywords:	ACCIDENT & EMERGENCY MEDICINE, Change management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Health & safety < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

TITLE

Identification of barriers, enablers, and interventions to inform de-implementation of low-value care in emergency medicine practice: A protocol for a mixed-methods scoping review informed by the Theoretical Domains Framework

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WORD COUNT: 2593

ABSTRACT

Introduction: Low-value care can lead to patient harm, misdirected clinician time and wastage of finite healthcare resources. Despite worldwide endeavours, de-implementing low-value care has proved challenging. Multifaceted, context and barrier-specific interventions are essential for successful de-implementation. The aim of this literature review is to summarise the evidence about barriers to, enablers of, and interventions for de-implementation of low-value care in emergency medicine practice.

Methods and analysis: A mixed methods scoping review using the Arksey and O'Malley framework will be conducted. MEDLINE, CINAHL, EMBASE, EMCare, Scopus and grey literature will be searched from inception. Primary studies will be included. Barriers, enablers, and interventions will be mapped to the domains of the Theoretical Domains Framework. Study selection, data collection and quality assessment will be performed by two independent reviewers. NVivo software will be used for qualitative data analysis. Mixed Methods Appraisal Tool will be used for quality assessment. PRISMA extension for Scoping Reviews framework will be used to present results.

Ethics and dissemination: Ethics approval is not required for this scoping review. This review will generate an evidence summary regarding barriers to, enablers of, and interventions for de-implementation of low-value care in emergency medicine practice. This review will facilitate discussions about de-implementation with relevant stakeholders including healthcare providers, consumers, and managers. These discussions are expected to inform the design and conduct of planned future projects to identify context-specific barriers and enablers then co-design, implement and evaluate barrier-specific interventions.

Keywords: low-value care, de-implementation, barriers, enablers, interventions, emergency medicine, review.

ARTICLE SUMMARY

Strengths and limitations of this study

- This scoping review will yield a comprehensive summary of barriers, enablers and interventions influencing de-implementation of low-value care in emergency medicine practice.
- The use of the Theoretical Domains Framework to analyse the barriers and enablers is a strength as this has been associated with increased systematic uptake and success of de-implementation interventions and interventions.
- The use of mixed-methods approach is a strength as this will yield an integrated evidence synthesis to inform future practice, policy, and research.
- This review will have limited relevance to settings other than emergency medicine as de-implementation is influenced by contextual and cultural factors.

INTRODUCTION

Low-value care refers to health care interventions which confer little or no benefit, impose a risk of harm that exceeds benefit or incur a cost disproportionate to benefit.[1] Low-value care can lead to patient harm, misdirected clinician time and wastage of finite healthcare resources.[2] Studies from North America have estimated that at least 5-19 % of all interventions are low-value care, incurring annual expenditure of A$99.6 –138.9 billion.[3 4] Analysis of prevalence and trends of low-value care in New South Wales, Australia estimated inpatient costs of A$49.9 - $99.3million to the public hospital system in 2016-2017.[5]

To address low-value care, the American Board of Internal Medicine launched the Choosing Wisely campaign in 2012, aiming to engage physicians and patients in conversations regarding unnecessary tests, treatments, and procedures.[6] Despite the campaign gaining traction globally, de-implementing low-value care has proved complex and challenging.[7-10] Evidence suggests emphasizing financial benefits of addressing low-value care could result in clinician disengagement and community distrust.[11] On the other hand, elucidating harms of low-value care and translating the recommendations into measurable outcomes may facilitate engagement.[9 10] Clinician and community engagement could be further enhanced by systematic exploration of determinants- also called barriers and enablers- of de-implementation of low-value care.[12]

Several literature reviews have explored barriers, enablers, and interventions for de-implementation of low-value care.[12-22] Van Dulmen et al demonstrated that situation-specific knowledge of barriers and enablers is essential for designing tailored de-implementation interventions.[12] A systematic review conducted by Wang et al concluded that addressing patient, clinician and system-level barriers is necessary for successful de-implementation of low-value breast cancer surgery.[13] De-implementation was perceived as challenging and controversial by healthcare staff who experienced anxiety, disempowerment, distrust, and feelings of being dismissed and disrespected.[14] Change led by frontline clinicians, rigorous outcome data, and transparent decision-making could strengthen de-implementation endeavours.[14] Multifaceted interventions have the greatest potential to reduce low-value care[15-18] when interventions target tests individually[16], involve patients in decision making[19], modify clinician environments[20], address contextual factors[17] and are informed by behavioural change theories.[21] Identification of barriers and enablers as well as development of effective interventions have been highlighted as areas of de-implementation of low-value care that merit further research.[22]

