National Institute for Health and Care Excellence

Final

Falls: assessment and prevention in older people and people 50 and over at higher risk

Evidence review B: Clinical assessments

NICE guideline NG249

Evidence reviews underpinning recommendations 1.1.1 to 1.1.7 in the NICE guideline

April 2025

Final

These evidence reviews were developed by NICE

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1. Clinical Assessments

1.1. Review question

How accurate are assessments by Clinicians, such as questioning, observation and examination, in identifying people at risk of falls?

1.1.1. Introduction

In the delivery of healthcare, identifying individuals at risk of falls stands as a key task with far-reaching implications for patient well-being and quality of life. Clinicians, through methods such as questioning, observation, and physical examination, strive to gauge the likelihood of falls. As many factors influence balance and mobility, the question arises: How accurate are these assessments by clinicians in identifying those at risk of falls?

Assessments range from opportunistic interactions to more structured formal assessments and may be undertaken by a range of healthcare professions in a variety of settings. Due to the nature of these clinician assessments, there is an element of subjectivity which may impact upon assessment outcomes.

This chapter looks at the efficacy of clinician-led methods in gauging fall risk.

1.1.2. Summary of the protocol

For full details, see the review protocol in Appendix A.

Table 1: PICO characteristics of review question

Population	Inclusion: • people aged 65 and over • people aged 50 to 64 who have a condition or conditions that may put them at higher risk of falling. It was identified that there are some people aged younger than 65 who have an increased risk of falling, such as those with Parkinson's disease or diabetes. Exclusion: • people under 65, and people with a condition or conditions that may put them at increased risk of falling under the age of 50. Strata: age group: people aged 50 to 64 who have a condition or conditions that may put them at higher risk of falling; settings (hospitals, community, long-term residential care).

Prediction risk tool	• Questioning to identify those at risk of falls e.g. asking whether they have fallen recently, feel unsteady when walking or worry about falling. • Observation by clinicians such as observing gait, balance, and frailty. • Basic clinical examinations such as blood pressure. Strata: settings (hospitals, community, long-term residential care) The different settings would use different record systems. Community would be mainly based on primary care records; care homes could use the care records held in the home +/- primary care records. Also, the populations behave very differently in fall prevention interventions i.e. what works in community dwellers is not effective in hospital. Therefore, would anticipate this finding if looking for the effectiveness of electronic record searches.
Condition/ domain being studied	Falls: an unexpected event in which the participants come to rest on the ground, floor, or lower level.

Outcomes	• Predictive accuracy of estimation of risk of falls:
	  ○ Discrimination (sensitivity, specificity, predictive values)
	  ○ Area under the ROC curve (c-statistic, c-index)
	  ○ Predicted risk versus observed risk (calibration)
	  ○ Reclassification
	Other statistical measures for example: D statistic, R^2 statistic and Brier points.

Study design	Prospective or retrospective cohort studies or systematic reviews of these. Published NMAs and IPDs will be considered for inclusion. Exclusion: • Case-control studies • Cross-sectional studies

1.1.3. Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol in appendix A and the methods document.

Declarations of interest were recorded according to NICE's conflicts of interest policy.

1.1.4. Risk prediction evidence

Evidence was identified regarding assessments completed by clinicians to identify people at risk of falls. The assessments and the specific outcomes are summarised in Table 2. Full details can be found in Appendix D.

1.1.4.1. Included studies

Eleven studies were included in the review.[1-6, 8-12] Four studies focused on nurses' clinical judgement [2, 5, 6, 10]. Three studies included clinical judgement from licensed practical nurses or nurses' aides.[4, 8, 10] Two studies included focused on physiotherapists' judgement.[3, 10] One study examined nursing home staff judgement.[1] Clinician observation was the focus in one study.[9] Five of the included studies focused on hospital patients. [2, 3, 5, 6, 9] The remaining studies were set in nursing homes and residential care facilities.[1, 4, 8, 10] Evidence from these

studies is summarised in the clinical evidence summary below. The studies were stratified by setting – hospital and residential care and then separated by the practitioner making the judgement (Nurses or Physiotherapists).

See also the study selection flow chart in Appendix A and study evidence tables in Appendix D.

1.1.4.2. Excluded studies

No Cochrane reviews were identified at the full text screening level.

See the excluded studies list in Appendix H.

1.1.5. Summary of studies included in the prognostic evidence

The included study characteristics are summarised in the table below.

Table 2: Summary of studies included in the evidence review – hospital setting

Study	Risk assessment	Population	Outcomes (including definitions)	Estimation of fall risk
Eagle, 1999[2] Prospective cohort study	Nurses' clinical judgement (Is your patient at risk for falls in the near future)? (n=98) Duration of study: patients followed up for 3 months.	Hospitalised adults from a geriatric ward and rehabilitation ward Median age (range): 69 (23 to 96). Sex: 60% female Setting: Hospital USA	Rate of falls	55 accidental falls during the study period. Other arms included the Morse Fall Scale and the Functional Reach test.
Haines, 2009[3] Prospective cohort study 17 rehabilitation units	Physiotherapist clinical judgement (question 'will this patient experience one or more falls during their rehabilitation period?') (n=1123) Duration of study: between 1- and 6-months follow-up	Hospitalised adults admitted for rehabilitation and referred for physiotherapy. Mean age: 75 years Sex: 60% female Setting: Australia	Rate of fall	286 patients were determined likely to fall. 125 patients fell.
Milisen, 2012[5] Prospective cohort study	Routine nursing assessment (clinical judgement on the question "do you think your patient	Hospitalised adults (geriatric ward)	Rate of falls	130 fallers were identified of the 65 years or older population (n= 1564)

Study	Risk assessment	Population	Outcomes (including definitions)	Estimation of fall risk
4 surgical, 8 geriatric and 4 general medical wards in 6 hospitals	is at high risk for falling?") (n=2470) Duration of study: 3 months	Mean age (SD): 67.6 (18.3) years Sex: 55.7% female Setting: Flanders, Belgium		The study compares General Medical ward, Surgical and geriatric wards, with differing ages, but reports 65 years and over separately which meets the protocol inclusion criteria.
Myers, 2003[6] Prospective cohort study One tertiary teaching hospital facility	Nurses' clinical judgement (asked to state whether the patient was a fall risk and also to rate the patients' fall risk on a scale of 0-10) (n=226) Duration of study: 14 weeks	Hospitalised adults (aged care and rehabilitation wards). Mean age (SD): 84.91 (8.53) years Sex: 71.7% female Setting: Western Australia	Number of fallers	34 patients experienced a fall (n=226) Other arms included two fall risk assessment tools (FRAT1 and FRAT2). Patients ranged from 41 years to 98 years.
Vassallo, 2008[9] Prospective cohort study	Clinical judgement based on observation of wandering behaviour (n=200) Duration of study: 21 days follow-up	Hospitalised adults (rehabilitation ward) Mean age: 80.9 years Sex: 62% female Setting: Bournemouth, UK	Rate of falls	157 out of 200 patients correctly identified for falls. Other arms included Downton and STRATIFY
Vratsistas-Curto 2018[11] Prospective cohort study	Physiotherapists judgement of risk (rated and recorded patients' likelihood of falling during rehabilitation with a simple yes/no response) (n=300) Duration of study: NR	Hospitalised adults (rehabilitation) Mean age (SD): 80 (11) years Sex: 58% female Setting: Sydney, Australia	Rate of falls	Other arms included Predict FIRST, Ontario Modified STRATIFY (OMS) and falls in the past year.

Study	Risk assessment	Population	Outcomes (including definitions)	Estimation of fall risk
Webster, 2010[12] Prospective cohort study	Nurses' judgement (n=801) Duration of study: NR	Older participants Mean age (SD): 77.7 (7.89) years Sex: 50.8% female Setting: Hospital setting (tertiary hospital)	Rate of falls	59 falls identified

Table 3: Summary of studies included in the evidence review – residential care setting

Study	Risk assessment	Population	Outcomes (including definitions)	Estimation of fall risk
Bentzen, 2011[1] Prospective cohort study in 18 nursing homes	Nursing home staff judgement (used own clinical experience and knowledge about the resident to classify their risk: 'how do you judge the residents' risk of falling? 1. No risk, 2 very low risk, 3 small risk, 4 high risk, 5 very high risk) Cut-off 4 or more as high risk (n=1148) Duration of study: 18 months	Nursing home residents Mean age (SD): 84.6 (8.1) years Sex: 72.3% female Setting: Oslo, Norway	Rate of falls	329 fallers during the first 180 days Other arms of the trial included STRATIFY-modified for nursing homes and previous falls remembered by staff
Lundin-Olsson, 2003[4] 4 residential care facilities	Nurses' aides' and licensed practical nurses' judgement (n=208) (staff global rating of the resident's risk of future falls – 'how do you judge the risk that Mr/Ms X will	Nursing home residents Mean age (SD): 83.2 (6.8) years Sex: 72.5% female Setting: Umea, northern Sweden	Rate of falls	104 residents fell at least once Other arms included Mobility Interaction Fall (MIF) chart and history of falls (during the past 6 months).

Study	Risk assessment	Population	Outcomes (including definitions)	Estimation of fall risk
	fall within 6 months - high or low) Duration of study: 6 months follow-up			
Nordin, 2008[8] Prospective cohort study	Licensed practical nurses' or nurses' aides' judgement (n=183) (personal knowledge of the resident and questioned 'how do you judge the risk that Mr or Mrs X will fall within 6 months – high or low') Duration of study: 6 months follow-up	Frail adults at residential care facilities Mean age (SD): 84.3 (6.6) Sex: 73% female Setting: Sweden	Rate of falls	97 residents fell during the follow-up period. Other arms included Timed Up-and-Go test, a modified Up-and-Go test and fall history 'has Mr or Mrs X fallen in the previous 6 months'.
Vlaeyen, 2021[10] Prospective cohort study 15 Nursing homes	Physiotherapists', nurses', and nurses' aides' judgement at 6 months-assessed separately (question 'do you think your resident is at high risk of falling – yes/no') (n=420) Duration of the study: 6 months follow-up	Nursing home residents Mean age (SD): 85.9 (6.9) years Sex: 73.3% female Setting: Flanders, Belgium	Number of fallers	Fallers = 211 Non-fallers= 209 Other arms included fall history and the Care Home Falls Screen (CaHFRiS) and the Fall Risk Classification Algorithm (FriCA).

See Appendix D for full evidence tables

Table 4: Listed predictors of studies

Study	Predictors
Milisen, 2012[5]	Age, sex, origin of admission, and length of hospital stay
Vassallo, 2008[9]	Observation of wandering behaviour
Eagle, 1999[2]	History of falls, ambulatory aids, mental status/ behaviour, safety, balance, and physical status.

Study	Predictors
Haines, 2009[3]	No details provided (physiotherapist clinical experience)
Myers, 2003[6]	No details provided (nurses clinical experience)
Vratsistas-Curto 2018[11]	No details provided (physiotherapist clinical experience)
Webster, 2010[12]	No details provided (nurses clinical experience)
Lundin-Olsson, 2003[4]	History of falls
Bentzen, 2011[1]	No details provided (personal clinical experience)
Vlaeyen, 2021[10]	No details provided (personal clinical experience)
Nordin, 2008[8]	No details provided

1.1.6. Summary of predictive accuracy evidence: discrimination

1.1.6.1. Overview of outcome data

Hospital setting

Sensitivity and specificity

Table 5: Clinical evidence profile: sensitivity and specificity data in a hospital setting

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Effect size (95% CI)	Quality
Nursing assessment of falls risk for patients 65 years or older in a hospital setting								
Nursing assessment	4	2390	Serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Pooled sensitivity=0.84 (95%CI 0.69 to 0.93)	MODERATE
Nursing assessment	4	2390	Serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Pooled specificity=0.38 (95%CI 0.20 to 0.60)	MODERATE
Clinician observation of wandering behaviour falls risk for patients 65 years or older in a hospital setting								
Clinician observation	1	200	Very serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Sensitivity=0.43 (95%CI 0.35- 0.51)	VERY LOW
Clinician observation	1	200	Very serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Specificity=0.91 (95%CI 0.78- 0.97)	VERY LOW
Physiotherapist judgement of falls risk for patients 65 years or older in a hospital setting								
Physiotherapist judgement based on physiotherapy assessment	1	1123	Serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Sensitivity=0.61 (95%CI 0.54- 0.67)	LOW

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Effect size (95% CI)	Quality
Physiotherapist judgement based on physiotherapy assessment	1	1123	Serious risk of bias[a]	No serious inconsistency	No serious indirectness	No serious imprecision[b]	Specificity=0.82 (95%CI 0.80- 0.85)	MODERATE

a) Risk of bias was assessed using the PROBAST checklist. Downgraded by 1 increment if the majority of the evidence was at high risk of bias and downgraded by 2 increments if the majority of the evidence was at very high risk of bias. The above study was determined to be of serious risk of bias due to prior knowledge of the predictors.
b) The judgement of precision was based on visual inspection of the confidence intervals of the area under curve across two clinical thresholds: 0.5 and 0.7. The threshold of 0.5 marked the boundary between no predictive value better than chance and a predictive value better than chance. The threshold of 0.7 marked the boundary above which the committee might consider recommendations. If the 95% CIs crossed one of these thresholds a rating of serious imprecision was given and if they crossed both of these thresholds a rating of very serious imprecision as given.

AUC data

Table 6: Clinical evidence profile: AUC data in a hospital setting

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Effect size (95% CI)	Quality
Nursing assessment of falls risk for patients 65 years or older in a hospital setting								
Nursing assessment	2	1790	Serious risk of bias[a]	No serious inconsistency	No serious indirectness	Very serious imprecision[b]	Median: Area under curve= 0.65 (95%CI NR) range: 0.65 to 0.66	VERY LOW
Physiotherapist judgement of likelihood of falling for patients 65 years or older in a hospital setting								
Physiotherapist judgement of likelihood of falling	1	300	Serious risk of bias[c]	No serious inconsistency	No serious indirectness	Very serious imprecision[b]	AUC= 0.65 (95% CI 0.57-0.73)	LOW

a) Risk of bias was assessed using the PROBAST checklist. Downgraded by 1 increment if the majority of the evidence was at high risk of bias and downgraded by 2 increments if the majority of the evidence was at very high risk of bias. The above evidence was determined to be of serious risk of bias due to prior knowledge of the predictors.
b) The judgement of precision was based on visual inspection of the confidence intervals of the area under curve across two clinical thresholds: 0.5 and 0.7. No confidence interval was reported by one of the studies so this was marked as very serious imprecision.
c) Risk of bias was assessed using the PROBAST checklist. Downgraded by 1 increment if the majority of the evidence was at high risk of bias and downgraded by 2 increments if the majority of the evidence was at very high risk of bias. The above evidence was determined to be of serious risk of bias due to limited participants with the outcome.

Youden Index

The Youden Index is a summary statistic of the Receiver Operating Curve (ROC) and also includes an optimal cut-off point for the prognostic marker. The closer the summary value is to 1 (or 100%) the better the predictive accuracy.

