

# Bruyère Reports

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## **Evidence-based screening tools and fall risk assessment in con- tinuing care**

A Bruyère Rapid Review

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## Key messages

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Falls prevention has been identified as a high priority at Bruyère Continuing Care. Many falls occur as a result of interactions of multiple risk factors at the individual and setting level.

Based on our assessment of the evidence, we recommend three strategies to reduce fall rates in Bruyère Continuing Care settings:

- Implement a comprehensive risk assessment tool, tailored for the clinical setting, for use at admission to design individualized, multifactorial falls prevention plans
- Implement post-fall huddles to foster ongoing team learning and continuously improve the comprehensive risk assessment process.
- Engage staff and clients in implementing falls prevention, fostering a culture of ongoing learning and continuous monitoring and improvement of individual falls prevention plans.

Tools for implementing falls prevention strategies and a review of risk assessment tools is covered in the companion Bruyère Evidence Review.

# Executive summary

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The objective of this review was to assess the effectiveness of fall risk screening tools and fall risk assessment tools as a basis for falls prevention intervention in four settings in continuing care:

- 1) palliative care;
- 2) rehabilitation (geriatric and stroke);
- 3) long term care; and
- 4) short and long term medical care (subacute).

We searched MEDLINE for guidelines and systematic reviews assessing the predictive validity and effectiveness of risk screening and risk assessment tools in these continuing care settings. We found 4 high quality guidelines addressing this question, and 6 systematic reviews of varying quality.

In the four relevant clinical practice guidelines, the utility of using a screening tool for falls risk at admission to classify people as high risk of falling is controversial. The UK NICE 2013 guidelines recommend against using a screening tool because they are no more effective than clinical judgment and take up staff time. Similarly, the Australian Commission on Safety and Quality in Health Care (2009) recommend that since most patients in subacute care (including geriatric and rehabilitation settings) are at high risk of falling, falls risk screening may be of limited value, and a full falls risk assessment is more beneficial. In contrast, the Registered Nursing Association of Ontario (RNAO) 2011 updated guidelines recommend falls risk screening with accepted tools such as the Morse or STRATIFY tools followed by a risk assessment to identify modifiable risk factors. Similarly, the American Geriatrics Society (2010) guidelines recommend falls risk screening with 3 questions followed by comprehensive multifactorial risk assessment.

All four clinical practice guidelines recommended a comprehensive multifactorial risk assessment to identify modifiable risk factors for anyone at risk of falling, accompanied by the implementation of interventions tailored to the individual's identified risk factors (e.g. strengthening exercises, medication review, client and staff education and environmental modifications). In a companion BBERG report on effectiveness of falls prevention strategies, multifactorial interventions based on risk assessment prevent 7 out of 1000 more falls

than control/usual care (RR = 0.69, 95% CI 0.49 to 0.96)

All four clinical practice guidelines recommend that the choice of screening tools and fall risk assessment tools should be guided by the patient's needs, clinical utility, feasibility for staff, acceptability to patients and similarity of the patient population with the population in which the instrument was developed or assessed. No single falls risk assessment tool was recommended for these settings because of the need to tradeoff strengths and limitations that is setting-specific. The six systematic reviews identified 18 risk screening tools and four risk assessment tools that have met the criteria of >70% sensitivity and specificity. These tools are publicly available. The MDS\_RAI was described as a tool for multifactorial risk assessment that may be easy to incorporate into practice systems because it is already required in long term care.

All clinical practice guidelines recommended that staff education and continuing review is important to promote individualized falls risk assessments (updated when needed), to identify modifiable risk factors and implement targeted interventions that are compatible with the client's risk factors, needs, values, and preferences. Importantly, falls prevention is sensitive for clients and patients because they are associated with loss of independence. Similarly, falls prevention is a sensitive issue for staff because there may be fear of repercussions or blame. Staff and client education can be used to address these barriers to change, and focus on the positive aspects of falls prevention.