As part of global efforts to address low-value care, leading emergency medicine organizations have developed recommendations to reduce coagulation studies[23], urine cultures[24 25], blood cultures[23] , cranial Computed Tomography (CT) in syncope[26], cranial CT in head trauma[23], cervical CT in neck trauma[23], ankle radiographs in ankle trauma[27], duplex lower extremity ultrasound in suspected deep vein thrombosis[27], CT Pulmonary Angiography in suspected pulmonary embolism[27] and CT Kidney-Ureters-Bladder in suspected renal colic.[23] However, barriers, enablers, and interventions for de-implementation of low-value care in emergency medicine practice have not been summarised in a literature review. The proposed literature review intends to address this knowledge gap. Such a review is necessary to better inform emergency clinicians who face unique challenges of overcrowding[28], diagnostic uncertainty[29], limited-information[30], ambulant patient population, high staff turnover and time constraints.[31 32] Such a review will also contribute to de-implementation endeavours in emergency departments providing healthcare to a significant proportion of the national population in United States of America(130million visits/year)[33], United Kingdom(17.4million ED visits/year)[34], Canada(11.7million ED visits/year)[35] and Australia(8.8million ED visits/year).[36] The objective of this review is to examine the extent, range, and nature of research activity by systematically evaluating and

synthesising the literature about de-implementation of low-value care in emergency medicine practice. A scoping review methodology will be employed as this objective aligns with the accepted definition and purpose of a scoping review.[37-39]

METHODS AND ANALYSIS

This scoping review will be conducted in alignment with the enhanced Arksey and O'Malley framework[37 40-43] employing a mixed methods approach and the Theoretical Domains Framework. The review is expected to take 12 months (November 1, 2021 - October 31, 2022). The protocol has been registered with Open Science Framework Registry(osf.io/bp8fa).

A mixed-methods approach will be employed as this scoping review will integrate and synthesise data, from quantitative, qualitative and mixed-methods studies.[44] This scoping review will be informed and underpinned by the Theoretical Domains Framework (TDF) as use of theoretical principles to guide understanding has been found to increase systematic uptake and success of interventions, interventions, and policies.[45] The TDF is a multi-level, well operationalized, implementation science framework with 128 constructs and 14 domains derived from 33 behavioural change theories.[46 47] The TDF has several strengths that make it a suitable choice to inform this review. Firstly, the overlapping domains across multiple theories of behavioural change will enable comprehensive identification and mapping of potential barriers, enablers, and interventions for de-implementation of low-value care [46-48] in emergency medicine practice. Secondly, the TDF has a predominant focus at individual-level factors[47] which will enable accurate mapping of barriers, enablers, and interventions at the level of emergency health-care provider. Thirdly, the TDF has been successfully applied to multiple studies in emergency medicine settings including a process evaluation of Canadian CT Head Rule trial [49], a qualitative study of factors influencing mild traumatic brain injury[50] and a study of de-implementing low-value care in infant bronchiolitis.[51] Finally, a TDF-informed scoping review can guide the subsequent choice of appropriate behaviour change theories to develop, implement and evaluate interventions to change behaviour[48] of emergency healthcare providers. The scoping review framework is detailed below.

Identification of research question

'What is known from existing literature about healthcare provider-level barriers to, enablers of and interventions for de-implementation of low-value care in emergency medicine practice'?

Identification of relevant studies

Primary observational and interventional studies which employed qualitative, quantitative, or mixed-methods approaches to explore barriers, enablers, and interventions for de-implementation of low-value care in emergency medicine practice will be included. Low-value care will be defined as tests, treatments and procedures that, according to best available evidence, have little or no benefit or impose harms that outweigh any likely benefits or incur costs that are disproportionate to any benefits.[1] De-implementation will be defined as an active process of reducing low-value care by stopping or changing an existing practice.[12] Barriers will be defined as factors that decrease the likelihood of introduction and sustainability of de-implementation of low-value care[52]. Enablers will be defined as factors that increase the likelihood of introduction and sustainability of de-implementation of low-value care.[53] Interventions will be defined as actions that introduce and sustain de-implementation of low-value care.[54] Animal studies and quantitative studies with a sample size less than 30 will be excluded.[55] No date or language limits will be applied to enable accurate mapping of the growth of emergency medicine literature about de-implementation of low-value care over time and ensure inclusion of all relevant studies. A complete list of eligibility criteria is presented in Table 1.