Clinical evidence profile: Youden Index data in a hospital setting

Risk tool	No of studies	n	Effect size (95% CI)
Nursing assessment of falls risk for patients 65 years or older in a hospital setting			
Routine nursing assessment	1	1564	Youden Index= 32%
Physiotherapist judgement based on physiotherapy assessment of falls risk for patients 65 years or older in a hospital setting			
Physiotherapist judgement based on physiotherapy assessment	1	1123	Youden Index= 0.43 (95%CI 0.36- 0.50)

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Residential care

Sensitivity and specificity

Table 7: Clinical evidence profile: sensitivity and specificity data in a residential care setting

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Effect size (95% CI)	Quality
Nurses and nurses' aides judgement on fall risk on patients 65 years or older in a residential care setting								
Nurses judgement	4	2233	Very serious risk of bias[a]	No serious inconsistency	No serious indirectness	Very serious imprecision[c]	Pooled sensitivity= 0.58 (95%CI 0.44 to 0.71)	VERY LOW
Nurses judgement	4	2233	Very serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[c]	Pooled specificity= 0.73 (95%CI 0.60 to 0.83)	VERY LOW
Physiotherapists judgement on fall risk on patients 65 years or older in a residential care setting								
Physiotherapist judgement	1	399	Serious risk of bias[d]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Sensitivity=47.4% (95%CI 39.8- 55.1)	LOW
Physiotherapist judgement	1	399	Serious risk of bias[d]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	Specificity=77.5% (95%CI 70.5- 83.5)	LOW

a) Risk of bias was assessed using the PROBAST checklist. Downgraded by 1 increment if the majority of the evidence was at high risk of bias and downgraded by 2 increments if the majority of the evidence was at very high risk of bias. The above study was determined to be of very serious risk of bias due to unclear participant selection process, limited information regarding the predictors, and prior knowledge of the outcome.
c) The judgement of precision was based on visual inspection of the confidence intervals of the area under curve across two clinical thresholds: 0.5 and 0.7. The threshold of 0.5 marked the boundary between no predictive value better than chance and a predictive value better than chance. The threshold of 0.7 marked the boundary above which the committee might consider recommendations. If the 95% CIs crossed one of these thresholds a rating of serious imprecision was given and if they crossed both of these thresholds a rating of very serious imprecision as given.
d) Risk of bias was assessed using the PROBAST checklist. Downgraded by 1 increment if the majority of the evidence was at high risk of bias and downgraded by 2 increments if the majority of the evidence was at very high risk of bias. The above study was determined to be of serious risk of bias due to unclear information regarding the predictors.

AUC data

Table 8: Clinical evidence profile: AUC data in a residential care setting

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Effect size (95% CI)	Quality
Nurses and nurses' aides judgement on fall risk on patients over 65 years in a residential setting								
Licensed practical nurses' or nurses' aides' judgement	1	183	Serious risk of bias[a]	No serious inconsistency	No serious indirectness	Serious imprecision[b]	ROC curve= 0.68 (95%CI 0.60- 0.76)	LOW

a) Risk of bias was assessed using the PROBAST checklist. Downgraded by 1 increment if the majority of the evidence was at high risk of bias and downgraded by 2 increments if the majority of the evidence was at very high risk of bias. The above study was determined to be of serious risk of bias due to no information provided regarding participant selection.
b) The judgement of precision was based on visual inspection of the confidence intervals of the area under curve across two clinical thresholds: 0.5 and 0.7. The threshold of 0.5 marked the boundary between no predictive value better than chance and a predictive value better than chance. The threshold of 0.7 marked the boundary above which the committee might consider recommendations. If the 95% CIs crossed one of these thresholds a rating of serious imprecision was given and if they crossed both of these thresholds a rating of very serious imprecision as given.

Youden Index

Clinical evidence profile: Youden Index data in a residential care setting

Risk tool	No of studies	n	Effect size (95% CI)
Nurses judgment of falls risk for patients 65 years or older in a residential care setting			
Nurses' judgement	1	399	Youden Index= 0.27
Nurses' aides' judgement of falls risk for patients 65 years or older in a residential care setting			
Nurses' aides' judgement	1	399	Youden Index= 0.24
Physiotherapist judgement of falls risk for patients 65 years or older in a residential care setting			
Physiotherapist judgement		399	Youden Index= 0.25

1.1.7. Calibration

None of the included studies provided information regarding calibration.

1.1.8. Reclassification

None of the included studies provided information regarding reclassification.

1.1.9. Economic evidence

1.1.9.1. Included studies

No health economic studies were included.

1.1.9.2. Excluded studies

One economic study relating to this review question was identified but was excluded due to a combination of limited applicability and methodological limitations. [3] The study is listed in Appendix H, with reasons for exclusion given.

See also the health economic study selection flow chart in Appendix F.

1.1.10. Summary of included economic evidence

No health economic studies were included.

1.1.11. Economic model

This area was not prioritised for new cost-effectiveness analysis.

1.1.12. Evidence statements

1.1.12.1. Economic

- No relevant economic evaluations were identified.

1.1.13. The committee's discussion and interpretation of the evidence

1.1.13.1. The outcomes that matter most

The outcome that the clinical assessment (questioning, observation and examination) should predict was the risk of falls. The accuracy of clinical assessments to estimate the risk of falls was measured using:

- Discrimination (sensitivity, specificity, predictive values)
- Area under the ROC curve (c-index, c-statistic)
- Predicted risk versus observed risk
- Reclassification
- Other statistical measures: for example, D statistic, R2 statistic and Brier points

For the purposes of decision making, all outcomes were considered to be of equal importance and were therefore rated as critical by the committee. Evidence was available for

sensitivity, specificity, AUC and Youden's Index outcomes. No calibration or reclassification data was identified.

Clinical thresholds

The committee discussed the clinical thresholds used to determine imprecision when completing evaluations of the evidence on GRADE Clinical decision thresholds were set at default values of 70% for sensitivity and specificity above which a test would be recommended and 50% below which a test is of no clinical use. The committee considered 70% to be good for falls evidence and to get above 90% is rare. The committee did not choose to prioritise sensitivity or specificity in their decision making as it would depend on the context.

1.1.13.2. The quality of the evidence

The quality of evidence was mainly ranged from Low to Very Low with some elements demonstrating Moderate quality. However, the committee noted that most of the papers were examining if staff working with patients get a sense of who is going to fall or not, which could have been determined if they already knew that the patient had a fall history (and potentially make their judgements more accurate) or if staff can identify risk factors that increase the patient's risk of a fall. This was determined to be subjective. However, clinical judgement will vary across staff. The committee noted that routine observation/questioning based on inconclusive processes completed in practice was not something that could be recommended. The concern with the use of clinical judgement was that it would be variable and not able to be standardised.

1.1.13.3. Benefits and harms

The committee agreed the studies did not address which methods of assessment were the most accurate in predicting a risk of falls because they focused on clinical judgement or knowledge of the patient. Most studies provided no information on what the clinical assessments carried out comprised of. A few studies used age, sex, mental status and medication prescribed as predictors for falls. The committee noted a few of the studies reported history of falls as a prognostic factor, and acknowledged this is a good indicator and a history of a previous fall would trigger a referral for further assessment. The committee concluded all the evidence demonstrated was that unstructured assessment could not be recommended. They did agree that the recommendation to ask people if they have had a fall within the current NICE Falls guideline should be retained based on the limited evidence and what is already current practice.

Clinical settings

The committee noted none of the included studies were completed within community settings, they were all in hospitals or care home facilities. The intent of the review was to tailor the guidance for different settings. The committee noted it would be difficult to extrapolate the findings to community settings. This was especially notable given that the findings were based on clinical judgement and there is likely to be less frequent clinical input in this setting for clinicians to be able to make accurate judgements.

The committee commented that primary care settings are where a person at risk of falling is commonly identified. A GP will use a consultation appointment for opportunistic questioning, based on a person's unsteady gait, or their knowledge of the patient and their medical condition. However, it was acknowledged that because of the short consultation time a GP has limited opportunity to assess a person's falls risk. Assessment of risk based on observation and asking a person about any history of falls is current practice in the community and will often be carried out by a nurse or physiotherapist. The committee discussed if a person has fallen in the community this would trigger further questions to

obtain further information on the person and the nature of the fall which would be used to determine if further falls assessment and management are required.

The committee noted that the practice of asking patients about their fall history within a residential care setting is already in place. Fire services, paramedics, and members of other organisations, such as social care would also undertake completing fall risk assessments, and this was noted to be a useful source of information.

1.1.13.4. Cost effectiveness and resource use

No published health economic evidence was identified that met the inclusion criteria. In the absence of health economic evidence, the committee was encouraged to discuss current practice and make a judgement regarding the cost and cost-effectiveness of any new recommendations relating to the use of clinical assessments in identifying people at risk of falls.

The committee noted that routine questioning by health care professionals about falls history is considered current practice. The cost of this routine questioning is expected to be low as it requires minimal additional staff time to an existing healthcare professional visit. Considering the lack of clinical evidence to suggest a change in current practice and the absence of health economic evidence, the committee decided to maintain the prior recommendation. Given this is already current practice, continuing with this recommendation is not expected to have a significant resource impact.

1.1.14. Recommendations supported by this evidence review

This evidence review supports recommendations 1.1.1 to 1.1.7 in the NICE guideline.

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Appendices

Appendix A Review protocols

A.1 Review protocol for clinical observation

ID	Field	Content
1.	Review title	How accurate are assessments by clinicians, such as questioning, observation and examination, in identifying people at risk of falls?
2.	Review question	Q 2.3 How accurate are assessments by Clinicians, such as questioning, observation and examination, in identifying people at risk of falls?
3.	Objective	Does questioning of individuals by clinicians (e.g. asking if they have fallen in last 12 months, how often, severity, are they concerned about falling) followed on (or combined) with basic clinical checks and observation effectively identify people who are at risk of falls?
4.	Searches	The following databases (from inception) will be searched: • Embase • MEDLINE • Epistemonikos Searches will be restricted by: • English language studies • Human studies The searches may be re-run 6 weeks before the final committee meeting and further studies retrieved for inclusion if relevant. The full search strategies will be published in the final review.

		Medline search strategy to be quality assured using the PRESS evidence-based checklist (see methods chapter for full details).
5.	Condition or domain being studied	• Falls: an unexpected event in which the participants come to rest on the ground, floor, or lower level.
6.	Population	Inclusion: • people aged 65 and over • people aged 50 to 64 who have a condition or conditions that may put them at higher risk of falling. It was identified that there are some people aged younger than 65 who have an increased risk of falling, such as those with Parkinson's disease or diabetes. Exclusion: any age group that does not fit the inclusion criteria. Strata: age group: people aged 50 to 64 who have a condition or conditions that may put them at higher risk of falling; settings (hospitals, community, long-term residential care)
7.	Prediction risk tool (Clinical assessment is not a tool as such but would identify people at possible risk of falls by looking at different factors).	• Questioning to identify those at risk of falls e.g. asking whether they have fallen recently, feel unsteady when walking or worry about falling • Observation by clinicians such as observing gait, balance and frailty • Basic clinical examination such as blood pressure Strata: settings (hospitals, community, long-term residential care) The different settings would use different record systems. Community would be mainly based on primary care records; care homes could use the care records held in home +/- primary care records. Also, the populations behave very differently in fall prevention interventions. i.e. what works in community dwellers is not effective in hospital. Therefore, would anticipate this finding if looking for the effectiveness of electronic record searches.
8.	Target condition	• Falls: an unexpected event in which the participants come to rest on the ground, floor, or lower level.

9.	Types of study to be included	• Prospective or retrospective cohort studies or systematic reviews of these. Published NMAs and IPDs will be considered for inclusion. **Exclusion**: • Case-control studies • Cross-sectional studies
10.	Other exclusion criteria	Non-English language studies.
11.	Context	All healthcare settings where electronic patient records are used.
12.	Primary outcomes (critical outcomes)	*All outcomes are considered equally important for decision making and therefore have all been rated as critical:* *Accuracy of estimation of risk of falls:* Statistical outputs may include: • Discrimination (sensitivity, specificity, predictive values) • Area under the ROC curve (c-statistic, c-index) • Predicted risk versus observed risk (calibration) • Reclassification Other statistical measures: for example, D statistic, R^2 statistic and Brier points

13.	Data extraction (selection and coding)	EndNote will be used for reference management, sifting, citations and bibliographies. All references identified by the searches and from other sources will be uploaded into EPPI reviewer and de-duplicated. 10% of the abstracts will be reviewed by two reviewers, with any disagreements resolved by discussion or, if necessary, a third independent reviewer. The full text of potentially eligible studies will be retrieved and will be assessed in line with the criteria outlined above. A standardised form will be used to extract data from studies (see Developing NICE guidelines: the manual section 6.4). 10% of all evidence reviews are quality assured by a senior research fellow. This includes checking: • papers were included /excluded appropriately. • a sample of the data extractions • correct methods are used to synthesise data. • a sample of the risk of bias assessments Disagreements between the review authors over the risk of bias in particular studies will be resolved by discussion, with involvement of a third review author where necessary. Study investigators may be contacted for missing data where time and resources allow.
14.	Risk of bias (quality) assessment	Risk of bias will be assessed using the PROBAST checklist as described in Developing NICE guidelines: the manual.
15.	Strategy for data synthesis	Analyses with and without accounting for competing risks will be included. Discrimination, calibration, and re-classification data will be reported separately. If appropriate, C statistic and net reclassification index data will be meta-analysed (if at least 3 studies reporting data at the same threshold) in RevMan. Summary outcomes will be reported from the meta-analyses with their 95% confidence intervals in adapted GRADE tables.

		Sensitivity and specificity data will be meta-analysed using a Bayesian approach (using WinBugs software) if 3 or more data points are found. Heterogeneity between the studies in effect measures will be assessed using visual inspection of the sensitivity/specificity or net reclassification index RevMan 5 plots, or summary area under the curve (AUC) plots. If data are pooled, an I^2 of 50-74% will be deemed serious inconsistency and an I^2 of 75% or above very serious inconsistency. If meta-analysis is not possible, data will be presented, and quality assessed as individual values in adapted GRADE profile tables and plots of un-pooled sensitivity and specificity from RevMan software. Publication bias will be considered with the guideline committee, and if suspected will be tested for when there are more than 5 studies for that outcome. The risk of bias across all available evidence will be evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group http://www.gradeworkinggroup.org/	
16.	Analysis of sub-groups	Subgroups that will be investigated if heterogeneity is present: • older people who are likely to be frail compared to younger people (no age cut-off it will depend on what is reported)	
17.	Type and method of review	☐	Intervention
		☐	Diagnostic
		☒	Prognostic
		☐	Qualitative
		☐	Epidemiologic
		☐	Service Delivery
		☐	Other (please specify)
18.	Language	English	

19.	Country	England		
20.	Anticipated or actual start date			
21.	Anticipated completion date	21/8/2024		
22.	Stage of review at time of this submission	Review stage	Started	Completed
		Preliminary searches	☑	☑
		Piloting of the study selection process	☑	☑
		Formal screening of search results against eligibility criteria	☑	☐
		Data extraction	☐	☐
		Risk of bias (quality) assessment	☐	☐
		Data analysis	☐	☐
23.	Named contact	5a. Named contact Guideline Development Team NGC 5b Named contact e-mail Guidelines8@nice.org.uk 5e Organisational affiliation of the review National Institute for Health and Care Excellence (NICE)		
24.	Review team members	From NICE:		

		Gill Ritchie [Guideline lead] Julie Neilson [Senior systematic reviewer] Annette Chalker [Systematic reviewer] Sophia Kemmis-Betty [Senior Health economist] Steph Armstrong [Health economist] Joseph Runicles [Information specialist] Tamara Diaz [Project Manager] Madelaine Zucker [Systematic reviewer]
25.	Funding sources/sponsor	Development of this systematic review is being funded by NICE.
26.	Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.
27.	Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: [NICE guideline webpage].
28.	Other registration details	N/A
29.	Reference/URL for published protocol	
30.	Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: • notifying registered stakeholders of publication

		• publicising the guidelines through NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels and publicising the guideline within NICE.
31.	Keywords	Clinical assessment, routine questioning, observation, identifying, risk, falls
32.	Details of existing review of same topic by same authors	
33.	Current review status	☒ Ongoing ☐ Completed but not published ☐ Completed and published ☐ Completed, published and being updated ☐ Discontinued
34.	Additional information	N/A
35.	Details of final publication	www.nice.org.uk

A.2 Health economic review protocol

Table 9: Health economic review protocol

Review question	All questions – health economic evidence
Objectives	To identify health economic studies relevant to any of the review questions.
Search criteria	• Populations, interventions and comparators must be as specified in the clinical review protocol above. • Studies must be of a relevant health economic study design (cost–utility analysis, cost-effectiveness analysis, cost–benefit analysis, cost–consequences analysis, comparative cost analysis). • Studies must not be a letter, editorial or commentary, or a review of health economic evaluations. (Recent reviews will be ordered although not reviewed. The bibliographies will be checked for relevant studies, which will then be ordered.) • Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	A health economic study search will be undertaken using population-specific terms and a health economic study filter – see appendix B below.
Review strategy	Studies not meeting any of the search criteria above will be excluded. Studies published before 2007, abstract-only studies and studies from non-OECD countries or the USA will also be excluded. Studies published after 2007 that were included in the previous guideline(s) will be reassessed for inclusion and may be included or selectively excluded based on their relevance to the questions covered in this update and whether more applicable evidence is also identified. Each remaining study will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in appendix H of Developing NICE guidelines: the manual (2014).[7] **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations', then it will be included in the guideline. A health economic evidence table will be completed, and it will be included in the health economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations', then it will usually be excluded from the guideline. If it is excluded, then a health economic evidence table will not be completed, and it will not be included in the health economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the guideline committee if required. The ultimate aim is to include health economic studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and methodological quality that they could all be included, then the health economist, in discussion with the committee if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation in the excluded health economic studies appendix below.

