



# BMJ Open Frailty assessment tools for use by surgeons when evaluating older adults prior to surgery: a scoping review protocol

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## ABSTRACT

**Introduction** Despite growing evidence, uncertainty persists about which frailty assessment tools are best suited for routine perioperative care. We aim to understand which frailty assessment tools perform well and are feasible to implement.

**Methods and analysis** Using a registered protocol following Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA), we will conduct a scoping review informed by the Joanna Briggs Institute Guide for Scoping Reviews and reported using PRISMA extension for Scoping Reviews recommendations. We will develop a comprehensive search strategy with information specialists using the Peer Review of Electronic Search Strategies checklist, and implement this across relevant databases from 2005 to 13 October 2021 and updated prior to final review publication. We will include all studies evaluating a frailty assessment tool preoperatively in patients 65 years or older undergoing intracavitary, non-cardiac surgery. We will exclude tools not assessed in clinical practice, or using laboratory or radiologic values alone. After pilot testing, two reviewers will independently assess information sources for eligibility first by titles and abstracts, then by full-text review. Two reviewers will independently chart data from included full texts using a piloted standardised electronic data charting. In this scoping review process, we will (1) index frailty assessment tools evaluated in the preoperative clinical setting; (2) describe the level of investigation supporting each tool; (3) describe useability of each tool and (4) describe direct comparisons between tools. The results will inform ready application of frailty assessment tools in routine clinical practice by surgeons and other perioperative clinicians.

**Ethics and dissemination** Ethic approval is not required for this secondary data analysis. This scoping review will be published in a peer-review journal. Results will be used to inform an ongoing implementation study focused on geriatric surgery to overcome the current lack of uptake of older adult-oriented care recommendations and ensure broad impact of research findings.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The proposed review has been designed and will be conducted and reported in accordance with best practices in evidence synthesis methodology.
- ⇒ By focusing solely on tools studied for clinical application before surgery, we may exclude potentially useful tools that have not yet been investigated in a surgical population.
- ⇒ There may be non-frailty assessment tools that are of relevance in the preoperative setting that will not be captured in this review; however, this review focuses specifically on frailty assessment tools.

## INTRODUCTION

Despite exponential growth in frailty research in surgery, effective guidance for surgeons when evaluating older patients prior to surgery is lacking.<sup>1–5</sup> Frailty is present in 10%–30% of older adults, and is associated with inferior postoperative outcomes including major complications, death and functional decline.<sup>6–11</sup> A high prevalence of frailty has major health systems implications as the population ages and older adults comprise over half of inpatient surgical procedures.<sup>12 13</sup> Identification of frailty improves risk stratification, shared decision-making and enables targeted multidisciplinary intervention (eg, prehabilitation, nutritional supplementation, shared care).<sup>3 14 15</sup> Frailty assessment tools can be used in the clinical setting as measurement tools to diagnose or screen for frailty, to make a prognostic assessment of expected outcomes, or to estimate treatment effect to guide clinical decisions (ie, differential treatment effect).<sup>16 17</sup>

Myriad frailty assessment tools are described, with varying degrees of development and validation rigour; yet, it remains unclear which of these tools should be



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applied in routine surgical care.<sup>3–5 18</sup> Prior efforts at evidence synthesis have summarised the association of frailty with various postoperative outcomes, but most have focused on effects summarised across various tools or methods for evaluating frailty.<sup>11 19–23</sup> Without focusing on the properties of individual frailty assessment tools, it is challenging to select specific tools for routine clinical application. A recent review has synthesised the psychometric properties of frailty assessment tools in the non-surgical setting.<sup>24</sup> A single review has examined the association of individual frailty tools with postoperative outcomes, but these have been synthesised across surgical types and diagnostic or treatment effect properties were not examined.<sup>25</sup> Acknowledging the lack of clarity about which tools to apply, while many specialty societies recommend frailty screening, none strongly recommend specific tools.<sup>3 26–32</sup>

Given the exponential growth in publications on frailty in surgery, we aim to understand the available knowledge related to frailty assessment tools applied in routine surgical care including purpose, level of investigation, usability and comparisons. We will conduct a scoping review as this methodology is designed to address broad questions and examine the extent, range and characteristics of the published literature as well as summarise findings from a heterogeneous body of knowledge.<sup>33 34</sup> Based on the results of this scoping review, future systematic reviews with quantitative meta-analysis may be conducted for frailty assessment tools with sufficient available evidence.

In this scoping review, we will systematically identify the published literature assessing frailty assessment tools in the preoperative clinical setting, and

1. Index the frailty assessment tools that have been developed or evaluated in the preoperative clinical setting.
2. Describe the level of investigation supporting each tool for diagnosis, prognosis or treatment effect estimation.
3. Describe useability in clinical practice of each tool.
4. Describe direct comparisons between tools.