Table 1 Eligibility criteria

PICOTS criteria	Inclusion criteria	Exclusion criteria (Rationale)
Population	Human studies involving emergency health care providers, consumers or managers	Animal studies (not relevant to clinical practice)
Intervention/Exposure	De-implementation of low-value care	
Comparator	Usual/Standard practice	
Outcome	Barriers or enablers or interventions to de-implement low-value care	
Timeframe	All reported timeframes will be included	
Setting	Emergency department	
Design	Primary quantitative, qualitative and mixed-methods studies.	Reviews, protocols, perspectives, comment, opinions, editorials, letters to editors, news articles, books, chapters, policies, and guidelines (Not primary sources of data)
Quality or risk of bias	Studies will be included regardless of quality.	
Sample size	Studies will be included regardless of sample size	
Publication status	Studies will be included regardless of publication status	
Time period	Studies from inception to a maximum of two months prior to submission for publication will be included	
Language	Studies will be included regardless of their language of publication.	

Study selection

MEDLINE, CINAHL, EMBASE, EMCare and Scopus will be searched from inception to a maximum of two months prior to submission for publication. The search will be structured around three concepts: low-value, de-implementation and emergency medicine. The database search strategy will include a combination of relevant keywords, Medical Subject Heading terms, Boolean operators, and wildcards (truncation and question mark to account for plural words and spelling variations respectively). The search will be refined through an iterative process in consultation with an experienced medical librarian. Table 2 lists the proposed search terms. Grey literature will be identified through Grey Matters tool from the Canadian Association for Drugs and Technologies in Health[56], Google Scholar, relevant websites (Choosing Wisely, NICE, Lown Institute, Right Care Alliance) and content experts. After elimination of duplicates, two reviewers will independently perform title and abstract screening of retrieved results to identify potentially eligible articles followed by a full text review to determine eligible studies. Disagreements between the two initial reviewers will be discussed with and resolved by a third reviewer. Reference lists of included articles and relevant excluded articles will be screened to identify additional eligible articles. All articles that undergo a full text review will be assigned a unique identification number to enable accurate tracking of the included and excluded articles throughout the review process. Google Translate will be used to translate non-English articles. Endnote 20.0 will be used to manage references.[57]

Inter-reviewer reliability will be calculated for title/abstract screening and full text review stages using proportion of agreement between coders, Cohen's kappa[58] and prevalence and bias adjusted kappa.[59] The measures of inter-rater reliability will be reported to ensure transparency of the review process. These measures will not, however, alter the review process as any disagreements between the two independent reviewers during these phases will be resolved by a third reviewer.

Sensitivity and specificity of the search strategy will be evaluated as follows. Sensitivity will be calculated as ratio of the number of included studies indexed in MEDLINE that were retrieved by the search strategy to the number of included studies indexed in MEDLINE.[60] For acceptable sensitivity, we will identify 10 sentinel articles and ensure that they are all included in the search results. Specificity will be calculated as the ratio of number of included studies indexed in MEDLINE that were retrieved by the search strategy to the number of studies initially retrieved by the search strategy.[60] For acceptable specificity, we will

determine the feasibility of the scoping review by ensuring that the total number to citations to screen is less than 50,000.

Table 2 Search concepts and terms

Concept	Synonyms
Low-value care	health services misuse OR medical overuse OR unnecessary procedures OR inappropriate prescribing OR potentially inappropriate medication list OR health services overuse OR health services overutilization OR low-value OR low value OR unnecessary test OR unnecessary medication OR unnecessary surgery OR choosing wisely OR overdiagnosis OR overmedication OR overtreatment OR unwanted medical care OR medical reversal
De-implementation [61]	deprescriptions OR de-implement OR deimplement OR disinvest OR deadopt OR de-adopt OR disadopt OR decrease OR discontinue OR defund OR decommission OR decline OR delist OR reverse OR reject OR reallocate OR relinquish OR re-appraise OR re-prioritize OR redeploy OR abandon OR reassess OR replace OR reduce OR stop OR withdraw
Emergency Medicine	emergency physician OR emergency clinician OR emergency care provider OR emergency care specialist OR emergency medicine physician OR emergency medicine specialist OR emergency specialist OR emergentologist OR health personnel OR health care personnel OR health facilities OR health care facility OR emergency department OR ED OR casualty department OR accident and emergency OR emergency medicine OR hospital emergency service OR emergency room OR emergency unit OR emergency ward OR emergency outpatient unit or emergency service

Data charting

Two reviewers will independently chart data from included studies using a standardized data collection form (Microsoft Excel,2022[62]) using an iterative process of data collection and

refinement of the data collection form. Following data collection for 10% of included studies, the reviewers will meet to determine whether the data collection approach is consistent with the review objectives and whether relevant additional data variables need to be included. Data variables of interest and values are listed in Table 3. Two reviewers will independently sift and sort the collected data. Any disagreements will be discussed with and resolved by a third reviewer. Authors of included studies will be contacted for further data or clarification if indicated.