**Conclusion:** Given the diversity of tools and domains assessed and the diversity of patients and clients in the different settings, it may not be possible to select a single tool for all Bruyère settings. We recommend that local implementation teams with clinical expertise and knowledge of each setting are best placed to select the most appropriate tool for their setting, and method of implementing it using a combination of staff and client awareness and education to promote the positive aspects of falls prevention and a culture of continuous learning.

# Background: context and risk factors

## Context

The Senior Quality Committee of Bruyère Continuing Care requested a review of evidence regarding screening tools for falls risk in:

- 1) rehabilitation;
- 2) palliative care;
- 3) subacute care; and
- 4) long term care.

Preventing falls was identified by a recent Accreditation Canada report as a high priority(1). The Senior Quality Committee asked that this review of tools consider the context of each of these different settings with a focus on feasibility, relevance to the setting and validity/reliability.

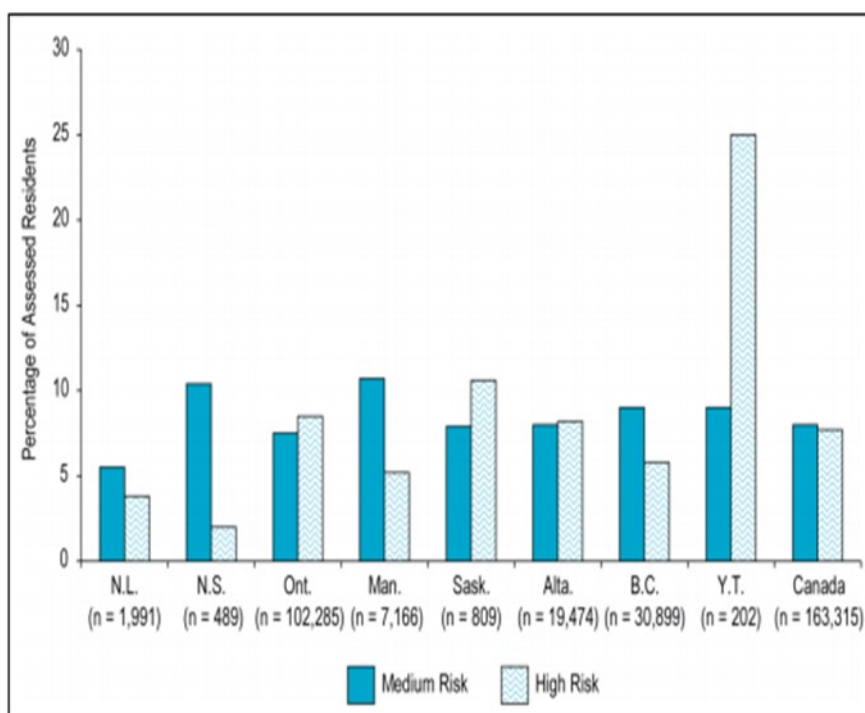
Falls are a major public health problem and the leading cause of injury-related hospitalizations among seniors (aged 65 and older) in Canada; 20 to 30% will experience a fall each year(2) and 85% of all fall-related hospitalizations are due to falls in seniors(1). Half of adults aged 85 and older will fall each year and 12% to 42% who fall will have a fall-related injury(3). There are more fall-related hospitalizations associated with serious injuries such as hip fractures in seniors

living in long-term residential care (59%) than in the community (32%)(2). The direct health care costs for fall-related injuries in Canada are estimated at \$2 billion annually(1).

## Risk factors for falls

Falling is associated with a variety of risk factors including biological, behavioural, environmental and socioeconomic risk factors(2, 4) which are intrinsic (relating to a person's behavior or condition) or extrinsic (relate to a person's environment or their interaction with the environment). Many falls occur as a result of interactions of multiple individual and extrinsic risk factors(1, 2). The most powerful predictor of a fall is a history of falling(1). Falls can occur in the home or in various hospital settings including continuing care (subacute care) and acute care. Continuing care involves two types of care – residential-based care and hospital-based care(1). According to CIHI Continuing Care Reporting System 2013-2014 data 9% of assessed residents in residential care are at high risk of falling and 6% of patients in hospital-based continuing care are at high risk of falling in Ontario(1) (see Figures 1 and 2).