The health economist will be guided by the following hierarchies.

Setting:

- UK NHS (most applicable).
- OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden).
- OECD countries with predominantly private health insurance systems (for example, Switzerland).
- Studies set in non-OECD countries or in the USA will be excluded before being assessed for applicability and methodological limitations.

Health economic study type:

- Cost–utility analysis (most applicable).
- Other type of full economic evaluation (cost–benefit analysis, cost-effectiveness analysis, cost–consequences analysis).
- Comparative cost analysis.
- Non-comparative cost analyses including cost-of-illness studies will be excluded before being assessed for applicability and methodological limitations.

Year of analysis:

- The more recent the study, the more applicable it will be.
- Studies published in 2007 or later (including any such studies included in the previous guideline(s)) but that depend on unit costs and resource data entirely or predominantly from before 2007 will be rated as 'Not applicable'.
- Studies published before 2007 (including any such studies included in the previous guideline(s)) will be excluded before being assessed for applicability and methodological limitations.

Quality and relevance of effectiveness data used in the health economic analysis:

- The more closely the clinical effectiveness data used in the health economic analysis match with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline.

Appendix B Literature search strategies

The literature searches for this review are detailed below and complied with the methodology outlined in Developing NICE guidelines: the manual (2014)

For more information, please see the Methodology review published as part of the accompanying documents for this guideline.

B.1.1 Clinical search literature search strategy

Searches were constructed using a PICO framework where population (P) terms were combined with Intervention (I) and in some cases Comparison (C) terms. Outcomes (O) are rarely used in search strategies as these concepts may not be indexed or described in the title or abstract and are therefore difficult to retrieve. Search filters were applied to the search where appropriate.

Table 10: Database parameters, filters and limits applied

Database	Dates searched	Search filter used
Medline ALL (OVID)	**01-01-1946 - 07-05-2024**	Systematic reviews Internal or external validation studies Exclusions (animal studies, letters, comments, editorials, news, historical articles, anecdotes, case studies/reports) English language
Embase (OVID)	**01-01-1974 - 07-05-2024**	Systematic reviews Internal or external validation studies Exclusions (animal studies, letters, comments, editorials, case studies/reports, conference abstracts or papers) English language
The Cochrane Library (Wiley)	Cochrane CDSR to 2024 Issue 5 of 12	
Epistemonikos (The Epistemonikos Foundation)	No date limits applied (searched 07/05/2024)	

Medline (Ovid) search terms

1	Accidental Falls/	27810
2	(fall or falls or falling or faller* or fallen or slip* or trip* or collapse*).ti,ab.	564533
3	or/1-2	571120
4	letter/	1207695
5	editorial/	636283

6	news/	216742
7	exp historical article/	409342
8	Anecdotes as Topic/	4747
9	comment/	994163
10	case report/	2316692
11	(letter or comment*).ti.	184942
12	or/4-11	4870580
13	randomized controlled trial/ or random*.ti,ab.	1520274
14	12 not 13	4838999
15	animals/ not humans/	5054620
16	exp Animals, Laboratory/	947075
17	exp Animal Experimentation/	10289
18	exp Models, Animal/	636704
19	exp Rodentia/	3510868
20	(rat or rats or mouse or mice or rodent*).ti.	1452296
21	or/14-20	10784533
22	3 not 21	414888
23	limit 22 to english language	390152
24	((risk* or frail* or screen* or gait or balance) adj2 (assess* or test* or tool* or scale* or process* or procedure* or protocol* or guide* or chart* or index or score*)).ti,ab,kf.	339527
25	"timed up and go".ti,ab,kf.	6653
26	(gait adj2 (technolog* or app or apps or measure*)).ti,ab,kf.	2962
27	"gait speed".ti,ab,kf.	7138
28	((Tinetti or Berg) and balance).ti,ab,kf.	3411
29	"functional reach test*".ti,ab,kf.	676
30	("performance oriented" or "performance orientated").ti,ab,kf.	434
31	"turn 180 degrees".ti,ab,kf.	8
32	("PRISMA-7" or (morse adj2 scale) or "downton fall risk index" or "FRAT").ti,ab,kf.	282
33	(clinical adj (assess* or check* or examination* or test* or observ*)).ti,ab,kf.	133813

34	((history or historical or prior or previous or repeat* or fear* or worry* or worries or worried or scared or frequent or frequency or severity) adj2 (question* or asking or observ*)).ti,ab,kf.	61961
35	or/24-34	539911
36	23 and 35	14836
37	Meta-Analysis/	174941
38	exp Meta-Analysis as Topic/	26390
39	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.	261847
40	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.	347858
41	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.	53125
42	(search strategy or search criteria or systematic search or study selection or data extraction).ab.	78508
43	(search* adj4 literature).ab.	93724
44	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.	346009
45	cochrane.jw.	16211
46	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.	3714
47	or/37-46	664572
48	exp Cohort studies/	2441747
49	(cohort adj (study or studies or analys* or data)).ti,ab.	312699
50	((longitudinal or retrospective or prospective) and (study or studies or review or analys* or cohort* or data)).ti,ab.	1527061
51	or/48-50	2986298
52	predict.ti.	61289
53	(validat* or rule*).ti,ab.	883109
54	(predict* and (outcome* or risk* or model*)).ti,ab.	1107306
55	((history or variable* or criteria or scor* or characteristic* or finding* or factor*) and (predict* or model* or decision* or identif* or prognos*)).ti,ab.	3961681
56	decision*.ti,ab. and Logistic models/	5827
57	(decision* and (model* or clinical*)).ti,ab.	232371
58	(prognostic and (history or variable* or criteria or scor* or characteristic* or finding* or factor* or model*)).ti,ab.	279769

59	(stratification or discrimination or discriminate or c statistic or "area under the curve" or AUC or calibration or indices or algorithm or multivariable).ti,ab.	1037404
60	ROC curve/	70313
61	or/52-60	5631996
62	36 and (47 or 51 or 61)	9052

Embase (Ovid) search terms

1	falling/	52317
2	(fall or falls or falling or faller* or fallen or fell or slip* or trip* or stumble* or tumble*).ti,ab.	770362
3	or/1-2	789618
4	letter.pt. or letter/	1327978
5	note.pt.	984282
6	editorial.pt.	805117
7	case report/ or case study/	3072399
8	(letter or comment*).ti.	244793
9	(conference abstract or conference paper).pt.	5887746
10	or/4-9	11382707
11	randomized controlled trial/ or random*.ti,ab.	2182136
12	10 not 11	10841632
13	animal/ not human/	1217302
14	nonhuman/	7710642
15	exp Animal Experiment/	3178638
16	exp Experimental Animal/	849783
17	animal model/	1787157
18	exp Rodent/	4138214
19	(rat or rats or mouse or mice or rodent*).ti.	1672392
20	or/12-19	19363512
21	3 not 20	418528
22	limit 21 to english language	386472

23	((risk* or frail* or screen* or gait or balance) adj2 (assess* or test* or tool* or scale* or process* or procedure* or protocol* or guide* or chart* or index or score*)).ti,ab,kf.	550666
24	timed up and go.ti,ab,kf.	11200
25	(gait adj2 (technolog* or app or apps or measure*)).ti,ab,kf.	4532
26	gait speed.ti,ab,kf.	11914
27	((Tinetti or Berg) and balance).ti,ab,kf.	5885
28	functional reach test*.ti,ab,kf.	1017
29	("performance oriented" or "performance orientated").ti,ab,kf.	605
30	turn 180 degrees.ti,ab,kf.	14
31	("PRISMA-7" or (morse adj2 scale) or "downton fall risk index" or "FRAT").ti,ab,kf.	503
32	(clinical adj (assess* or check* or examination* or test* or observ*)).ti,ab,kf.	205866
33	((history or historical or prior or previous or repeat* or fear* or worry* or worries or worried or scared or frequent or frequency or severity) adj2 (question* or asking or observ*)).ti,ab,kf.	90488
34	or/23-33	853407
35	22 and 34	18169
36	systematic review/	465074
37	meta-analysis/	314718
38	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.	387026
39	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.	489001
40	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.	70454
41	(search strategy or search criteria or systematic search or study selection or data extraction).ab.	108785
42	(search* adj4 literature).ab.	134521
43	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.	488565
44	cochrane.jw.	25079
45	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.	7537
46	or/36-45	1004834
47	cohort analysis/	1156211
48	follow-up/	2182739

49	cohort*.ti,ab.	1570591
50	48 and 49	361042
51	(cohort adj (study or studies or analys* or data)).ti,ab.	525288
52	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort* or data)).ti,ab.	3231316
53	or/47,50-52	3938992
54	predict.ti.	103594
55	(validat* or rule*).ti,ab.	1388382
56	(predict* and (outcome* or risk* or model*)).ti,ab.	1738435
57	((history or variable* or criteria or scor* or characteristic* or finding* or factor*) and (predict* or model* or decision* or identif* or prognos*)).ti,ab.	6072043
58	decision*.ti,ab. and Statistical model/	8192
59	(decision* and (model* or clinical*)).ti,ab.	385291
60	(prognostic and (history or variable* or criteria or scor* or characteristic* or finding* or factor* or model*)).ti,ab.	477054
61	(stratification or discrimination or discriminate or c statistic or "area under the curve" or AUC or calibration or indices or algorithm or multivariable).ti,ab.	1559951
62	Receiver operating characteristic/	229651
63	or/54-62	8441348
64	35 and (46 or 53 or 63)	11358

Cochrane Database of Systematic Reviews search terms

#1	MeSH descriptor: [Accidental Falls] explode all trees	2160
#2	(fall or falls or falling or faller* or fallen or slip* or trip* or collapse*):ti,ab	50239
#3	#1 or #2	50408
#4	((risk* or frail* or screen* or gait or balance) near/2 (assess* or test* or tool* or scale* or process* or procedure* or protocol* or guide* or chart* or index or score*)):ti,ab	40704
#5	timed up and go:ti,ab	4256
#6	(gait near/2 (technolog* or app or apps or measure*)):ti,ab	852
#7	gait speed:ti,ab	2588
#8	((Tinetti or Berg) and balance):ti,ab	3101

#9	functional reach test*:ti,ab	1994
#10	("performance oriented" or "performance orientated"):ti,ab	121
#11	turn 180 degrees:ti,ab	6
#12	("PRISMA-7" or (morse near/2 scale) or "downton fall risk index" or "FRAT"):ti,ab	55
#13	(clinical near/1 (assess* or check* or examination* or test* or observ*)):ti,ab	30590
#14	((history or historical or prior or previous or repeat* or fear* or worry* or worries or worried or scared or frequent or frequency or severity) near/2 (question* or asking or observ*)):ti,ab	8619
#15	(or #4-#14)	83872

Epistemonikos search terms

(title:((title:((fall OR falls OR falling OR faller* OR fallen OR slip* OR trip* OR collapse*)) OR abstract:((fall OR falls OR falling OR faller* OR fallen OR slip* OR trip* OR collapse*)))) OR abstract:((title:((fall OR falls OR falling OR faller* OR fallen OR slip* OR trip* OR collapse*)) OR abstract:((fall OR falls OR falling OR faller* OR fallen OR slip* OR trip* OR collapse*)))))

B.2 Health Economics literature search strategy

Health economic evidence was identified by applying economic evaluation and quality of life filters to the clinical literature search strategy in Medline and Embase. The following databases were also searched: NHS Economic Evaluation Database (NHS EED - this ceased to be updated after 31st March 2015), Health Technology Assessment database (HTA - this ceased to be updated from 31st March 2018) and The International Network of Agencies for Health Technology Assessment (INAHTA)

Table 11: Database parameters, filters and limits applied

Database	Dates searched	Search filters and limits applied
Medline (OVID)	Health Economics 1 January 2014 – 8 May 2024	Health economics studies Quality of Life studies Exclusions (animal studies) English language
	Quality of Life 1 January 2004 to – 8 May 2024	
Embase (OVID)	Health Economics 1 January 2014 – 8 May 2024	Health economics studies Quality of Life studies

Database	Dates searched	Search filters and limits applied
	Quality of Life 1 January 2004 to – 8 May 2024	Exclusions (animal studies) English language
NHS Economic Evaluation Database (NHS EED) (Centre for Research and Dissemination - CRD)	Inception – 31 March 2015 (database no longer updated as of this date)	
Health Technology Assessment Database (HTA) (Centre for Research and Dissemination – CRD)	Inception – 31 March 2018 (database no longer updated as of this date)	
The International Network of Agencies for Health Technology Assessment (INAHTA)	Inception - 8 May 2024	English language

Medline (Ovid) search terms

1	Accidental Falls/
2	(fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*).ti,ab.
3	or/1-2
4	letter/
5	editorial/
6	news/
7	exp historical article/
8	Anecdotes as Topic/
9	comment/
10	case report/
11	(letter or comment*).ti.
12	or/4-11
13	randomized controlled trial/ or random*.ti,ab.
14	12 not 13
15	animals/ not humans/
16	exp Animals, Laboratory/
17	exp Animal Experimentation/
18	exp Models, Animal/

19	exp Rodentia/
20	(rat or rats or mouse or mice or rodent*).ti.
21	or/14-20
22	3 not 21
23	limit 22 to english language
24	limit 23 to yr="2004 -Current"
25	23 and 24
26	Economics/
27	Value of life/
28	exp "Costs and Cost Analysis"/
29	exp Economics, Hospital/
30	exp Economics, Medical/
31	Economics, Nursing/
32	Economics, Pharmaceutical/
33	exp "Fees and Charges"/
34	exp Budgets/
35	budget*.ti,ab.
36	cost*.ti.
37	(economic* or pharmaco?economic*).ti.
38	(price* or pricing*).ti,ab.
39	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
40	(financ* or fee or fees).ti,ab.
41	(value adj2 (money or monetary)).ti,ab.
42	or/26-41
43	quality-adjusted life years/
44	sickness impact profile/
45	(quality adj2 (wellbeing or well being)).ti,ab.
46	sickness impact profile.ti,ab.
47	disability adjusted life.ti,ab.
48	(qal* or qtime* or qwb* or daly*).ti,ab.
49	(euroqol* or eq5d* or eq 5*).ti,ab.
50	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
51	(health utility* or utility score* or disutilit* or utility value*).ti,ab.