Table 3 Data variables and values

Data variable	**Values**
Author, Year of publication, Country of origin	
Aims and Objectives	Identification of barriers/facilitators, evaluation of de-implementation strategy/intervention
Design	Quantitative, Qualitative, Mixed-Methods
Setting	Emergency Medicine
Type of low-value care	Test, Treatment, Procedure
Stream, specialty, experience, gender and sample size of participants	Medical/ Nursing/ Allied health streams, Medical/Surgical/ Psychiatric/ Paediatric/ General Practice Specialties and subspecialties, Experience in years, Male/Female/Other
Use of theories, frameworks, or models of behavioural change	
Methodology and Methods of data collection	Methodology: Randomized/Cohort/Case-control/Cross-sectional/ Descriptive (Quantitative), Descriptive/ Grounded theory/ Ethnography/Action Research/Delphi/Case study/Phenomenology (Qualitative), Convergent/Sequential/Embedded/Multi-phase (Mixed-methods)

	Methods: Surveys, questionnaires, interviews, focus groups, observation, key informants, other validated tools.
Findings/Results	Barriers, Enablers, Interventions, Degree of agreement between participants about barriers/enablers, Process measures of intervention including feasibility/relevance/ acceptability/ penetration/ uptake/ fidelity, Outcome measures of intervention including effectiveness, cost-effectiveness/safety/quality/ sustainability.
Relevant additional variables	

Collating, Summarizing and Reporting results

Data will be subjected to quantitative and qualitative analyses. The analyses will be structured around the barriers, enablers, and interventions of de-implementation of low-value care in emergency medicine practice. The quantitative analysis will summarise barriers, enablers, and interventions in terms of trends across time, geography, economies (high income versus low-middle income countries), design (controlled versus uncontrolled studies) and quality (high-quality versus low-quality studies). The qualitative analysis will map barriers, enablers, and interventions to the 14 domains of the Theoretical Domains Framework (TDF) shown in Table 4. The qualitative analysis will involve line-by-line and axial coding followed by thematic analysis of coded data. Themes will be pre-determined and aligned to the domains of the Theoretical Domains Framework. As the domains of the TDF are not mutually exclusive, barriers, enablers and interventions will be mapped to all relevant domains of the TDF. NVivo data management software will be used to facilitate qualitative data analysis.[63]

Table 4. Domains and definitions of the Theoretical Domains Framework (Adapted from Cane et al[64] under creative commons attribution licence CC BY 2.0)

Domain	**Definition**
1. Knowledge	An awareness of the existence of something
2. Skills	An ability or proficiency acquired through practice

3. Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting
4. Beliefs about capabilities	Acceptance of the truth, reality or validity about an ability, talent, or facility that a person can put to constructive use
5. Optimism	The confidence that things will happen for the best or that desired goals will be attained
6. Beliefs about Consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation
7. Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
8. Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way
9. Goals	Mental representations of outcomes or end states that an individual wants to achieve
10. Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives
11. Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour
12. Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours
13. Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
14. Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions

Quality assessment of included studies will be performed by two independent reviewers using the Mixed Methods Appraisal Tool[65], a validated tool for assessing methodological quality of quantitative, qualitative, and mixed-method studies (Figure 1). Although quality assessment was not part of the original Arksey and O'Malley framework, a lack of quality assessment could make the results of a scoping review challenging to interpret[66] and limit the uptake of findings into policy and practice.[39] Quality assessment will enable the synthesis of the results based on quality of included studies. Quality assessment will thus lend additional rigor to the scoping review methodology.

Results of the review will be presented using the PRISMA extension for Scoping Reviews (PRISMA-ScR) framework.[67] The results of the search strategy will be summarised in a PRISMA flow diagram. Search strategies for individual databases will be summarized and presented in a tabular format (Supplemental file). The results of the quantitative analysis will be presented as frequencies and proportions in a tabular summary of research methods, geographic location, types, numbers and range of barriers/enablers/interventions, degree of agreement about barriers and enablers, effectiveness of implementation process and effectiveness of interventions. The results of the qualitative analysis will be presented as a tabular summary of barriers, enablers and interventions mapped to the domains of TDF. The results from the quantitative and qualitative analyses will be synthesised and integrated using the JBI convergent integrated approach.[68] The results will be discussed in the context of current literature and in alignment to the review objective. The results of quality assessment of included studies will be presented as a tabular summary and their implications on the applicability of the review findings will be discussed. Limitations of the scoping review as well as implications for policy, practice and research will be discussed.