**Figure 1: Percentage of Residential-Based Long-Term Care Residents at Risk of Falls**



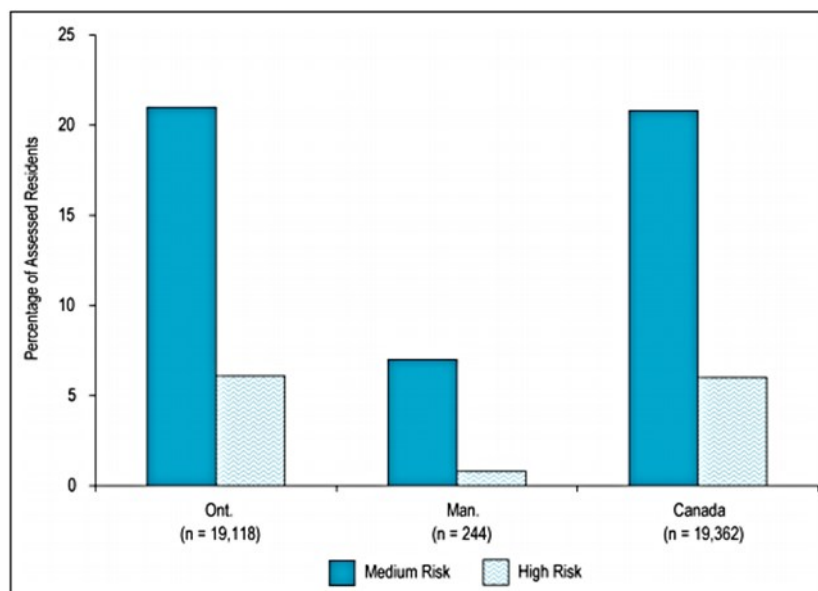
### Notes:

Results for Ontario, British Columbia, Alberta, and Yukon include all publicly funded facilities in that province/territory. Results for the remaining provinces/territories are based on partial coverage [i.e., only facilities submitting data to the Continuing Care Reporting System (CCRS)].

### Source:

Continuing Care Reporting System, 2013–2014, Canadian Institute for Health Information.

**Figure 2: Percentage of Hospital-based Continuing Care Residents at Risk of Falls**



**Notes:**

Manitoba data includes only facilities in the Winnipeg Regional Health Authority. Hospitals with continuing care beds are commonly known as extended, auxiliary, chronic or complex care beds.

**Source:**

Continuing Care Reporting System, 2013–2014, Canadian Institute for Health Information

### Defining the types of tools

Risk screening tools estimate a person’s likelihood of falling(5). They consider a variety of clinical factors or domains associated with falling that are relevant to the target population and the setting such as balance and mobility, functional status, continence, cognitive status, history of falls, medications. These tools have a scoring mechanism that can predict the individual’s level of risk at low, medium or high risk of falling.

Falls risk assessment is a systematic, comprehensive, iterative process to identify an individual patient/ resident’s modifiable risk factors for falling(5). They differ in the number of risk factors they include, and how each risk factor is assessed. Also, most do not assess environmental factors therefore these factors

may need to be assessed separately(2). See Table 1 for risk factors to consider in falls risk assessment.

In this review we considered the evidence of the effectiveness of risk screening tools and fall risk assessment tools in residential-based and hospital-based continuing care.