We will use this evidence synthesis to index the level of investigation evaluating frailty assessment tools that can be applied in routine clinical practice by surgeons and other perioperative physicians.

## METHODS AND ANALYSIS

We report this scoping review protocol in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P) recommendations along with updated scoping review methodologic guidance: the conduct of the review is informed by the formally Joanna Briggs Institute methodology manual for scoping reviews, and the final manuscript will be reported in accordance with the PRISMA Extension for Scoping Reviews (PRISMA-ScR) recommendations.<sup>33–36</sup> The completed PRISMA-P checklist can be found in online supplemental appendix A.

## Patient and public involvement

Patient and public will not be involved in the design, conduct or parting of the study. Results of this review will be disseminated to relevant conferences and peer-reviewed journals, and by including them in subsequent implementation research. The results of this scoping review will be compared with any recommendations provided in current specialty society recommendations.<sup>3 26–32</sup>

## Review question

The review question was generated in consultation with leading experts in evidence synthesis, knowledge translation, perioperative risk stratification and geriatric perioperative medicine. The research question is: What frailty assessment tools exist for use when evaluating older adults in the preoperative clinical setting, and what level of investigation is available assessing measurement, diagnostic, prognostic and useability properties?

## Definitions

Frailty is a state of vulnerability to stressors due to multi-system decline in physiological reserve and function, thereby increasing the risk of adverse health outcomes.<sup>37–41</sup> Several evidence-based models have been developed to operationalise frailty including (1) the cumulative deficit model reflecting a cumulative effect of deficits acquired across many domains including medical, social and functional; and (2) the phenotype model reflecting a biological syndrome of decline across multiple physiological systems.<sup>37 38 42</sup>

For this review, frailty assessment tools will be considered health measurement tools (either based on formative or reflective models), with a specific and reproducible set of variables used to assess frailty in older adults as reflected by the definition above; these tools typically are multicomponent tools developed to assess frailty based on an established model of frailty.<sup>16</sup>

## Eligibility criteria

The eligibility criteria are summarised here and elaborated in the tables provided in online supplemental appendix B.

## Population

We will include studies of older adults undergoing major intracavitary, non-cardiac surgery. This will be considered those aged 65 or older, or a study population with a median age of 65 or older, or where the majority of included individuals are 65 years or older.<sup>43 44</sup> We will exclude noncavitary (eg, soft tissue, extremity and neurosurgery) and cardiac surgery as these have largely different perioperative considerations and postoperative outcomes.

## Concept

We will include studies reporting on the development or evaluation of characteristics of a frailty assessment tool. Eligible studies will report on frailty assessment tool characteristics used for diagnosis, prognosis or estimating

treatment effect. Characteristics may include reliability, validity and useability (see elaboration tables below for further detail).<sup>45–51</sup> We will exclude tools not assessed in clinical practice (ie, assessed using administrative data alone without use in the clinic setting), assessing a single domain (eg, physical performance alone, malnutrition alone), or using laboratory/radiologic values alone, as these do not adequately represent the multidimensionality of frailty assessment tools. We will exclude studies that do not employ a formal frailty assessment tool; studies in which the ‘frailty’ assessment tool is in fact used to assess a different construct (eg, disability, sarcopenia); and studies that only include frailty as an adjustment covariate in a multivariable prognostic model without further reporting on individual characteristics of the frailty assessment (with respect to diagnosis, prognosis, measurement properties or other relevant outcomes).

### Context

We will include studies that report on frailty assessment tools for use in the clinical setting prior to surgery.

### Types of evidence sources

We will include randomised trials (primary and post hoc analyses), prospective or retrospective cohort studies, diagnostic test accuracy studies, measurement properties studies, prediction studies, useability studies and systematic reviews of any of the study types above reported in any language. We will include qualitative studies only if they include evaluation of the impact or clinical useability of frailty assessment tools. We will exclude studies that do not have full text publications.

### Information sources and search strategy

We will develop a comprehensive search strategy in collaboration with an expert information specialist, and this will be peer-reviewed using the Peer Review of Electronic Search Strategies checklist.<sup>52</sup>

We will translate and implement the search across all relevant databases (eg, MEDLINE, EMBASE, CENTRAL, CINAHL) from 2005 to 13 October 2021 (the first use of frailty as a title word in a surgical population was in 2006), humans-only studies and without language restrictions.<sup>38 53</sup> The search strategy takes the basic format of: Frailty Assessment Tools AND ((Post-Operative Care) OR (Prediction/Prognosis AND Postoperative Outcomes)). Sample search strategy is available in online supplemental appendix C. Case reports, comments, editorials and letters will be removed. We will report each database and register the date of search, and the search strategy for all databases and registers. We will not include a search of the grey literature as it is unlikely that informative clinical studies of frailty assessment tools in surgical populations will be available in these sources. The search will be updated prior to publication. We will supplement these sources by scanning references lists of included studies for additional sources of evidence. The grey literature was not searched given the objectives of this review are to

identify the level of evidence examining various performance measure of frailty assessment tools in the preoperative setting.