Stakeholder Consultation

Stakeholder consultation will not be part of this scoping review. However, the findings of this scoping review will be integral to stakeholder consultations that will inform three planned sequential projects to de-implement low-value care in emergency medicine practice. Emergency health care providers, consumers and managers will be the major stakeholders in these projects.

PATIENT AND PUBLIC INVOLVEMENT

Patients and public were not involved in the design of this scoping review and will not be involved in its conduct.

ETHICS AND DISSEMINATION

Ethics approval is not required for this scoping review of literature. The findings of this review are expected to contribute to the rapidly growing evidence base about de-implementation of low-value care as well as inform emergency medicine practitioners about potential barriers, enablers, and interventions. This review will inform subsequent planned projects at Townsville University Hospital, Queensland, Australia. This regionally located hospital has a catchment of 670,000 people[69] and an annual emergency department census of 91,997 for 2020-2021.[70] The planned projects are expected to identify context-specific, barriers and enablers to de-implementation of low-value care, co-design barrier-specific interventions, implement and evaluate the interventions in sequential phases. As participants in these projects, healthcare providers at Townsville University Hospital Emergency Department will be an integral part of the knowledge translation process. Healthcare consumers at Townsville University Hospital are also anticipated to be a part of the knowledge translation process by enabling de-implementation via shared decision-making with emergency healthcare providers. The findings of this review will inform discussions with the Townsville University Hospital managers about the systemic changes that can support healthcare providers to de-implement low-value care. The findings of this review as well as the subsequent projects will enhance the evidence base of emergency medicine. Findings will be disseminated via conference presentations, peer-reviewed publications, and discussions with formal and informal research networks of the reviewers

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Author contributions

VG conceived and designed the study and drafted the manuscript. RE, NM, TSG, ND, MC and KC critically reviewed and approved the final manuscript.

Competing interests

None declared.

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Data Statement

Technical appendix, statistical code and dataset will be available from the Dryad repository.

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Figure legend

Figure 1. Mixed-Methods Appraisal Tool

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?				
	S2. Do the collected data allow to address the research questions?				
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?				
	1.2. Are the qualitative data collection methods adequate to address the research question?				
	1.3. Are the findings adequately derived from the data?				
	1.4. Is the interpretation of results sufficiently substantiated by data?				
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?				
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?				
	2.2. Are the groups comparable at baseline?				
	2.3. Are there complete outcome data?				
	2.4. Are outcome assessors blinded to the intervention provided?				
	2.5 Did the participants adhere to the assigned intervention?				
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?				
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?				
	3.3. Are there complete outcome data?				
	3.4. Are the confounders accounted for in the design and analysis?				
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?				
	4.2. Is the sample representative of the target population?				
	4.3. Are the measurements appropriate?				
	4.4. Is the risk of nonresponse bias low?				
	4.5. Is the statistical analysis appropriate to answer the research question?				
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?				
	5.2. Are the different components of the study effectively integrated to answer the research question?				
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

Figure 1: Mixed-Methods Appraisal Tool (adapted from Hong et al[62])

DATABASE SEARCH STRATEGIES

MEDLINE

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) <1946 to February 18, 2022>(Search on Feb 20,2022)

1 exp Health Services Misuse/ 12443
2 exp Inappropriate Prescribing/ 4188
3 exp Potentially Inappropriate Medication List/ 791
4 (health services overuse or health services overutilization or low-value or low value or choosing wisely or unnecessary surger* or unnecessary medication* or unnecessary test* or overdiagnos* or overmedication or overtreatment or unwanted medical care or medical reversal*).mp. 17396
5 exp Deprescriptions/ 789
6 (de-implement* or deimplement* or disinvest* or deadopt* or de-adopt* or disadopt* or decreas* or discontinu* or defund* or decommission* or declin* or delist* or revers* or reject* or reallocat* or relinquish* or re-apprais* or re-prioriti?* or redeploy* or abandon* or reassess* or replac* or reduc* or stop* or withdraw*).mp. 7376157
7 exp Health Personnel/ 573291
8 exp Health Facilities/ 851882
9 exp Emergency Medicine/ 14966
10 1 or 2 or 3 or 4 32377
11 5 or 6 7376433
12 7 or 8 or 9 1328546
13 10 and 11 and 12 2349