**Table 1: Risk Factors to consider in falls risk assessment**

<b>Risk factor</b>	<b>Long term care</b>	<b>Hospitalized patients</b>	<b>Rehabilitation</b>	<b>Subacute</b>	<b>Palliative</b>
Previous fall history	OR 3.41	OR 2.76		OR 3	OR 4
Gender	Male (OR 1.14)				Female (OR 1.54)
Ambulatory aids	Cane/walker: OR 1.44	OR 2.84		OR 3	
Vision impairment	OR 1.6	OR 2.46		OR 2	
Cognitive impairment	OR 1.84 (wandering)	OR 2.62-6.33		OR 3-6	OR 1.2-1.5
Psychotropic drug use	OR 2	OR 1.93-7.95		OR 2-7	OR 2.9
Balance	Transfer independence (OR 1.49)				
Gait deficit				OR 2	
Polypharmacy	4+ medications				
Benzodiazepines	RR 1.44				
Diuretics	OR 7.2				
Vasodilators	OR 3.0				
Restraint use	OR 10.2				
Hypotension systolic	OR 2.0			Insufficient data	
Depression	OR 2.2				

RR= risk ratio; OR= odds ratio

# Search process and methods

We searched for relevant systematic reviews and guidelines published between January 2007 and June 2015 in Medline, the Cochrane Library (DARE and HTA) and Trip Database (Appendix 1).

We included systematic reviews and guidelines if they assessed the effectiveness of risk screening tools and fall risk assessment tools in predicting falls/identifying falls risk factors in residential-based and hospital-based continuing care populations. We excluded sys-

tematic reviews and clinical guidelines if they focused on fracture risk assessment tools or if the population was community-dwelling or the hospital setting focused on acute care.

The search results and potentially eligible articles were screened and reviewed in duplicate. The quality of guidelines and systematic reviews were assessed using the AGREE score and AMSTAR checklist respectively (Appendix 2).

## Guidelines on risk screening and risk assessment

We identified 4 guidelines that met our inclusion criteria: the Canadian Registered Nurses' Association of Ontario (RNAO) guidelines(6), the UK National Institute for Health and Care Excellence (NICE) guidelines (7), the Australian Commission on Safety and Quality

in Health Care (ACSQH) guidelines(2) and the American Geriatrics Society (AGS) guidelines(8) with evidence on screening tools and falls risk assessment. The guidelines were of high quality scoring 160 - 168/168 on AGREE II.

### Summary findings: Guidelines on risk screening and risk assessment

	NICE	RNAO	ACSQH	AGS
<b>Risk screening</b>	Not recommended [level III evidence]  since time intensive and no more effective than clinical judgment. Also all patients have a high risk of falling because of their medical	Recommended [level Ib evidence]  on admission to identify modifiable risk factors to support the decision making process for the care plan.	Recommended [level of evidence?]  On admission, when there is a change in the health and functional status of the individual or when the patient's environment changes.  If an individual is at high risk on admission (e.g. with a history of previous fall or medical condition) consider using multifactorial risk	Recommended [level of evidence?]  Risk screening with three questions: 1) History of fall in 12 months; 2) presenting with an acute fall; or 3) difficulty with walking or balance.



	<b>NICE</b>	<b>RNAO</b>	<b>ACSQH</b>	<b>AGS</b>
<b>Risk screening continued</b>	<p>their medical condition, a change in their environment and their age (65 years or older)</p>	<p>Suggested tools: Morse fall scale, STRATIFY and Hendrich Fall Risk Model</p> <p>choose tool appropriate for setting and population</p>	<p>assessment instead to identify modifiable risk factors.</p> <p>Some examples of validated tools for the hospital setting are STRATIFY, Downton index and Morse scale.</p> <p>Should be done by a staff member who understands the process and can administer the tool, interpret the results and make referrals where indicated.</p> <p>Using validated screening tools as part of routine clinical management can inform care and future assessment of patients/residents.</p>	<p>Recommended [level of evidence?]</p> <p>Risk screening with three questions: 1) History of fall in 12 months; 2) presenting with an acute fall; or 3) difficulty with walking or balance.</p>
<b>Comprehensive risk assessment</b>	<p>Recommended only if linked to multifactorial intervention to reduce risk of falls based on risk assessment [level III evidence]</p> <p>*Choose tools and domains based on setting and population</p>	<p>Further assessment is performed by clinicians with the appropriate knowledge, skills, and training if the initial screening indicates fall risk factors.</p> <p>**choose tool appropriate for setting and population</p>	<p>Recommend [Grade?]</p> <p>*choose tool based on setting and population</p> <p>*multidisciplinary team recommended with one coordinator</p>	<p>Recommend for those with history of falls or gait/balance problems [Grade?]</p> <p>No tool recommended, multiple domains suggested</p>