52	(hui or hui1 or hui2 or hui3).ti,ab.
53	(health* year* equivalent* or hye or hyes).ti,ab.
54	discrete choice*.ti,ab.
55	rosser.ti,ab.
56	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
57	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
58	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
59	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
60	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
61	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
62	or/43-61
63	25 and 42
64	limit 63 to yr="2014 -Current"
65	25 and 62

Embase (Ovid) search terms

1	falling/
2	(fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*).ti,ab.
3	or/1-2
4	letter.pt. or letter/
5	note.pt.
6	editorial.pt.
7	case report/ or case study/
8	(letter or comment*).ti.
9	(conference abstract or conference paper).pt.
10	or/4-9
11	randomized controlled trial/ or random*.ti,ab.
12	10 not 11
13	animal/ not human/
14	nonhuman/
15	exp Animal Experiment/
16	exp Experimental Animal/
17	animal model/

18	exp Rodent/
19	(rat or rats or mouse or mice or rodent*).ti.
20	or/12-19
21	3 not 20
22	limit 21 to english language
23	limit 22 to yr="2004 -Current"
24	health economics/
25	exp economic evaluation/
26	exp health care cost/
27	exp fee/
28	budget/
29	funding/
30	budget*.ti,ab.
31	cost*.ti.
32	(economic* or pharmaco?economic*).ti.
33	(price* or pricing*).ti,ab.
34	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
35	(financ* or fee or fees).ti,ab.
36	(value adj2 (money or monetary)).ti,ab.
37	or/24-36
38	quality adjusted life year/
39	"quality of life index"/
40	short form 12/ or short form 20/ or short form 36/ or short form 8/
41	sickness impact profile/
42	(quality adj2 (wellbeing or well being)).ti,ab.
43	sickness impact profile.ti,ab.
44	disability adjusted life.ti,ab.
45	(qal* or qtime* or qwb* or daly*).ti,ab.
46	(euroqol* or eq5d* or eq 5*).ti,ab.
47	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
48	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
49	(hui or hui1 or hui2 or hui3).ti,ab.
50	(health* year* equivalent* or hye or hyes).ti,ab.

51	discrete choice*.ti,ab.
52	rosser.ti,ab.
53	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
54	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
55	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
56	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
57	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
58	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
59	or/38-58
60	23 and 37
61	limit 60 to yr="2014 -Current"
62	23 and 59

NHS EED and HTA (CRD) search terms

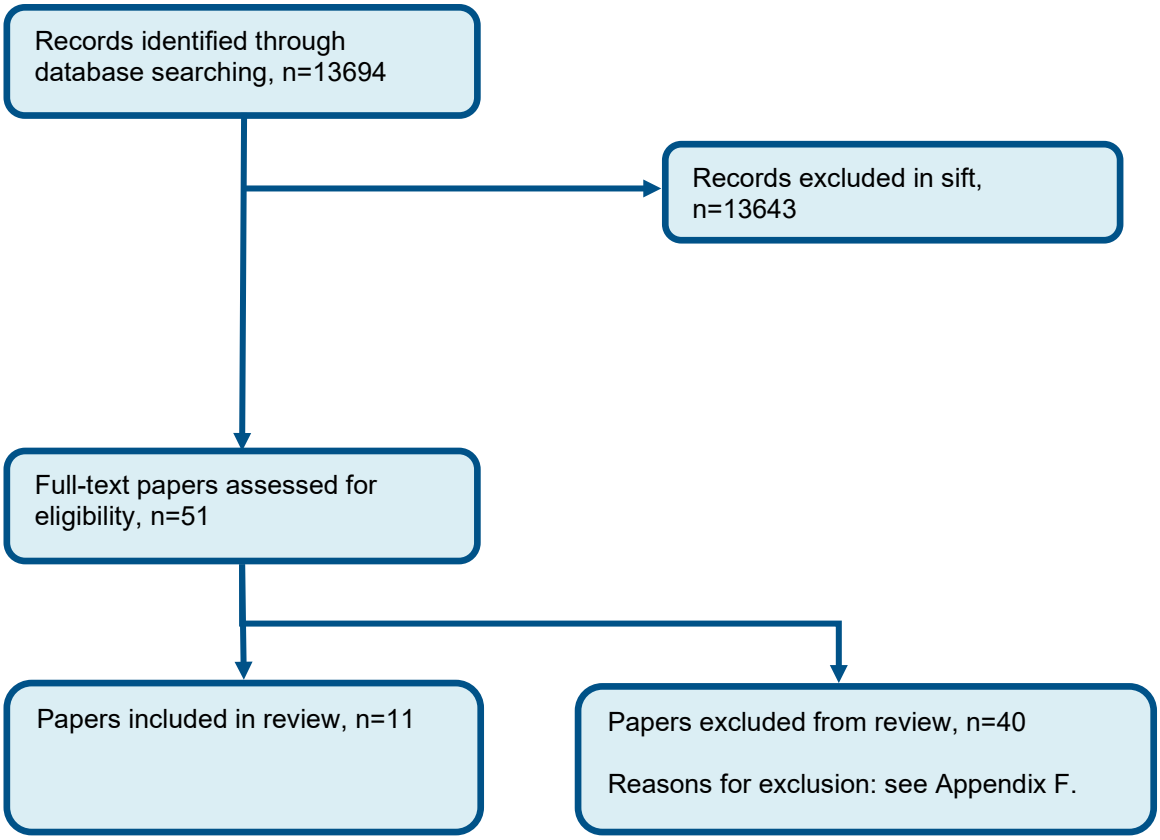
1	MeSH DESCRIPTOR Accidental Falls EXPLODE ALL TREES
2	((fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*))
3	#1 OR #2
4	(#3) IN NHSEED
5	(#3) IN HTA

INAHTA search terms

1	("Accidental Falls"[mh]) OR (fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*)
2	limit to english language
3	2004 - current

Appendix C Prognostic evidence study selection

Figure 1: Flow chart of clinical study selection for the review of the accuracy of assessments by clinicians in identifying people at risk of falls



Appendix D Prognostic evidence

Bentzen, 2011

Bibliographic Reference	**Bentzen, Hege; Bergland, Astrid; Forsen, Lisa; Diagnostic accuracy of three types of fall risk methods for predicting falls in nursing homes.; Aging clinical and experimental research; 2011; vol. 23 (no. 3); 187-95**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Prospective cohort study
Study setting	Nursing homes- Norway
Study dates	May 2005 to December 2006
Sources of funding	the Norwegian Institute for Health and Rehabilitation
Study sample	1148 nursing home residents

Inclusion criteria	Not specified
Exclusion criteria	Participants with missing information about the time of first fall
Population subgroups	Days 30, 90, 180 (predicted fall dates)
Risk tool(s)	Staff judgment
Predictors	Not specified
Model development and validation	N/A
Outcome	Fall
Duration of follow-up	13 weeks
Indirectness	Indirectness was not a concern in this study
Additional comments	329 fallers during the first 180 days

Characteristics

Study-level characteristics

Characteristic	Study (N = 1148)
% Female	n = NR; % = 72.3
Sample size	
Mean age (SD)	84.6 (8.1)

Characteristic	Study (N = 1148)
Mean (SD)	
Comorbidities Sample size	n = NR; % = NR
Fracture in previous 6 months Sample size	% = 9.9

Outcomes

Nursing home staff judgment

Outcome	Study, N = 1148
Sensitivity Custom value	NR
30 days Custom value	72 (95%CI 65-78)
90 days Custom value	65 (95%CI 60-71)
180 days Custom value	62 (95%CI 56-67)
Specificity	NR

Custom value	
30 days Custom value	69 (95%CI 66-72)
90 days Custom value	72 (95%CI 69-75)
180 days Custom value	75 (95%CI 71-79)
Positive predictive value 180 days Custom value	60 (95%CI 54-66)
Negative predictive value 180 days Custom value	76% (95%CI 72-80)

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias due to unclear participant selection, limited information regarding predictors, and prior knowledge of the outcome.)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern regarding applicability)*

Eagle, 1999

Bibliographic Reference	**Eagle DJ; Salama S; Whitman D; Evans LA; Ho E; Olde J; Comparison of three instruments in predicting accidental falls in selected inpatients in a general teaching hospital.; Journal of gerontological nursing; 1999; vol. 25 (no. 7)**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Not specified
Study setting	Hospital (rehabilitation unit and geriatric unit)
Study dates	Not specified
Sources of funding	Not specified
Study sample	98 patients from a geriatric and rehabilitation ward in a hospital.
Inclusion criteria	Patients whose wards signed an informed consent form.
Exclusion criteria	Terminally ill patients

Population subgroups	N/A
Risk tool(s)	Staff clinical judgment
Predictors	History of falls, ambulatory aids, mental status/ behaviour, safety, balance, and physical status.
Model development and validation	N/A
Outcome	Falls
Duration of follow-up	3 months
Indirectness	Indirectness was not a concern in this study
Additional comments	55 accidental falls during the study period

Characteristics

Study-level characteristics

Characteristic	Study (N = 98)
Mean age (SD) Mean (SD)	69 (NR)
Comorbidities Custom value	NA
Stroke	30

Custom value	
Orthopaedic and joint Custom value	21
Diabetes Custom value	12
Cancer Custom value	9
Infection Custom value	7
Gastrointestinal Custom value	7
Cardiovascular Custom value	5
Other Custom value	7

Outcomes

Clinical judgment

Outcome	Study, N = 98
Sensitivity Custom value	0.76
Specificity Custom value	0.49
Positive predictive value Custom value	0.39
Negative predictive value Custom value	0.83
accuracy Custom value	0.57

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias due to no provided definition of the outcome and pre-existing knowledge of the predictors.)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern regarding applicability)*

Haines, 2009

Bibliographic Reference	**Haines T; Kuys SS; Morrison G; Clarke J; Bew P; Cost-effectiveness analysis of screening for risk of in-hospital falls using physiotherapist clinical judgement.; Medical care; 2009; vol. 47 (no. 4)**

Study details

Secondary publication of another included study- see primary study for details	Yes- Bates D, Pruess K, Souney P, et al. Serious falls in hospitalized patients: correlates and resource utilization. Am J Med. 1995; 99: 137–143. cost-related study
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Australia
Study setting	hospital rehabilitation units
Study dates	May 2005 (end date not specified). Data collection for 1-6 months after May 2005.
Sources of funding	Not specified
Study sample	1123 participants admitted for rehabilitation and referred for physiotherapy
Inclusion criteria	Not specified

Exclusion criteria	Not specified
Population subgroups	Not specified
Risk tool(s)	Physiotherapist judgment
Predictors	Not specified
Model development and validation	N/A
Outcome	Falls
Duration of follow-up	Not specified
Indirectness	Indirectness was not a concern for this study.
Additional comments	286 patients were determined likely to fall. 125 patients fell.

Characteristics

Study-level characteristics

Characteristic	Study (N = 1123)
% Female Sample size	n = NR; % = NR
Male Sample size	n = 447; % = 40

Mean age (SD) Custom value	75
Comorbidities Sample size	n = NR; % = NR
Admitted after orthopaedic surgery Sample size	n = 402; % = 36
Admitted after stroke Sample size	n = 283; % = 25
Admitted after other neurological conditions Sample size	n = 103; % = 9

Outcomes

Physiotherapist clinical judgment

Outcome	Study, N = 1123
Sensitivity (95%CI) Custom value	0.61 (0.54-0.67)
Specificity (95%CI) Custom value	0.82 (0.80- 0.85)
Youden Index (95%CI)	0.43 (0.36- 0.50)

Custom value	
Positive predictive value Custom value	0.43 (95%CI 0.37- 0.49)
Negative predictive value Custom value	0.90 (95%CI 0.88- 0.92)

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias due to limited information regarding predictors)*
Overall Risk of bias and Applicability	Concerns for applicability	Unclear *(Unclear concerns)*

Lundin-Olsson, 2003

Bibliographic Reference	**Lundin-Olsson, Lillemor; Jensen, Jane; Nyberg, Lars; Gustafson, Yngve; Predicting falls in residential care by a risk assessment tool, staff judgement, and history of falls.; Aging clinical and experimental research; 2003; vol. 15 (no. 1); 51-9**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Sweden
Study setting	Residential care facilities
Study dates	Not specified
Sources of funding	the County Council of Vasterbotten, the Federation of County Councils in Sweden, the Umea University Foundation of Medical Research, the Gun and Bertil Stohnes' Foundation, and the Swedish Foundation for Health Care Sciences and Allergy Research
Study sample	208 residents

Inclusion criteria	Not specified
Exclusion criteria	Not specified
Population subgroups	N/A
Risk tool(s)	Nurse's aides and licensed practical nurses’ judgment based on knowledge of the resident
Predictors	History of falls
Model development and validation	N/A
Outcome	Falls
Duration of follow-up	6 months
Indirectness	Indirectness was not a concern with this study
Additional comments	104 residents fell at least once

Characteristics

Study-level characteristics

Characteristic	Study (N = 208)
% Female Sample size	n = NR; % = 69
Mean age (SD) Mean (SD)	82.4 (6.2)
Comorbidities Sample size	n = NR; % = NR
Impaired vision Sample size	n = NR; % = 20
Impaired hearing Sample size	n = NR; % = 30
Episodes of delirium in the past month Sample size	n = NR; % = 17
Urinary incontinence Sample size	n = NR; % = 33

Outcomes

Staff judgment

Outcome	Study, N = 104
Sensitivity Custom value	60%
Specificity Custom value	71%
Positive predictive value Custom value	67%
Negative predictive value Custom value	64%

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(Predictor assessment was likely made with knowledge of the outcome, not all enrolled participants were included in the analysis, no inclusion/exclusion criteria provided regarding participant selection and no information regarding time intervals between predictor assessment and outcome determination)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern for applicability)*

Milisen, 2012

Bibliographic Reference	**Milisen, Koen; Coussement, Joke; Flamaing, Johan; Vlaeyen, Ellen; Schwendimann, Rene; Dejaeger, Eddy; Surmont, Kurt; Boonen, Steven; Fall prediction according to nurses' clinical judgment: differences between medical, surgical, and geriatric wards.; Journal of the American Geriatrics Society; 2012; vol. 60 (no. 6); 1115-21**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Belgium (Flanders)
Study setting	Hospital- general medical ward, geriatric ward, and surgical ward
Study dates	November 2003- March 2004
Sources of funding	Not specified
Study sample	2470 individuals were screened
Inclusion criteria	Adults aged 19 years or older admitted to hospital for longer than 48 hours and were prescheduled for elective surgery.