Emcare

Ovid Emcare <1995 to 2022 Week 7>(Search on Feb 20,2022)

1 exp inappropriate prescribing/ 2610
2 exp potentially inappropriate medication/ 838
3 (health services overuse or health services overutilization or low-value or low value, or choosing wisely or unnecessary surger* or unnecessary medication* or unnecessary test* or overdiagnos* or overmedication or overtreatment or unwanted medical care or medical reversal* or health services misuse).mp. 6256
4 exp deprescription/ 286
5 (de-implement* or deimplement* or disinvest* or deadopt* or de-adopt* or disadopt* or decreas* or discontinu* or defund* or decommission* or declin* or delist* or revers* or reject* or reallocat* or relinquish* or re-apprais* or re-prioriti?* or redeploy* or abandon* or reassess* or replac* or reduc* or stop* or withdraw*).mp. 1837484
6 exp health care personnel/ 810480
7 exp health care facility/ 604543
8 exp emergency medicine/ 16333
9 exp emergency ward/ 78367
10 exp emergency physician/ 8586
11 1 or 2 or 3 8819
12 4 or 5 1837600
13 6 or 7 or 8 or 9 or 10 1249902
14 11 and 12 and 13 1375

EMBASE

Embase Session Results

No.	Query	Results
#4	#1 AND #2 AND #3	916
#3	'emergency physician' OR 'emergency ward' OR 'emergency medicine' OR 'emergency health service'	427,610
#2	'de-implement*' OR 'disinvest*' OR 'deadopt*' OR 'decreas*' OR 'discontinu*' OR 'defund*' OR 'decommission*' OR 'declin*' OR 'delist*' OR 'revers*' OR 'reject*' OR 'reallocat*' OR 'relinquish*' OR 're-apprais*' OR 're-prioriti?*' OR 'redeploy*' OR 'abandon*' OR 'reassess*' OR 'replac*' OR 'reduc*' OR 'stop*' OR 'withdraw*'	9,927,479
#1	'low-value' OR 'choosing wisely' OR 'medical overuse'/exp OR 'medical overuse' OR 'overdiagnos*' OR 'overtreatment'/exp OR 'overtreatment' OR 'overmedication'/exp OR 'overmedication' OR 'unwanted medical care' OR 'potentially inappropriate medication'/exp OR 'potentially inappropriate medication' OR 'inappropriate prescribing'/exp OR 'inappropriate prescribing' OR 'medical reversal' OR 'unnecessary test*' OR 'unnecessary medication*' OR 'unnecessary surger*'	40,633

SCOPUS

Scopus Search Sources Lists SciVal ↗

Advanced search

< Basic Search | Advanced | Search tips

Enter query string

{emergency physician*} OR {emergency clinician*} OR {emergency care provider*} OR {emergency care specialist*} OR {emergency medicine physician*} OR {emergency medicine specialist*} OR {emergency specialist*} OR {emergentologist*} OR {emergency department*} OR {ED} OR {casualty department} OR {accident and emergency} OR {emergency medicine} OR {hospital emergency service*} OR {emergency room*} OR {emergency unit*} OR {emergency ward*} OR {emergency outpatient unit*}