	NICE	RNAO	ACSQH	AGS
<b>Domains described in risk assessment</b>	cognitive impairment; continence problems; falls history including causes and consequences (such as injury and fear of falling); footwear that is unsuitable or missing; health problems that may increase their risk of falling; medication; postural instability, mobility problems and/or balance problems; syncope syndrome; visual impairment; and environmental hazards.	a focused history, physical examination, medication review, cognitive, functional and environmental assessment  A Falls Risk Assessment Tool (FRAT) should be validated for the population.	Some tools were listed:  Care plan assessment items for the acute setting; Peninsula Health Falls Risk Assessment Tool (FRAT), Falls Risk for Hospitalised Older People (FRHOP) and Peter James Centre Fall Risk Assessment Tool (PJC-FRAT) for the subacute or rehabilitation setting.	history of falls, medications and risk factor; physical exam (assessment of gait, cognition, cardiovascular status, vision, feet and footwear); functional assessment (ADL); and environmental assessment.

NICE: National Institute for Health and Care Excellence, UK

RNAO: Registered Nurses' Association of Ontario, Canada

ACSQH: Australian Commission on Safety and Quality in Health Care

AGS: American Society of Geriatrics

## Guidelines on multifactorial risk

All four guidelines recommend some type of multifactorial risk assessment linked to a tailored, individual plan for falls prevention which could address modifiable risk factors (e.g. deprescribing medications, strengthening exercises, environmental modifications, etc based on the assessment).

There is no agreement on which risk assessment tools are best for particular settings. All guidelines suggested that tools and/or domains need to be chosen based on the setting and patient population.

The 5 tools identified as having evidence of benefit in prospective studies as part of a falls prevention program are:

- Care plan assessment items for the acute setting
- FRAT for the subacute and rehabilitation setting
- PJC FRAT for the subacute and rehabilitation setting
- Falls risk for hospitalized older people (FRHOP) tool for the subacute and rehabilitation setting
- MDS-RAI for long term care.

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These tools vary in the number of risk factors they include and how each factor is assessed. A multidisciplinary team should do the assessment where possible or a skilled staff person.

Regarding subacute, rehab, long term care, palliative, we found that specific tools have been developed in these settings:

- Subacute/rehab – FRAT, PJC-FRAT, FRHOP,
- Long term care – MDS-RAI

- Palliative – FRASE tool but did not meet the 70% predictive accuracy criteria.

Some tools consist of sub-domains to assess specific risk factors and these may involve the use of additional validated tools and measures such as the Timed Up and Go Test or the Functional independence measure (FIM) for assessing balance/gait problems.

## Evidence review: systematic reviews on screening tools and falls risk assessment

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We identified 6 systematic reviews(5, 9-13). The quality of the systematic reviews varied. One review each had an AMSTAR score of 7/11(9), 6/11(11), 5/11(12), 3/11(10); and two scored 2/11(5, 13).

In these 6 systematic reviews, 23 screening tools and 10 falls risk assessment tools for both residential-based and hospital-based continuing care were assessed for prediction of falls. Only one review assessed the time to administer the tool and if training was required to administer the tool. (Appendix 3). Only 18 falls screening tools and four risk assessment tools met the criteria of >70% for specificity and sensitivity proposed by NICE (13-15). (See Table 2).

Four tools could be used for both screening and falls risk assessment: the Fall assessment questionnaire, Falls Risk Assessment Tool (FRAT), the Peter James Centre Fall Risk Assessment Tool (PJC-FRAT) and the Resident Assessment instrument (MDS-RAI).