Exclusion criteria	Younger than 19 years or incomplete assessment
Population subgroups	General medical ward = 992 patients Surgical ward= 812 patients Geriatric ward = 666 patients 65 years or older =
Risk tool(s)	Nurses' judgment of risk of falling
Predictors	Age, sex, origin of admission, and length of hospital stay
Model development and validation	N/A
Outcome	Hospital inpatient falls
Duration of follow-up	Not reported
Indirectness	Indirectness was not a concern for this study
Additional comments	130 fallers

Characteristics

Study-level characteristics

Characteristic	Study (N = 2470)
% Female	n = 1374; % = 55.6
Sample size	

65 years or older Sample size	n = 956; % = 61.1
Geriatric ward Sample size	n = 455; % = 68.3
Mean age (SD) Mean (SD)	67.6 (18.3)
65 years or older Mean (SD)	79.4 (7.8)
Geriatric ward Mean (SD)	83.2 (7.3)

Outcomes

Total patient sample

Outcome	Study, N = 2470
ROC Curve AUC Custom value	0.74 (95%CI 0.70- 0.78)

Geriatric ward

Outcome	Study, N = 666
ROC Curve AUC Custom value	0.61 (95%CI 0.55- 0.67)

65 years and older

Outcome	Study, N = 1564
ROC Curve Custom value	0.66 (95%CI 0.62- 0.70)
65-74 years Custom value	0.73 (95%CI 0.63- 0.83)
75-84 years Custom value	0.65 (95%CI 0.59- 0.72)
85 years or older Custom value	0.57 (95%CI 0.49- 0.65)

Predictive property of nurses' judgment

Outcome	Study, N = 2470
Total sample Custom value	NA

Sensitivity Custom value	87%
Specificity Custom value	61%
Positive predictive value Custom value	12%
Negative predictive value Custom value	99%
False-Positive Rate Custom value	39%
False negative rate Custom value	13%
accuracy Custom value	62%
Youden Index Custom value	48%
Sensitivity Custom value	90%

Specificity Custom value	32%
Positive predictive value Custom value	17%
Negative predictive value Custom value	95%
False positive rate Custom value	68%
False negative rate Custom value	10%
accuracy Custom value	39%
Youden Index Custom value	22%
65 years or older Custom value	NA
Sensitivity Custom value	87%

Specificity Custom value	45%
Positive predictive values Custom value	13%
Negative predictive values Custom value	98%
False positive rate Custom value	55%
False negative rate Custom value	13%
accuracy Custom value	49%
Youden Index Custom value	32%
65- 74 years Custom value	NA
Sensitivity Custom value	81%

Specificity Custom value	65%
Positive predictive value Custom value	10%
Negative predictive value Custom value	99%
False positive rate Custom value	35%
False negative rate Custom value	19%
accuracy Custom value	65%
Youden Index Custom value	46%
75-84 years Custom value	NA
Sensitivity Custom value	89%

Specificity Custom value	42%
Positive predictive value Custom value	13%
Negative predictive value Custom value	98%
False positive rate Custom value	58%
False negative rate Custom value	11%
accuracy Custom value	46%
Youden Index Custom value	31%
85 years or older Custom value	NA
Sensitivity Custom value	88%

Specificity Custom value	27%
Positive predictive value Custom value	14%
Negative predictive value Custom value	94%
False positive rate Custom value	74%
False negative rate Custom value	12%
accuracy Custom value	34%
Youden Index Custom value	15%

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias due to prior knowledge of the predictors.)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern regarding applicability)*

Myers, 2003

Bibliographic Reference	**Myers, Helen; Nikoletti, Sue; Fall risk assessment: a prospective investigation of nurses' clinical judgement and risk assessment tools in predicting patient falls.; International journal of nursing practice; 2003; vol. 9 (no. 3); 158-65**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Australia
Study setting	Acute care tertiary teaching hospital facility
Study dates	Not specified- completed over 14-week period
Sources of funding	Not specified
Study sample	226 patients
Inclusion criteria	Not specified
Exclusion criteria	Not specified

Population subgroups	N/A
Risk tool(s)	Nurses' judgement based on clinical assessment after admission
Predictors	Not specified for nurses' judgement Risk assessment tool 1 predictors: Age, mental status, elimination, history of falling, sensory impairment, activity and medications Risk assessment tool 2 predictors: Mobility, mental status, elimination, history of falling, and medications
Model development and validation	N/A
Outcome	Number of patients who fell
Duration of follow-up	Not specified - time until first fall, discharge, or death.
Indirectness	Indirectness was not a concern for this study
Additional comments	34 fallers

Characteristics

Study-level characteristics

Characteristic	Study (N = 226)
% Female Sample size	n = 162; % = 71.7
Mean age (SD) Mean (SD)	84.91 (8.53)

Outcomes

Clinical judgement

Outcome	Study, N = 226
Sensitivity Custom value	88%
Specificity Custom value	26%
PPV Custom value	18%
NPV Custom value	92%

ROC curve AUC Custom value	0.646

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(No information provided regarding the predictors)*
Overall Risk of bias and Applicability	Concerns for applicability	High *(Due to participant selection, predictor information and outcome determination)*

Nordin, 2008

Bibliographic Reference	**Nordin, Ellinor; Lindelof, Nina; Rosendahl, Erik; Jensen, Jane; Lundin-Olsson, Lillemor; Prognostic validity of the Timed Up-and-Go test, a modified Get-Up-and-Go test, staff's global judgement and fall history in evaluating fall risk in residential care facilities.; Age and ageing; 2008; vol. 37 (no. 4); 442-8**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Sweden
Study setting	Residential care facilities
Study dates	Not specified
Sources of funding	This investigation was supported by grants from the Swedish Research Council (K2004-27KX-15041-01A and K2005-27VX-15357-01A), the Swedish Council for Working Life and Social Research, the Aldrecentrum Vasterbotten, the Erik and Anne-Marie Detlof's Foundation, Umea University, the ˚ SJCKMS and Gun and Bertil Stohne's Foundation.
Study sample	183 participants at residential care facilities

Inclusion criteria	Individuals with a Mini Mental Status Examination score of 10 or more.
Exclusion criteria	Not specified
Population subgroups	Not specified
Risk tool(s)	Licensed practical nurse or nurse's aide judgment (GLORF)
Predictors	Not specified
Model development and validation	N/A
Outcome	Falls
Duration of follow-up	6 months
Indirectness	Indirectness was not a concern for this study
Additional comments	97 participants fell during the follow-up period

Characteristics

Study-level characteristics

Characteristic	Study (N = 183)
% Female Sample size	n = 134; % = 73
Mean age (SD) Mean (SD)	84.3 (6.6)
Comorbidities Sample size	n = NR; % = NR
Hearing impaired Sample size	n = 29; % = 16
Vision impaired Sample size	n = 45; % = 25
Dementia Sample size	n = 109; % = 60
Depression Sample size	n = 108; % = 59
Delirium (previous year)	n = 51; % = 28

Characteristic	Study (N = 183)
Sample size	
Heart disease Sample size	n = 123; % = 67
Previous stroke/ TIA Sample size	n = 38; % = 21
Urinary incontinence Sample size	n = 48; % = 26
Fracture in the previous 5 years Sample size	n = 65; % = 36

Outcomes

GLORF

Outcome	Study, N = 183
ROC curve Custom value	0.68 (95%CI 0.60-0.76)
Sensitivity Custom value	56% (95%CI 46–65)
Specificity Custom value	80% (95%CI 71–87)

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias regarding participant selection)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern of applicability)*

Vassallo, 2008

Bibliographic Reference	**Vassallo, Michael; Poynter, Lynn; Sharma, Jagdish C; Kwan, Joseph; Allen, Stephen C; Fall risk-assessment tools compared with clinical judgment: an evaluation in a rehabilitation ward.; Age and ageing; 2008; vol. 37 (no. 3); 277-81**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	United Kingdom
Study setting	Rehabilitation hospital
Study dates	Not specified
Sources of funding	None specified
Study sample	Elderly patients admitted for rehabilitation
Inclusion criteria	Not specified

Exclusion criteria	Not specified
Population subgroups	Not specified
Risk tool(s)	Clinician judgment by observation of wandering behaviour
Predictors	Observation of wandering behaviour
Model development and validation	N/A
Outcome	Falls
Duration of follow-up	Followed up to the point of discharge
Indirectness	Indirectness was not a concern for this study
Additional comments	157 patients were correctly identified

Characteristics

Study-level characteristics

Characteristic	Study (N = 200)
% Female Custom value	123
Mean age (SD) Mean (SD)	80.9 (NR)

Outcomes

Clinical observation of wandering behaviour for identifying all falls

Outcome	Study, N = 200
Sensitivity Custom value	43.1 (95%CI 0.30-0.56)
Specificity Custom value	90.6 (95%CI 0.84- 0.94)
Positive predictive value Custom value	61.1 (95%CI 0.44- 0.75)
Negative predictive value Custom value	82.3 (95%CI 0.75- 0.87)
Number of patients correctly identified Custom value	157
Total predictive accuracy Custom value	78.0 (95%CI 0.72- 0.83)

Clinical observation of wandering behaviour for identifying recurrent falls

Outcome	Study, N = 200
Sensitivity	58.8 (95%CI 0.35- 0.78)

Custom value	
Specificity Custom value	85.8 (95%CI 0.79- 0.90)
Positive predictive value Custom value	27.7 (95%CI 0.16- 0.44)
Negative predictive value Custom value	95.7 (95%CI 0.91- 0.97)
Number of patients identified correctly Custom value	167
Total predictive accuracy Custom value	83.5 (95%CI 0.77- 0.87)

Critical appraisal - PROBAST tool 2.1

Section	**Question**	**Answer**
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias regarding participant selection, predictor assessments made with knowledge of the outcome and no provided definition of the outcome.)*
Overall Risk of bias and Applicability	Concerns for applicability	Low

Vlaeyen, 2021

Bibliographic Reference	**Vlaeyen E; Poels J; Colemonts U; Peeters L; Leysens G; Delbaere K; Dejaeger E; Dobbels F; Milisen K; Predicting Falls in Nursing Homes: A Prospective Multicenter Cohort Study Comparing Fall History, Staff Clinical Judgment, the Care Home Falls Screen, and the Fall Risk Classification Algorithm.; Journal of the American Medical Directors Association; 2021; vol. 22 (no. 2)**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Belgium
Study setting	Nursing homes
Study dates	November 2014- January 2016
Sources of funding	Not specified
Study sample	420 nursing home residents

Inclusion criteria	Residing permanently in the nursing home, able to walk independently with or without a walking aid, and able to speak Flemish
Exclusion criteria	Residents who were bedridden, completely wheelchair-bound, terminally ill, not able to understand Flemish, or not able to understand simple instructions.
Population subgroups	N/A
Risk tool(s)	Physiotherapist judgment, nurse judgment, nurse's aide judgment at 1, 3, and 6 months based on personal clinical experience
Predictors	Not reported
Model development and validation	N/A
Outcome	Fall
Duration of follow-up	6 months
Indirectness	Indirectness was not a concern in this study
Additional comments	Fallers = 211 Non-fallers= 209

Characteristics

Study-level characteristics

Characteristic	Study (N = 420)
% Female Sample size	n = 308; % = 73.3
Mean age (SD) Mean (SD)	85.9 (6.9)
Comorbidities Sample size	n = NR; % = NR
Urinary incontinence Sample size	n = 269; % = 64
Visual impairment Sample size	n = 254; % = 60.5
Hearing impairment Sample size	n = 51; % = 12.1

Outcomes

Physiotherapist judgment at 1 month

Outcome	Study, N = 419
Sensitivity Custom value	50.0% (95%CI 37.2- 62.8)
Specificity Custom value	67.7 (95%CI 62.0-73.0)
Youden Index Custom value	0.18

Physiotherapist judgment at 3 months

Outcome	Study, N = 411
Sensitivity Custom value	52.8 (95%CI 43.6-61.9)
Specificity Custom value	73.7 (95%CI 67.6-79.3)
Youden Index Custom value	0.27

Physiotherapist judgment at 6 months

Outcome	Study, N = 399
Sensitivity Custom value	47.4 (95%CI 39.8-55.1)
Specificity Custom value	77.5 (95%CI 70.5-83.5)
Youden Index Custom value	0.25
PPV Custom value	67.8% (95%CI 60.5- 74.3)
NPV Custom value	59.6% (95%CI 55.6-63.4)

Registered Nurse judgment at 1 month

Outcome	Study, N = 419
Sensitivity Custom value	71.2 (95%CI 58.8-81.7)
Specificity Custom value	57.4 (95%CI 51.8-62.9)
Youden Index Custom value	0.29

Registered Nurse judgment at 3 months

Outcome	Study, N = 411
Sensitivity Custom value	61.2 (95%CI 52.3-69.7)
Specificity Custom value	61.0 (95%CI 54.6-67.1)
Youden Index Custom value	0.22

Registered Nurse judgment at 6 months

Outcome	Study, N = 399
Sensitivity Custom value	59.8 (95%CI 52.3-66.9)
Specificity Custom value	67.4 (95%CI 60.1-74.2)
Youden Index Custom value	0.27
PPV Custom value	65.1 (95%CI 59.4-70.3)
NPV Custom value	62.2 (95%CI 57.4-66.9)

Nurse's Aide judgment at 1 month

Outcome	Study, N = 419
Sensitivity Custom value	53.0 (95%CI 40.3-65.4)
Specificity Custom value	61.1 (95%CI 55.5-66.5)
Youden Index Custom value	0.14

Registered nurse's aide at 3 months

Outcome	Study, N = 411
Sensitivity Custom value	50.8 (95%CI 41.8-59.7)
Specificity Custom value	64.6 (95%CI 58.3-70.6)
Youden Index Custom value	0.15

Registered nurse's aide at 6 months

Outcome	Study, N = 399
Sensitivity Custom value	51.9 (95%CI 44.4-59.3)
Specificity Custom value	71.8 (95%CI 64.7-78.3)
Youden Index Custom value	0.24
PPV Custom value	65.1 (58.7-71.0)
NPV Custom value	59.6 (55.3-63.8)

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	Unclear *(Unclear risk of bias due to predictor assessment)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern regarding applicability)*

Vratsistas-Curto, 2018

Bibliographic Reference	Vratsistas-Curto, Angela; Tiedemann, Anne; Treacy, Daniel; Lord, Stephen R; Sherrington, Cathie; External validation of approaches to prediction of falls during hospital rehabilitation stays and development of a new simpler tool.; Journal of rehabilitation medicine; 2018; vol. 50 (no. 2); 216-222

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Australia
Study setting	Public hospital- general rehabilitation unit
Study dates	April 2010 to May 2011
Sources of funding	A grant from the Ingham Institute for Applied Medical Research.
Study sample	300 inpatients admitted to the general rehabilitation unit
Inclusion criteria	All admitted patients

Exclusion criteria	Patients who were not receiving rehabilitation
Population subgroups	N/A
Risk tool(s)	Physiotherapist judgment
Predictors	Primary diagnosis, age, sex, falls experienced in the past 12 months, and medications
Model development and validation	N/A
Outcome	Falls
Duration of follow-up	Not specified
Indirectness	Indirectness was not a concern for this study
Additional comments	41 patients fell during their rehabilitation stay

Characteristics

Study-level characteristics

Characteristic	Study (N = 300)
% Female Sample size	n = 173; % = 58
Mean age (SD) Mean (SD)	80 (11)

Outcomes

Physiotherapist judgment

Outcome	Study, N = 300
AUC Custom value	0.65 (95%CI 0.57-0.73)

Critical appraisal - PROBAST tool 2.1

Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias due to a limited number of participants with the outcome and limited information available regarding the analysis)*
Overall Risk of bias and Applicability	Concerns for applicability	Low *(Low concern for applicability)*

Webster, 2010

Bibliographic Reference	**Webster, J.; Courtney, M.; Marsh, N.; Gale, C.; Abbott, B.; Mackenzie-Ross, A.; McRae, P.; The STRATIFY tool and clinical judgment were poor predictors of falling in an acute hospital setting; Journal of Clinical Epidemiology; 2010; vol. 63 (no. 1); 109-113**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	N/A
Study location	Australia
Study setting	acute tertiary hospital
Study dates	17 March - 24 October 2007
Sources of funding	‘Queensland Nursing Council’ grant and a ‘Strengthening Aged Care’ grant
Study sample	801 hospital patients
Inclusion criteria	Hospital inpatients

Exclusion criteria	Not specified
Population subgroups	N/A
Risk tool(s)	Nurses' judgment
Predictors	Not specified
Model development and validation	N/A
Outcome	Fall
Duration of follow-up	Stated, but not defined
Indirectness	Indirectness was not a concern for this study
Additional comments	According to nurses' judgment 501 patients were at risk of falling, but 60 did fall.