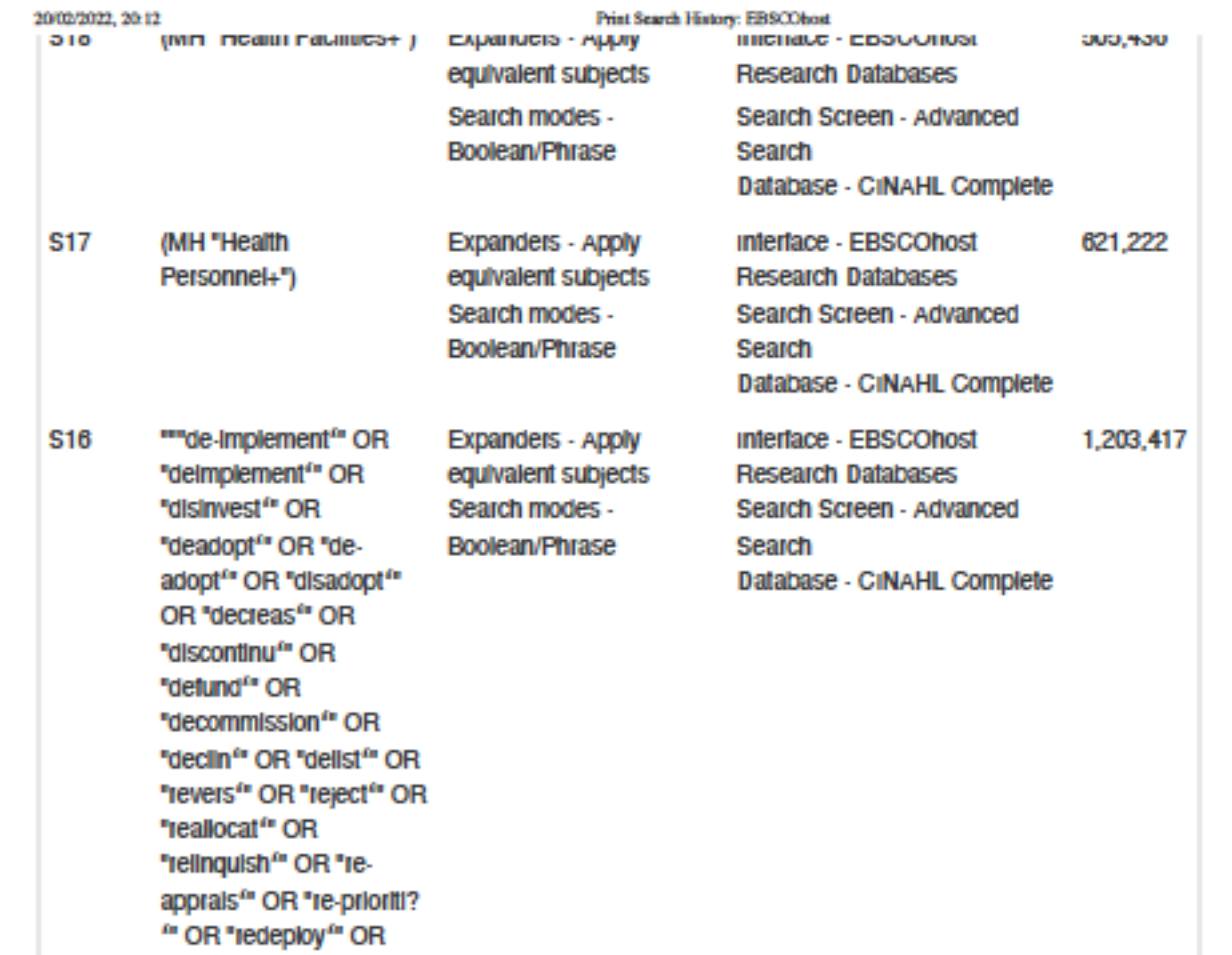
Search history | Combine queries... e.g. #1 AND NOT #3

15	({health services misuse} OR {inappropriate prescribing} OR {potentially inappropriate medication list} OR {health services overuse} OR {health services overutilization} OR {low-value} OR {low value} OR {choosing wisely} OR {unnecessary surger*} OR {unnecessary medication*} OR {unnecessary test*} OR {overdiagnos*} OR {overmedication} OR {overtreatment} OR {unwanted medical View More	3,179 document results
12	{emergency physician*} OR {emergency clinician*} OR {emergency care provider*} OR {emergency care specialist*} OR {emergency medicine physician*} OR {emergency medicine specialist*} OR {emergency specialist*} OR {emergentologist*} OR {emergency department*} OR {ED} OR {casualty department} OR {accident and emergency} OR {emergency medicine} OR {hospital emergency service*} OR {emergency room*} OR {emergency unit*} OR {emergency ward*} OR {emergency outpatient unit*}	3,938,719 document results
7	"deprescri*" OR "de-implement*" OR "deimplement*" OR "disinvest*" OR "deadopt*" OR "de-adopt*" OR "disadopt*" OR "decreas*" OR "discontinu*" OR "defund*" OR "decommission*" OR "declin*" OR "delist*" OR "revers*" OR "reject*" OR "reallocat*" OR "relinquish*" OR "re-apprais*" OR "re-prioriti?*" OR "redeploy*" OR "abandon*" OR "reassess*" OR "replac*"	15,365,210 document results
1	{health services misuse} OR {inappropriate prescribing} OR {potentially inappropriate medication list} OR {health services overuse} OR {health services overutilization} OR {low-value} OR {low value} OR {choosing wisely} OR {unnecessary surger*} OR {unnecessary medication*} OR {unnecessary test*} OR {overdiagnos*} OR {overmedication} OR {overtreatment} OR {unwanted medical care} OR {medical reversal*}	58,471 document results

