Diagnostic test accuracy of simple instruments for identifying frailty in community dwelling older people: protocol for a systematic review and meta-analysis.

Background
Frailty is a state of vulnerability to poor resolution of homeostasis following a stressor event and is independently associated with important adverse outcomes (1). Routine identification of frailty to enable improved, evidence based care pathways for older people has been advocated in international consensus guidance (2).

Objectives
This systematic review will investigate diagnostic test accuracy of simple instruments for identifying frailty in community dwelling older people to inform the British Geriatrics Society Best Practice Guidance on Management of Frailty in Community Settings.

Methods
Criteria for considering studies for this review
Prospective studies which assess the diagnostic test accuracy (DTA) (sensitivity, specificity, positive and negative predictive values) of one or more simple instruments for identifying frailty in community dwelling older people (index tests) against a reference standard will be considered for inclusion. Prospective cohort studies, case control studies and cross sectional studies will all be considered for inclusion, as tests of diagnostic test accuracy may be nested within these observational studies. DTA studies nested within randomised controlled trials will only be considered for inclusion if the trial population is representative of a community dwelling population of older people. Retrospective studies will not be considered for inclusion. Reference lists of previous systematic reviews of instruments for identifying frailty in
community dwelling older people will be assessed to identify further studies for inclusion.

**Participants**
Participants will be community dwelling older people, defined for this review as a mean age in the study population of 65 years and over. DTA studies of hospitalised patients, those in intermediate care and care home residents will be excluded.

**Index tests**
A range of simple instruments for identifying frailty are available (1). These include questionnaires (e.g. Tilburg frailty indicator (3), Groningen frailty index (4)) and brief assessments (e.g. gait speed (5), grip strength (6), Edmonton frail scale (7)).

**Reference standards**
The two main emerging models of frailty are the Cardiovascular Health Study (CHS) phenotype model (8) and the Canadian Study of Health and Aging (CSHA) Frailty Index (FI) (9). The current gold standard in clinical practice comprehensive geriatric assessment (CGA) (10). The CHS phenotype model, CSHA FI and specialist CGA will be the reference standard tests for this review. Studies that assess DTA of one or more index tests against one or more of the three reference standards will be considered for inclusion.

**Search methods for identification of studies**
We will search Medline, EMBASE, CINAHL, Web of Science, Cochrane database of systematic reviews, Cochrane database of abstracts of reviews, AMED, PsychInfo, Scopus and PedRo to identify studies for inclusion.

**Selection of studies**
Two independent reviewers will assess all titles and abstracts to identify all potentially eligible studies, with any disagreements resolved by consensus.
Two independent reviewers will then assess all full text articles for inclusion, with disagreements resolved by consensus.

**Data extraction and management**
A piloted data extraction form will be used. Two independent reviewers will extract all data. Baseline data will include age, gender and comorbidities. The reference standard frailty model and index tests, including cut-points for diagnosis, will be recorded. Data on sensitivity, specificity, positive predictive value, negative predictive value, likelihood ratio, true positive, true negative, false positive and false negative rates will be extracted.

**Assessment of methodological quality**
Two independent reviewers will independently assess methodological quality using the QUADAS tool (11).

**Statistical analysis and data synthesis**
Sensitivity and specificity, with 95% confidence intervals, will be calculated for each index test by constructing 2x2 tables of primary reported data on true positive, true negative, false positive and false negative rates using RevMan 5.2 software. Meta-analysis will be performed using bivariate modelling (Stata 12) if the reported cut points for diagnosis of frailty using reference tests and index tests are consistent across studies. We will construct summary receiver operating characteristic (SROC) curves for each index test and assess for statistically significant differences across tests if different cut-points are used for index test diagnosis of frailty.

**References**