Characteristics: Study-level characteristics

Characteristic	Study (N = 801)
% Female Sample size	n = NR; % = NR
Male Sample size	n = 394; % = 49.2
Mean age (SD) Mean (SD)	77.7 (7.89)

Outcome: Nurses' judgment

Outcome	Study, N = 501
Sensitivity Custom value	0.85
Specificity Custom value	0.38
NPV Custom value	0.96
PPV Custom value	0.12

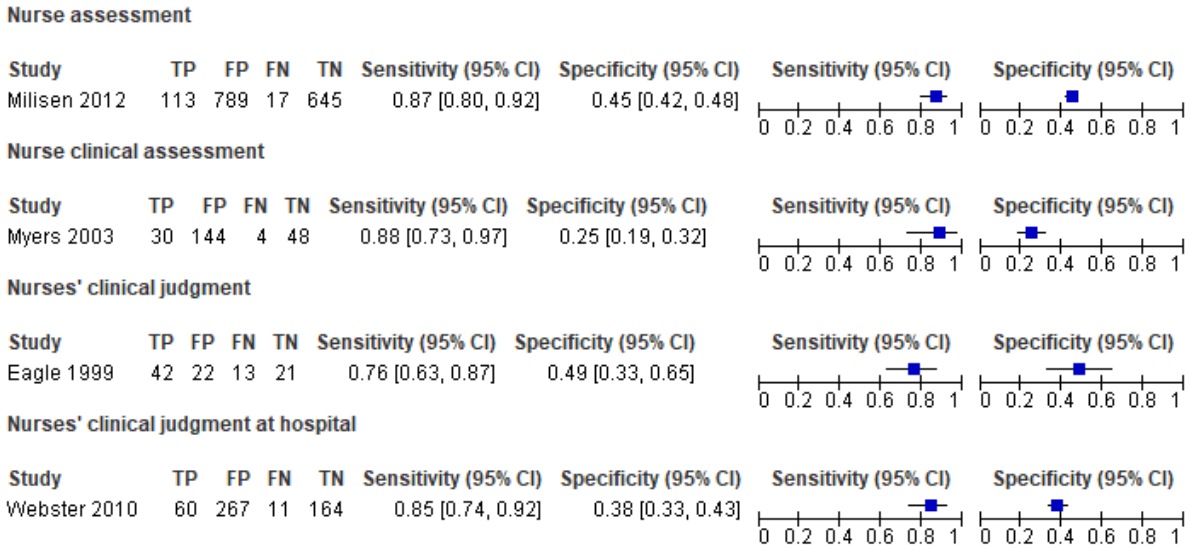
Critical appraisal - PROBAST tool 2.1

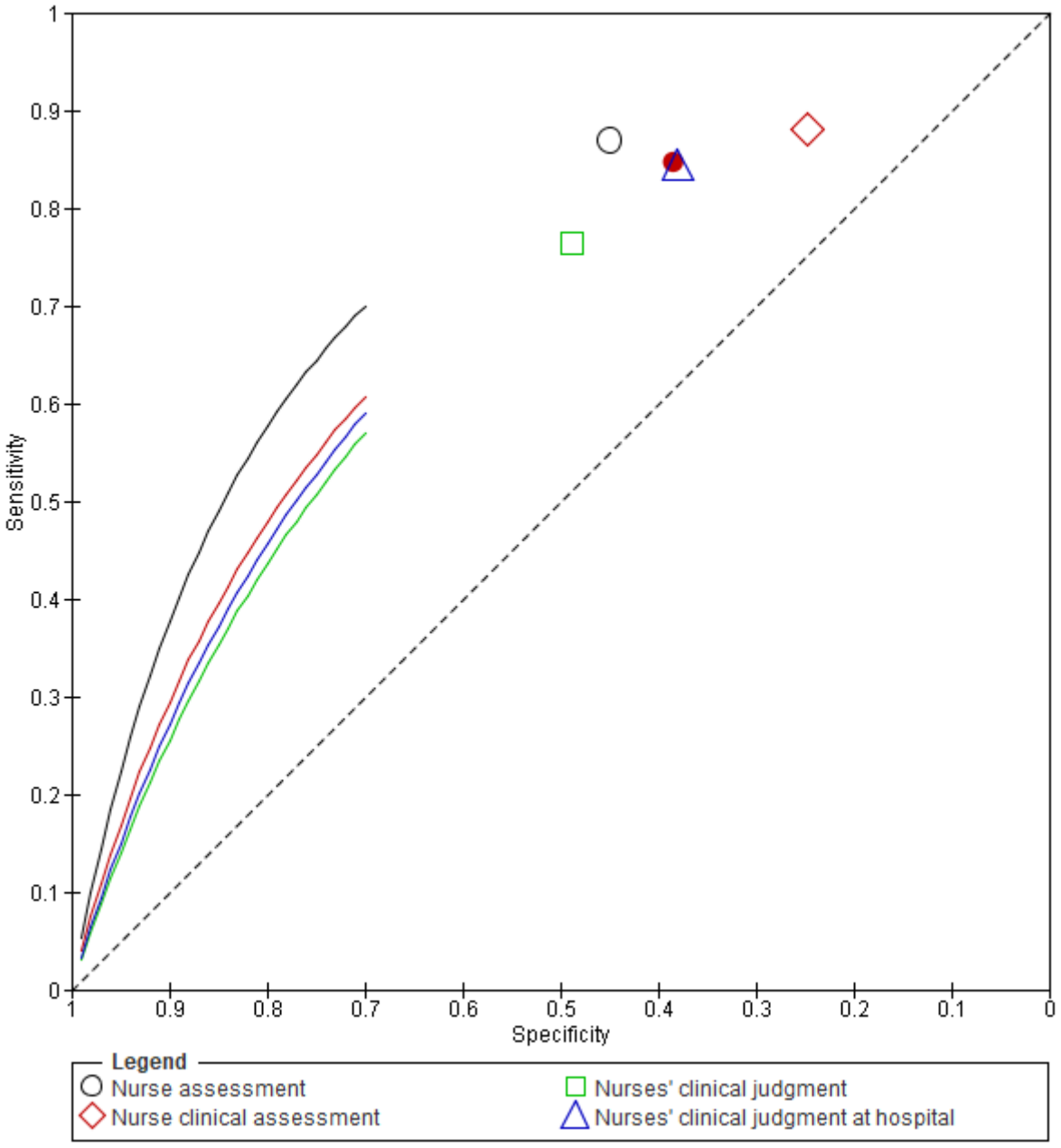
Section	Question	Answer
Overall Risk of bias and Applicability	Risk of bias	High *(High risk of bias due to unclear participant selection criteria, and no information provided regarding the predictors, and limited number of participants with the reported outcome.)*
Overall Risk of bias and Applicability	Concerns for applicability	Unclear *(Unclear concern regarding applicability)*

Appendix E Forest plots

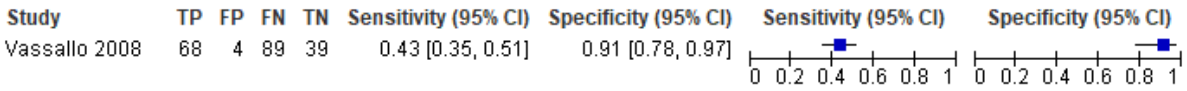
E.1.1.1 Hospital setting

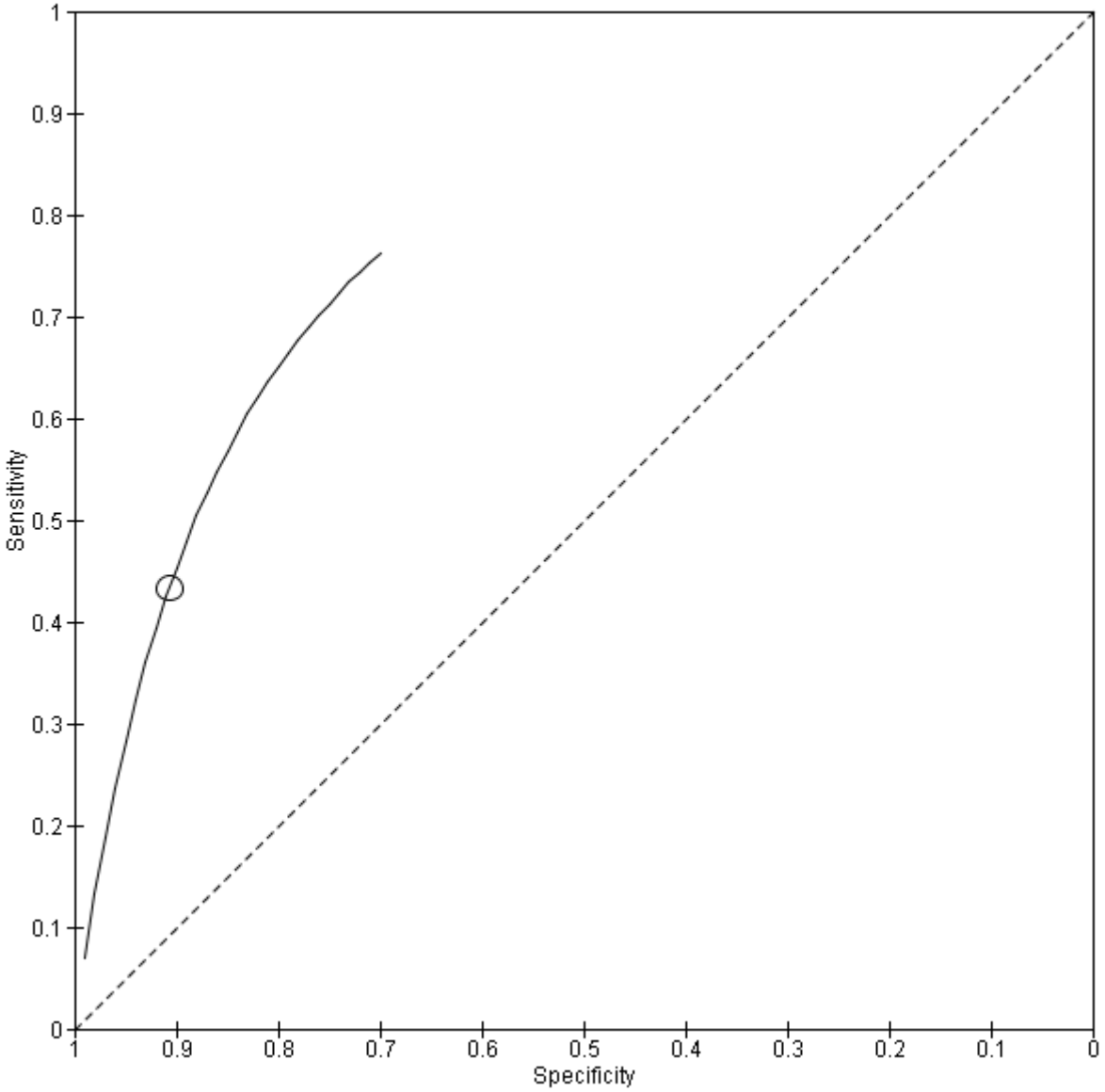
Nursing assessment of falls risk for patients 65 years or older



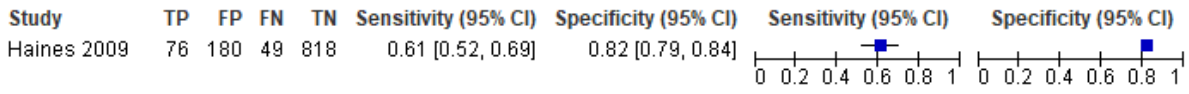


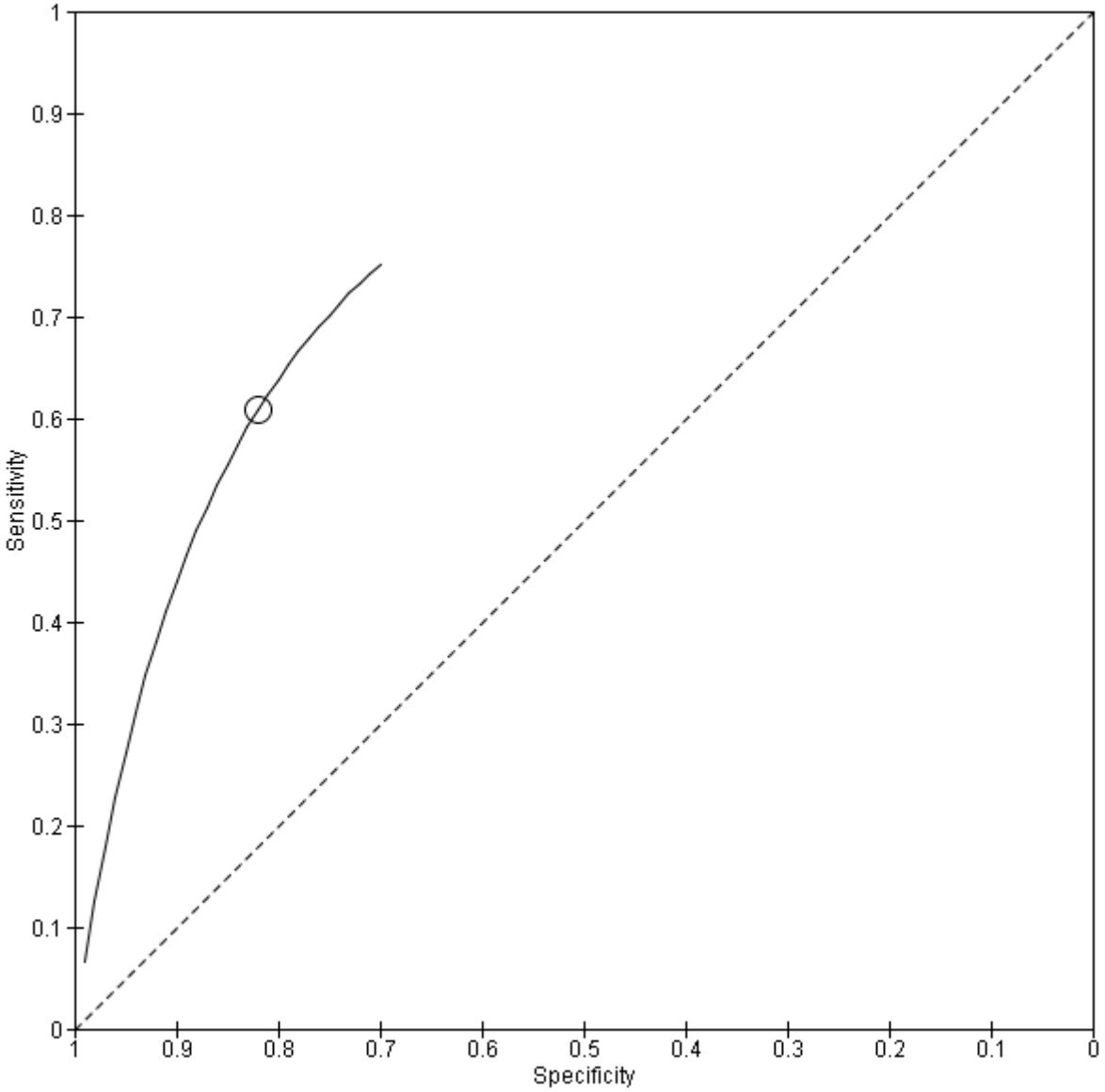
Forest plot from Vassallo, 2008:





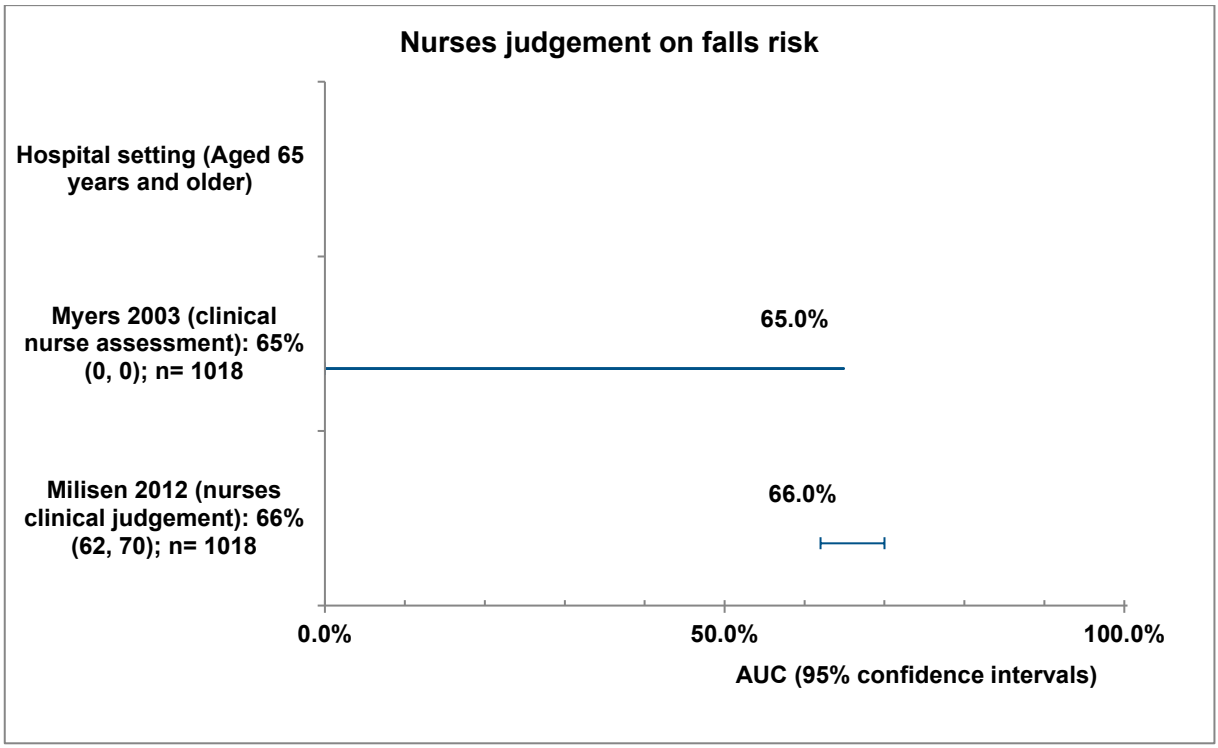
Forest plot from Haines, 2009:





AUC data

ROC plot: Nurses judgement on falls risk in a hospital setting



Residential setting

Nurses and nurses' aides clinical judgement

Registered nurses' judgment based on personal clinical experience

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Vlaeyen 2021	126	68	85	141	0.60 [0.53, 0.66]	0.67 [0.61, 0.74]

Nursing home staff judgment at 180 days

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Bentzen 2011	353	145	217	434	0.62 [0.58, 0.66]	0.75 [0.71, 0.78]

Nurses's Aides' judgment based on personal clinical experience

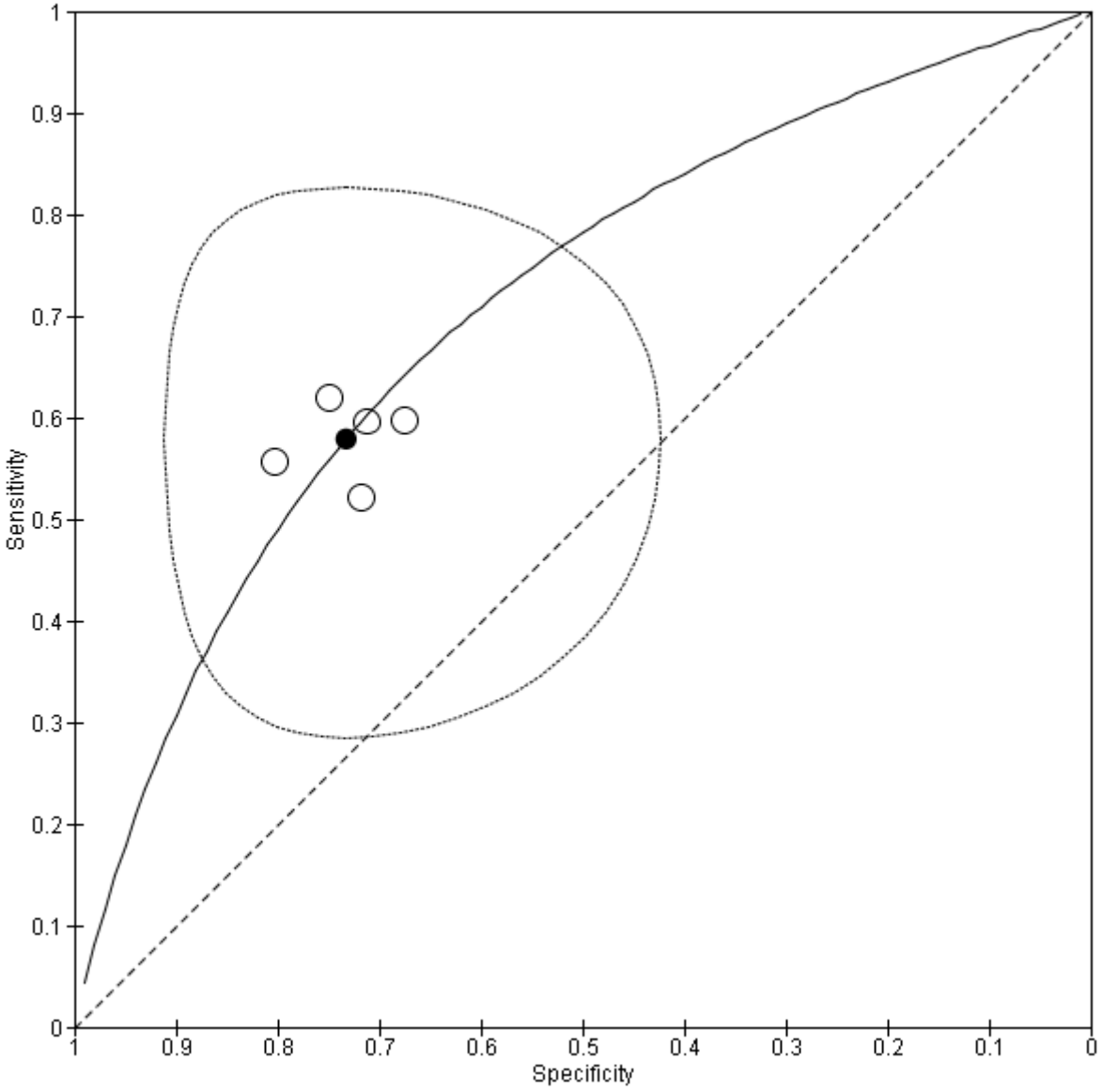
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Vlaeyen 2021	110	59	101	150	0.52 [0.45, 0.59]	0.72 [0.65, 0.78]

Nurses' aides and licensed practical nurses' judgment based on knowledge of the resident

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Lundin-Olsson 2003	62	30	42	74	0.60 [0.50, 0.69]	0.71 [0.61, 0.80]

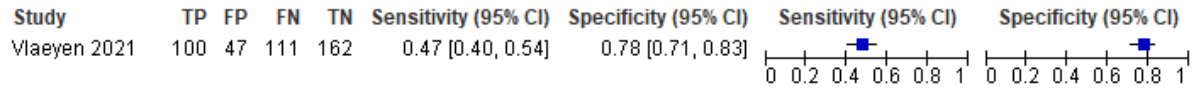
Licensed practical nurse or nurse's aide judgment GLORF

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Nordin 2008	54	17	43	69	0.56 [0.45, 0.66]	0.80 [0.70, 0.88]



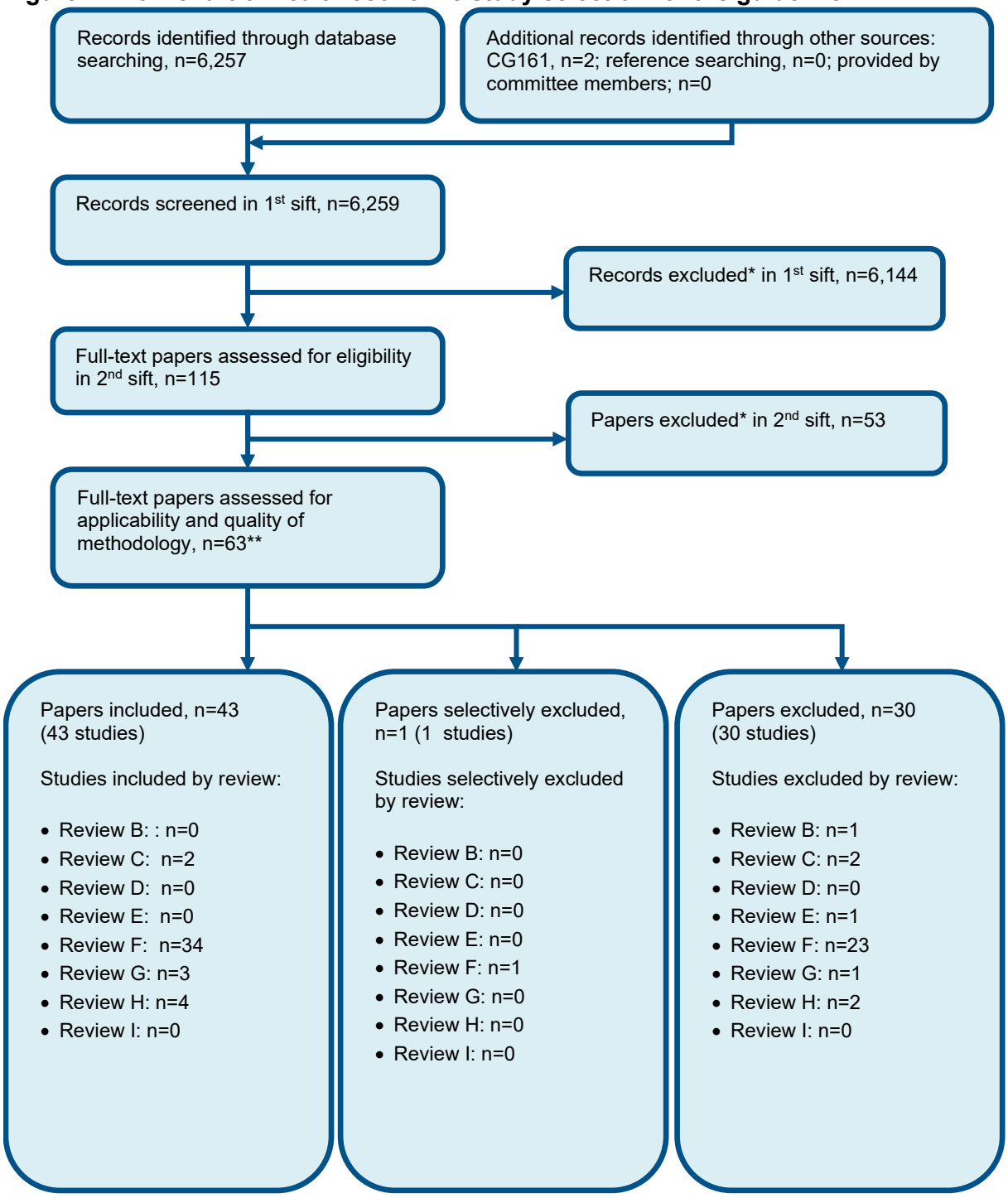
Physiotherapists clinical judgement – residential setting

Forest plot from Vlaeyen, 2021



Appendix F Economic evidence study selection

Figure 2: Flow chart of health economic study selection for the guideline



* Non-relevant population, intervention, comparison, design or setting; non-English language
**One paper included in two reviews

Appendix G Economic evidence tables

There was no included health economic evidence.