CINAHL

Sunday, February 20, 2022 10:12:07 AM

#	Query	Limiters/Expanders	Last Run Via	Results
S25	S22 AND S23 AND S24	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,308
S24	S17 OR S18 OR S19 OR S20 OR S21	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,044,208
S23	S15 OR S16	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,203,475
S22	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	13,720
S21	(MH "Physicians, Emergency")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	4,568
S20	(MH "Emergency Service+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	67,785
S19	(MH "Emergency Medicine")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	13,067
S18	(MH "Health Facilities+")	Expanders - Apply	Interface - EBSCOhost	505,428



20/02/2022, 20:12 Print Search History: EBSCOhost

S16	(MH "Health Facilities+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	305,430
S17	(MH "Health Personnel+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	621,222
S16	""de-implement*" OR "deimplement*" OR "disinvest*" OR "deadopt*" OR "de-adopt*" OR "disadopt*" OR "decreas*" OR "discontinu*" OR "defund*" OR "decommission*" OR "declin*" OR "delist*" OR "revers*" OR "reject*" OR "reallocat*" OR "relinquish*" OR "re-apprais*" OR "re-priorit?*" OR "redeploy*" OR "abandon*" OR "reassess*" OR "replac*" OR "reduc*" OR "stop*" OR "withdraw*""	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,203,417
S15	(MH "Deprescribing")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	146
S14	"unnecessary treatment*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	2,361
S13	"unnecessary test*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	482
S12	(MH "Unnecessary	Expanders - Apply	Interface - EBSCOhost	3,809

https://web-a-ebscohost-com.elibrary.jcu.edu.au/ehost/searchhistory/PrintSearchHistory?vid=84&sid=ada07f80-e0e0-4806-83f3-f0e95ad8f5bb%40redis&bquer... 2/4

	Procedures")	equivalent subjects Search modes - Boolean/Phrase	Research Databases Search Screen - Advanced Search Database - CINAHL Complete	
S11	"overmedication"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	60
S10	"overtreatment"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,595
S9	"unwanted medical care"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	4
S8	"medical reversal"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	16
S7	"potentially inappropriate medication list"	Expanders - Apply equivalent subjects Search modes - SmartText Searching	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	4,057
S6	"overdiagnosis"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,493
S5	"choosing wisely"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	770
S4	"low-value health care"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search	38

		Boolean/Phrase	Search Database - CINAHL Complete	
S3	"low value"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	855
S2	(MH "Inappropriate Prescribing")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	3,179
S1	(MH "Health Services Misuse+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	5,906

GREY LITERATURE SEARCH STRATEGIES

Websites

Search terms: “low-value OR “de-implementation” OR “emergency medicine”

Searched websites(URL’s):

Google scholar(https://scholar.google.com/)

Choosing wisely US(https://www.choosingwisely.org/)

Choosing wisely Australia(https://www.choosingwisely.org.au/)

Choosing Wisely Canada(https://choosingwiselycanada.org/)

National Institute for Health and Care Excellence(https://www.nice.org.uk/)

Right care alliance(https://rightcarealliance.org/)

Lown institute(https://lowninstitute.org/)

Canadian Agency for Drugs and Technologies in Health(CADTH) Grey Matters Tool

Search terms: “low-value OR “de-implementation” OR “emergency medicine”

Content experts

Number of content experts contacted: 12(Prof Louise Cullen, Prof Diana Egerton-Warbuton, Prof Gerben Keijzers, Prof Daniel Fatovich, Prof Paul Glasziou, A/Prof Magnolia Cardiona, A/Prof Loai Albarqouni, Dr Emma Tavender, Ms Robyn Linder, Ms Jessica Sheppard, Ms Libby Haskell)

Search strategy: “Seminal works and/or grey literature exploring barriers/enablers/interventions to de-implement low-value care in emergency medicine practice”

Citation searching

Search strategy: Manual search for articles meeting eligibility criteria

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A mixed-methods scoping review informed by the Theoretical Domains Framework

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.	3-4
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.	4
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.	5
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.	6-7
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.	8
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Supplementary file
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	8
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.	9

Identification of barriers, enablers, and strategies to inform de-implementation of low-value care in emergency medicine practice: A mixed-methods scoping review informed by the Theoretical Domains Framework

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	9-10
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).	12
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	11
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.	N/A
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	N/A
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.	N/A
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	N/A
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.	N/A
Limitations	20	Discuss the limitations of the scoping review process.	N/A
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.	N/A
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.	14

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).

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‡ 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 (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.