### Review team calibration and consistency

We anticipate a large number of citations, so a review team will be used for selection of sources of evidence, and data charting of individual sources of evidence. For each step, a standardised electronic form and explanation and elaboration document will be developed by the study team based on eligibility criteria and objectives. The review leads will pilot test the forms on a sample of eligible and non-eligible papers to assess appropriateness and comprehensiveness and make revisions as needed. The full review team will be trained to use these forms sequentially in each review step. After training for each step, calibration exercises will be conducted with the full review team by pilot testing the forms on 50 randomly selected citations for screening, and five citations for data charting. We will review discrepancies in group discussions and refinements will be made to the forms as needed and reported. Additional calibration exercises may be done if sufficient agreement across reviewers is not reached or if reviewers express the need for more training. Sufficient agreement in level 1 screening will be accepted if no more than 20% of studies included by the review leads are excluded by one or more reviewer. Sufficient agreement in level 2 screening and data charting will be at least 80% agreement across all reviewers. Pilot forms will be set up in Excel; an example template is in online supplemental appendix D.

### Records and selection of sources of evidence

We will employ the Covidence web-based platform for systematic review management.<sup>54</sup> After deduplication, all citations will be loaded into Covidence. We will conduct two-level citation screening for eligibility: level 1 screening titles and abstracts and level 2 screening full texts. Two independent reviewers will screen each citation at both screening stages using the piloted selection form and accompanying elaboration and explanation document reflecting the eligibility criteria. Calibration exercises will be conducted as described previously. Citations selected for inclusion by at least one reviewer in stage 1 will be included in stage 2 screening. The reason for exclusion in full-text screening will be recorded. The results of the search and selection will be reported and presented in a PRISMA flow diagram. We will request additional information from study authors by email if needed to decide on eligibility. Disagreement will be resolved through discussion involving a third reviewer if needed.

### Data charting process

Once all records for final inclusion have been selected, we will chart data from all full text records.

### Process

Two independent reviewers will chart data from each eligible record. When more than one record exists for



the same study, the record with the most complete or most recent information will be used. We will develop and pilot electronic data charting forms in Google Forms and a detailed explanation and elaboration manual for additional details and definitions on data items to be charted prior to data charting (this will incorporate the below data items and definitions). Calibration exercises will be conducted as described previously. Disagreement will be resolved through discussion, and involving a third reviewer if agreement is not reached. We will request additional information from study authors if needed.

### Data items

We will chart data on study and population (eg, publication type, country, age, proportion with frailty, setting); frailty assessment tool characteristics (eg, name, type, geriatric domains, scoring, purpose, access); measurement properties of frailty assessment tools (eg, conceptual framework, validity, reliability); information on tools for diagnosis (eg, type, reference standard, diagnostic accuracy measures); information on tools for prognosis (eg, analysis type, predicted outcomes, purpose, accuracy measures); and useability (eg, feasibility, acceptability, time, equipment).

Tables elaborating data items that will be charted are included in supplementary appendix E, providing definitions, prespecified assumptions and simplifications, as well as information on how items should be interpreted.

### Synthesis of results

Synthesis will be guided by the main study objectives. The outputs will be stratified across settings (emergency, benign, oncology) and surgery types (eg, colorectal, gynaecology, urology). We will collate all studies and relevant information relating to each frailty assessment tool. The expected results of the scoping review include an index of the frailty assessment tools developed or evaluated in the preoperative setting with older adults undergoing surgery, along with the level of investigation across diagnosis, prognosis, treatment effect estimation and other measurement properties.

The synthesis will including the following items:

#### Characteristics of frailty assessment tools

We will list all frailty assessment tools described in the literature. For each tool we will list characteristics including the number of studies evaluating each tool, scale, scoring method, language versions, development population, purpose of tool and access.

#### Frailty assessment tool measurement properties

We will summarise which measurement properties have been assessed for each tool as listed in the data charting items.

#### Level of investigation

We will summarise the level of investigation for each frailty assessment tool stratified by purpose (eg, diagnosis, prognosis). Specifically, level of investigation will be ordered

as development study, validation study, replication study, impact study and systematic review. Studies will be included if they only provide unadjusted or adjusted associations between preoperative frailty (measured using a frailty assessment tool) and a postoperative outcome, but will be ranked as the lowest level of investigation unless formal diagnostic test, prognostic, treatment effect estimate, impact analysis or measurement properties study methodology is used.

#### Useability

For tools with higher levels of investigation, we will summarise assessments of useability descriptively.

#### Comparisons

We will summarise the outcomes of any direct comparisons between tools.

#### Summary of results

We will create a visual summary (eg, bubble plot) to visually summarise the number of studies and level of investigation supporting each tool, stratified by setting (overall, oncology, benign, emergency) and by surgery type.

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