Appendix H Excluded studies

H.1 Clinical studies

Table 12: Studies excluded from the clinical review

Study	Code [Reason]
Agarwal, G; Angeles, R; Pirrie, M; Marzanek, F; McLeod, B; Parascandalo, J; Dolovich, L. (2017). Effectiveness of a community paramedic-led health assessment and education initiative in a senior's residence building: the Community Health Assessment Program through Emergency Medical Services (CHAP-EMS). 17 (no.1); 8.	- Study does not contain an intervention relevant to this review protocol
Arihisa, Katsuhiko; Yamamoto, Akihiko; Hayashi, Tatsuhiro; Hayashi, Ayu; Ishizuki, Chinami; Miyaguchi, Hideki. (2019). Development and testing of a visual tool for assessing risk of falls. Quality management in health care. 28(3): 139-146.	- Study not reported in English
Beauchet, O; Noublanche, F; Simon, R; Sekhon, H; Chabot, J; Levinoff, E J; Kabeshova, A; Launay, C P. (2018). Falls risk prediction for older inpatients in acute care medical wards: Is there an interest to combine an early nurse assessment and the artificial neural network analysis? The Journal of nutrition, health & aging. 22(1); 131-137	- Study does not contain an intervention relevant to this review protocol
Chiang, Tsai-Lien; Hsu, Chan-Peng; Yuan, Yu-Jie; Lin, Chaou-Shune. (2022). Can EMS providers and emergency department nurses work together to identify home risk factors for falls in older people? Medicine. 101(38), e30752.	- Study does not contain an intervention relevant to this review protocol
Coll-Planas, Laura; Kron, Martina; Sander, Silvia; Rissmann, Ulrich; Becker, Clemens; Nikolaus, Thorsten. (2006). Accidental falls among community-dwelling older adults: improving the identification process of persons at risk by nursing staff. Zeitschrift fur Gerontologie und Geriatrie. 39(4); 277-82.	- Study does not contain an intervention relevant to this review protocol
Demons, Jamehl L; Chenna, Swapna; Callahan, Kathryn E; Davis, Brooke L; Kearsley, Linda; Sink, Kaycee M; Watkins, Franklin S; Williamson, Jeff D; Atkinson, Hal H. (2014). Utilizing a Meals on Wheels program to teach falls risk assessment to medical students. Gerontology & geriatrics education. 35(4); 409-20.	- Study does not contain an intervention relevant to this review protocol
Flannery, Caragh; Dennehy, Rebecca; Riordan, Fiona; Cronin, Finola; Moriarty, Eileen; Turvey, Spencer; O'Connor, Kieran; Barry, Patrick; Jonsson, Agnes; Duggan, Eoin; O'Sullivan, Liz; O'Reilly, Eilis; Sinnott, Sarah-Jo; McHugh, Sheena. (2022). Enhancing referral processes within an integrated fall prevention pathway for older people: a mixed-methods study. BMJ open. 12(8), e056182	- Study does not contain an intervention relevant to this review protocol
Gemmeke, Marle; Koster, Ellen S; Pajouheshnia, Romin; Kruijtbosch, Martine; Taxis, Katja; Bouvy, Marcel L. (2021). Using pharmacy dispensing data to predict falls in older individuals. British journal of clinical pharmacology. 87(3); 1282-1290.	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
Goldberg, Elizabeth M; Marks, Sarah J; Ilegbusi, Aderonke; Resnik, Linda; Strauss, Daniel H; Merchant, Roland C. (2020). GAPcare: The geriatric acute and post-acute fall prevention intervention in the emergency department: Preliminary data. Journal of the American Geriatrics Society. 68(1); 198-206	- Study does not contain an intervention relevant to this review protocol
Guerard, Emily J; Deal, Allison M; Williams, Grant R; Jolly, Trevor A; Nyrop, Kirsten A; Muss, Hyman B. (2015). Falls in older adults with cancer: Evaluation by oncology providers. Journal of oncology practice. 11(6); 470-4.	-Study design not relevant to this review protocol
Halter, Mary; Vernon, Susan; Snooks, Helen; Porter, Alison; Close, Jacqueline; Moore, Fionna; Porsz, Simon. (2011). Complexity of the decision-making process of ambulance staff for assessment and referral of older people who have fallen: A qualitative study. Emergency medicine journal. 28(1); 44-50.	- Study does not contain an intervention relevant to this review protocol
Hunderfund, Andrea N Leep; Sweeney, Cynthia M; Mandrekar, Jayawant N; Johnson, Leann M; Britton, Jeffrey W. (2011). Effect of a multidisciplinary fall risk assessment on falls among neurology inpatients. Mayo Clinic proceedings. 86(1); 19-24.	-Population not relevant to this review protocol.
Irvin, D J. (1999). Psychiatric unit fall event. Journal of psychosocial nursing and mental health services. 37(12); 8-16.	- Study does not contain an intervention relevant to this review protocol
Jacobsohn, Gwen Costa; Leaf, Margaret; Liao, Frank; Maru, Apoorva P; Engstrom, Collin J; Salwei, Megan E; Pankratz, Gerald T; Eastman, Alexis; Carayon, Pascale; Wiegmann, Douglas A; Galang, Joel S; Smith, Maureen A; Shah, Manish N; Patterson, Brian W. (2022). Collaborative design and implementation of a clinical decision support system for automated fall-risk identification and referrals in emergency departments. Healthcare. 10(1); 100598.	- Study does not contain an intervention relevant to this review protocol
Kanne, Geraldine E; Sabol, Valerie K; Pierson, Dana; Corcoran, Misty W; Silva, Susan G; White, Heidi K. (2021). On the Move clinic: A fall prevention nurse practitioner-driven model of care. Geriatric nursing. 42(4); 850-854	- Study does not contain an intervention relevant to this review protocol
Karani, Mamta V; Haddad, Yara; Lee, Robin. (2016). The role of pharmacists in preventing falls among America's older adults. Frontiers in public health. 4; 250.	- Study does not contain an intervention relevant to this review protocol
Karlsson, Lee; Doe, Kelsey; Gerry, Meghan; Moore, Brooke; Wingood, Mariana; Renfro, Mindy; Gell, Nancy. (2001). Outcomes of a physical therapist-led, statewide, community-based fall risk screening. Journal of geriatric physical therapy. 43(4); 185-193.	- Study does not contain an intervention relevant to this review protocol
Keuseman, Rachel; Miller, Donna. (1995). A hospitalist's role in preventing patient falls. Hospital practice. 48(1); 63-67.	-Review article but no a systematic review
Kinn, Sue; Clawson, Denise. (2002). Health visitor risk assessment for preventing falls in elderly people. British journal of nursing. 11(5); 316-21.	- Study does not contain an intervention relevant to this review protocol
Marschollek, Michael; Rehwald, Anja; Wolf, Klaus-Hendrik; Gietzelt, Matthias; Nemitz, Gerhard; zu Schwabedissen, Hubertus Meyer; Schulze, Mareike. (2011). Sensors vs. experts- a performance comparison of sensor-based fall risk assessment vs. conventional assessment in a sample of geriatric patients. BMC medical informatics and decision making. 11; 48.	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
Meyer, Gabriele; Kopke, Sascha; Bender, Ralf; Muhlhauser, Ingrid. (2005). Predicting the risk of falling—efficacy of a risk assessment tool compared to nurses' judgment: a cluster-randomised controlled trial. BMC geriatrics 5(14).	-Data not reported in an extractable format or a format that can be analysed
Milisen, K; Dejaeger, E; Braes, T; Dierickx, K; De Bondt, K; Smeulders, W; Teughels, S; Pelemans, W; Boonen, S. (2006). Process evaluation of a nurse-led multifactorial intervention protocol for risk screening and assessment of fall problems among community-dwelling older persons: a pilot study. The journal of nutrition, health & aging. 10(5); 446-52	- Study does not contain an intervention relevant to this review protocol and no useable outcomes
Moore, T; Martin, J; Stonehouse, J. (1996). Predicting falls: Risk assessment tool versus clinical judgement. Perspectives (Gerontological Nursing Association (Canada)). 20(1); 8-11.	- Study does not contain an intervention relevant to this review protocol
Peeters, G.M.E.E.; Pluijm, S.M.F.; Van Schoor, N.M.; Elders, P.J.M.; Bouter, L.M.; Lips, P. (2010). Validation of the LASA fall risk profile for recurrent falling in older recent fallers. Journal of Clinical Epidemiology. 63(11); 1242-1248.	- Study does not contain an intervention relevant to this review protocol
Pelicioni, Paulo H S; Waters, Debra L; Still, Amanda; Hale, Leigh. (2022). A pilot investigation of reliability and validity of balance and gait assessments using telehealth with healthy older adults. Experimental gerontology. 162; 111747	- Study does not contain an intervention relevant to this review protocol
Ritchie, Christine; Wieland, Darryl; Tully, Chris; Rowe, Joseph; Sims, Richard; Bodner, Eric. (2002). Coordination and advocacy for rural elders (CARE): a model of rural case management with veterans. The Gerontologist. 42(3); 399-405.	- Study does not contain an intervention relevant to this review protocol
Rodriguez-Molinero, Alejandro; Galvez-Barron, Cesar; Narvaiza, Leire; Minarro, Antonio; Ruiz, Jorge; Valldosera, Esther; Gonzalo, Natalia; Ng, Thalia; Sanguino, Maria Jesus; Yuste, Antonio. (2017). A two-question tool to assess the risk of repeated falls in the elderly. PloS one. 12(5); e0176703.	- Study does not contain an intervention relevant to this review protocol
Sattar, Schroder; Kenis, Cindy; Haase, Kristen; Burhenn, Peggy; Stolz-Baskett, Petra; Milisen, Koen; Ayala, Ana Patricia; Puts, Martine T E. (2020). Falls in older patients with cancer: Nursing and Allied Health Group of International Society of Geriatric Oncology review paper. Journal of geriatric oncology. 11(1); 1-7	- Study does not contain an intervention relevant to this review protocol
Seiger Cronfalk, Berit; Fjell, Astrid; Carstens, Nina; Rosseland, Lars Malvin Kvinge; Rongve, Arvid; Ronnevik, Dag-Helge; Seiger, Ake; Skaug, Knut; Ugland Vae, Karen Johanne; Hauge Wennersberg, Marianne; Bostrom, Anne-Marie. (2017). Health team for the elderly: A feasibility study for preventive home visits. Primary care research & development. 18(3); 242-252.	- Study does not contain an intervention relevant to this review protocol
Shah, M.N.; Caprio, T.V.; Swanson, P.; Rajasekaran, K.; Ellison, J.H.; Smith, K.; Frame, P.; Cypher, P.; Karuza, J.; Katz, P. (2010). A novel emergency medical services-based program to identify and assist older adults in a rural community. Journal of the American Geriatrics Society. 58(11); 2205-2211.	-Study design not relevant to this review protocol
Soto, D.; Fogel, J.F. (2012). Do physicians in-training assess for falls among the elderly population in the outpatient setting? Journal of the American Geriatrics Society. 60(4); 158.	- Study does not contain an intervention relevant to this review protocol
Southerland, Lauren T; Slattery, Lauren; Rosenthal, Joseph A; Kegelmeyer, Deborah; Kloos, Anne. (2017). Are triage questions sufficient to assign fall risk precautions in the ED? The American journal of emergency medicine. 35(2); 329-332	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
Suh, Minhee; Cho, Insook. (2021). Effectiveness of nursing care provided for fall prevention: Survival analysis of nursing records in a tertiary hospital. Japan journal of nursing science. 18(2); e12403	-Population not relevant to this review protocol
Szymaniak, Samara. (2015). Accurate falls risk assessment and interventions for preventing falls in patients in the acute care setting within a private hospital in a large capital city: A best practice implementation project. JBI database of systematic reviews and implementation reports. 13(9); 386-406.	- Study does not contain an intervention relevant to this review protocol
Tatum Iii, Paul E; Talebreza, Shaida; Ross, Jeanette S. (2018). Geriatric assessment: An office-based approach. American family physician. 97(12); 776-784.	-Review article but not a systematic review
van Rie, Kayla J; Kanji, Amisha; Naude, Alida. (2022). Professional guidelines and reported practice of audiologists performing fall risk assessment with older adults: a systematic review. American journal of audiology. 31(1); 243-260.	- Study does not contain an intervention relevant to this review protocol
Wilbur, Jason; Jogerst, Gerald; Butler, Nicholas; Xu, Yinghui. (2022). How accurate are geriatricians' fall predictions? BMC geriatrics. 22(1); 436	- Study does not contain an intervention relevant to this review protocol
Wood, Tyler A; Wajda, Douglas A; Sosnoff, Jacob J. (2019). Use of a short version of the activities-specific balance confidence scale in multiple sclerosis. International journal of MS care. 21(1); 15-21.	- Study design not relevant to this review protocol
Xia, Lixia; Zheng, Yining; Lin, Zheng; Chen, Peng; Mei, Kewen; Zhao, Jing; Liu, Yilan; Song, Baoyun; Gao, Hongmei; Sun, Chao; Yang, Hui; Wang, Ying; Song, Kuiqi; Yang, Yan; Luan, Xiaorong; Wen, Xianxiu; Yin, Xin; Fu, Adan; Cai, Yinghua; Xie, Liling; Li, Yaling; Lu, Jieyu; Wu, Xinjuan; Wang, Rong; Gu, Zejuan. (2022). Gap between risk factors and prevention strategies? A nationwide survey of fall prevention among medical and surgical patients. Journal of advanced nursing. 78(8); 2472-2481	-Study design not relevant to this review protocol

H.2 Health Economic studies

Published health economic studies that met the inclusion criteria (relevant population, comparators, economic study design, published 2007 or later and not from non-OECD country or USA) but that were excluded following appraisal of applicability and methodological quality are listed below. See the health economic protocol for more details.

Table 13: Studies excluded from the health economic review

Reference	Reason for exclusion
Haines 2009[3]	Excluded due to a combination of applicability and methodological limitations. Australian healthcare perspective with 2005 resource use and 2007-unit costs as well as 1991 USA unit costs for injurious falls, overall, these are unlikely to reflect the current NHS context. QoL and mortality not included and therefore QALYs not estimated. Short time horizon (6 months). Falls prevention intervention effectiveness based on single RCT and may not reflect the full body of evidence. Unclear if cost of falls prevention intervention included in analysis.

Appendix I Winbugs output

Figure 3: OpenBUGS output- Nursing assessment of falls risk for patients 65 years or older hospital setting

	mean	sd	MC error	2.5%	median	97.5%	start	sample		
Sigma.sq[1,1]	0.763	1.4	0.009493	0.123	0.4484	3.264	60001	60000		
Sigma.sq[1,2]	-0.124	0.8931	0.007081	-1.482	-0.0538	0.8616	60001	60000		
Sigma.sq[2,1]	-0.124	0.8931	0.007081	-1.482	-0.0538	0.8616	60001	60000		
Sigma.sq[2,2]	0.8102	1.857	0.01082	0.1382	0.4776	3.392	60001	60000		
md[1]	1.713	0.4696	0.003704	0.7994	1.71	2.653	60001	60000		
md[2]	-0.4694	0.4562	0.003254	-1.362	-0.4724	0.4278	60001	60000		
sensitivity.bar	0.8382	0.06498	5.405E-4	0.6899	0.8469	0.9342	60001	60000		
specificity.bar	0.3893	0.09926	6.608E-4	0.2039	0.3841	0.6053	60001	60000		

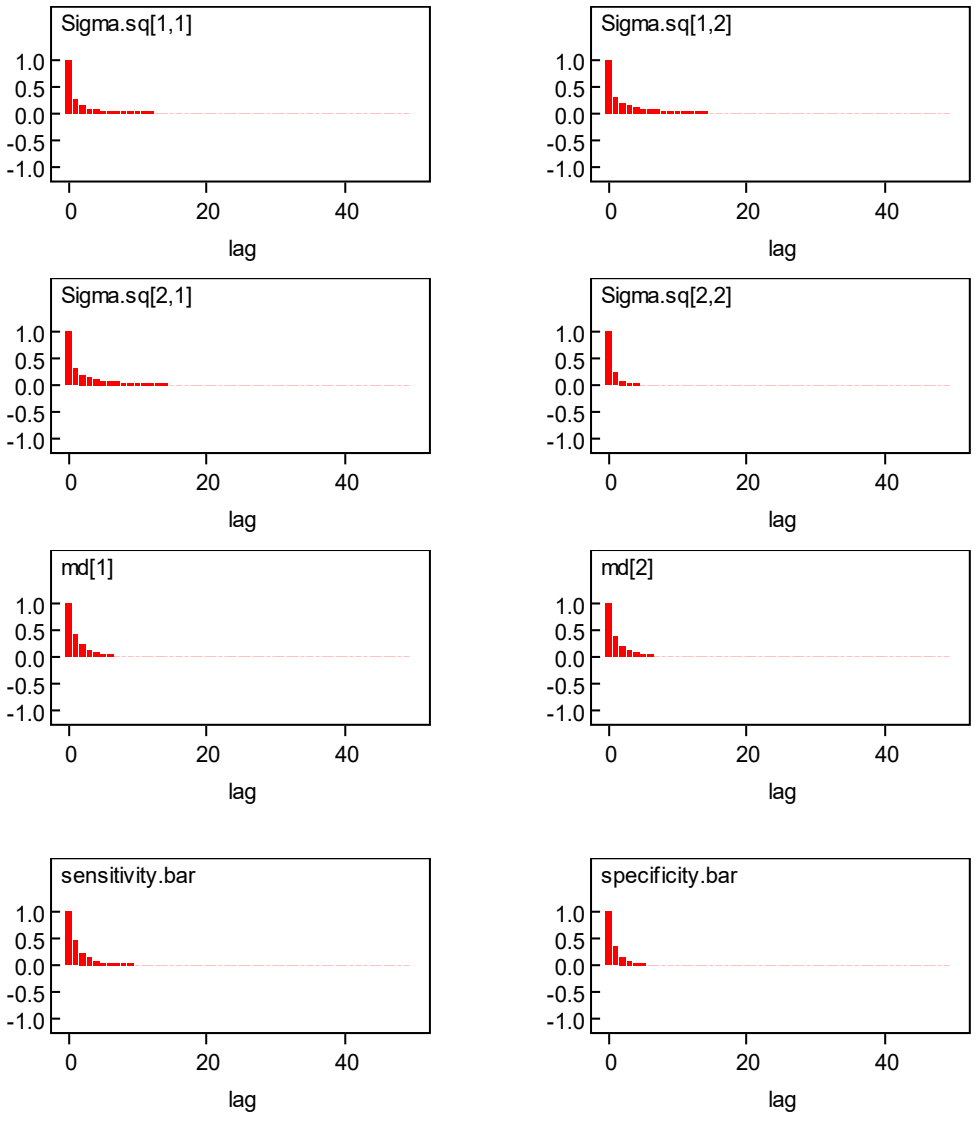


Figure 4: OpenBUGS output- Nursing assessment of falls risk for patients 65 years or older residential setting

node	mean	sd	MC error	2.5%	median	97.5%	start	sample
Sigma.sq[1,1]	0.3874	0.5294	0.002679	0.09005	0.269	1.382	60001	60000
Sigma.sq[1,2]	-0.004162	0.3175	0.001774	-0.4995	-0.003022	0.495	60001	60000
Sigma.sq[2,1]	-0.004162	0.3175	0.001774	-0.4995	-0.003022	0.495	60001	60000
Sigma.sq[2,2]	0.4287	0.5424	0.003067	0.09586	0.2949	1.575	60001	60000
md[1]	0.3182	0.2841	0.001616	-0.2528	0.3183	0.8845	60001	60000
md[2]	1.008	0.3021	0.001673	0.405	1.007	1.613	60001	60000
sensitivity.bar	0.5775	0.06722	3.8E-4	0.4371	0.5789	0.7078	60001	60000
specificity.bar	0.7287	0.05862	3.208E-4	0.5999	0.7324	0.8338	60001	60000