**Table 2: Synthesis of evidence: screening tools and fall risk assessment tools with high predictive accuracy**

<b>Tool</b>	<b>Long term care</b>	<b>Rehabilitation</b>	<b>Subacute</b>	<b>Palliative</b>	<b>Mixed setting</b>	<b>Time to administer tool</b>	<b>Training required to administer tool</b>
<b>Risk assessment tools</b>							
Falls assessment questionnaire			P		P		no
Fall risk assessment in Geriatric-Psychiatric Inpatients to lower events (FRAGILE) tool			P				
Falls risk assessment tool (FRAT)			P				no
PJC-FRAT			P				no
MDS-RAI	P					80 minutes	yes
<b>Screening tools</b>							
Barthel index					P		
Berg balance scale			P			14 minutes	yes
Clinical and functional performance tool					P		
Clinical assessment and sensory measurement data					P		
Clinical judgment evaluation scale					P		
Clinical risk factors					P		
Dynamic gait index					P	15 minutes	no
Elderly fall screening test					P	17 minutes	yes

Tool	Long term care	Rehabilitation	Subacute	Palliative	Mixed setting	Time to administer tool	Training required to administer tool
Fall assessment questionnaire			P		P		no
Falls risk assessment tool (FRAT)	P		P		P		no
Hendrich fall risk model			P		P	<1 minute	no
Morse fall scale	P	P	P		P	<1 minute	yes
MDS-Risk assessment instrument	P					80 minutes	yes
Observation of wandering behavior		P	P				
PJC-FRAT			P		P		no
STRATIFY	P	P	P		P		no
The Ontario modified STRATIFY	P	P	P		P		no
Timed up and go (TUG) test						<1 minute	yes
Tinetti performance oriented					P	20 minutes	yes

PJC-FRAT = Peter James Center Falls risk Assessment Tool

STRATIFY = St Thomas Risk Assessment Tool in Falling Elderly In-patients

## Falls risk screening tools

All the systematic reviews assessed the predictive accuracy of different tools and four screening tools met the high predictive accuracy criteria and were assessed in 3 or more systematic reviews: the St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY), Morse Fall scale, Hendrich II Fall Risk model and clinical judgment. These have been recommended for use on admission or after a fall in the RNAO guidelines to identify people at high risk of falling.

One review also considered the time it took to administer the different tools and if training is required to administer the tool (Table 3).

**Table 3: Falls risk screening tools**

	Subacute	Geriatric/rehab	Palliative	Long term care	Time to administer tool	Training required to administer tool
<b>Morse</b>	P	P		P	<1 minute	yes
<b>Hendrich</b>	P	P			<1 minute	no
<b>STRATIFY</b>	P	P		P	1 minute	no
<b>Clinical judgment</b>	P	P		P	<1 minute	no
<b>MDS-RAI</b>				P	80 minutes	yes

### Falls risk assessment

Four falls risk assessment tools met these criteria of 70% for sensitivity and specificity and were assessed in 2 or more systematic reviews:

1) the Falls risk assessment tool (FRAT);

2) the Fall assessment questionnaire

3) Fall risk assessment in Geriatric-Psychiatric inpatients to lower events (FRAGILE) tool) and

4) the MDS risk assessment instrument (MDS-RAI).

See Table 4.

**Table 4: Falls risk assessment tools**

	FRAT	FRAT PJC	FRAGILE	MDS-RAI
<b>Setting developed</b>	Subacute care	Subacute care	Geriatric psychiatric care	Long term care
<b>Setting used</b>	Subacute, rehab	Subacute, rehab	Geriatric psychiatric care	Long term care
<b>Domains covered</b>	Recent falls, medications, psychological, cognitive status; vision, mobility, transfers, behavior, ADL, environment, nutrition, continence, other (osteoporosis, history of fracture/s)	Medical (history of falls, health condition); Nursing (toileting); physiotherapy (gait and balance); occupational therapy (activities of daily living e.g. dressing, bathing); modified FIM measure; changes in status	Conley scale (nurses' assessment: history of falls, impaired judgment, impaired gait, dizziness); medical diagnosis (Alzheimer's disease, Delusions, Delirium, Depression); Medications – Sedative or antipsychotic (acute, chronic); incontinence control (females); nursing care (Does the patient need total assistance with bathing?)	Identification and evaluation of potential problems; identification of requirements for rehabilitation; maintenance of client strengths and prevention of decline; and promotion of comprehensive well-

	FRAT	FRAT PJC	FRAGILE	MDS-RAI
<b>Training re-quired to ad-minister tool (i.e. does it need skilled person)</b>	no	no	no	yes

## Discussion of evidence review: strengths and limitations

Strengths of this review are a systematic search for the evidence, assessment of relevance to specific settings and assessment of quality using validated tools

Limitations of this review are that the underlying evidence base is low quality, dispersed, and there is disparity among guideline panels about whether to use a falls risk screening tool, and about the content of a multifactorial risk assessment tool.

There is disparity around what factors to include in the risk assessment process. A brief assessment could be done for a specific risk factor or for those at low risk (e.g. balance and mobility could be assessed using the TUG test in the outpatient setting); a more comprehensive assessment for high risk patients may require referral to a geriatrician.

There is scarcity of evidence regarding the use of falls risk assessment tools across different settings. For example, only one tool, the Falls Risk Assessment Scale for the Elderly (FRASE), was assessed in palliative care but did not meet the predictive accuracy cutoff point of 70%. A systematic review of palliative care settings suggested that different risk factors are prevalent in

palliative care, thus requiring tailored risk assessment and intervention.

The MDS risk assessment instrument is widely recommended for use in long term care. Although it contains risk factors for falling, there is no clear pathway to specifically identify patients at risk.

# Implementation

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The choice of screening tools and risk assessment tools should be guided by the patient's needs, clinical utility, feasibility for staff, acceptability to patients and similarity of the patient population with the population in which the instrument was developed or assessed, the predictive accuracy of the tool(2, 5, 6, 10, 13, 16). Healthcare organization leaders should also consider training of staff to use the tool, potential staff acceptance and adherence(5, 6) which could be influenced by the length of time for completing the assessment. The length of time for completing the assessment varied from less than one minute (for the TUG test, Hendrich fall risk model and Morse fall scale) to 80 minutes (for Resident assessment instrument in long-term residential care). See Appendix 3.

There is no consensus on which falls risk factors should be included in falls screening and risk assessment tools. Some tools are more specific for some risk factors. For example, of the high predictive accuracy tools,

five tools were intended for impaired balance and mobility: Berg Balance test, Timed up and go (TUG) test, Tinetti performance oriented mobility scale, Elderly fall screening test, Dynamic gait index.

# Recommendations

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From our review, we suggest the following recommendations.

1. Tools should be tailored to the needs of the patient population. The choice should be guided by clinical utility, feasibility for staff, acceptability to patients/clients and similarity of the patient/client population with the population in which the instrument was developed or assessed.
2. Bruyère Continuing Care should develop an organizational policy to conduct a comprehensive falls risk assessment for anyone considered at risk of falling, tailored to the client population and setting and implement multifactorial interventions that are

compatible with the client's risk factors, needs, values, and preferences.



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# Appendices

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## Appendix 1: Methods

### Eligibility criteria

We included systematic reviews and clinical guidelines if they met the following inclusion criteria.

Criteria	Description
<b>Population</b>	patients seen in any of the following hospital-based continuing settings: palliative care, rehabilitation care (including geriatrics and stroke), and short and long-term medical care (including out-patient care, and sub-
<b>Intervention</b>	fall risk assessment or screening tool
<b>Comparison</b>	not applicable
<b>Outcomes</b>	falls

We excluded systematic reviews and clinical guidelines if they focused on fracture risk assessment tools or if the population was community-dwelling or the setting focused on acute care

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## Search methods

We searched for articles published between January 2007 and June 2015 in Medline, the Cochrane Library (DARE and HTA). We used the following search strategy in Medline and adapted it for the Cochrane Library.

- 1 Accidental Falls/
- 2 fall.tw.
- 3 falls.tw.
- 4 faller\$.tw.
- 5 fallen.tw.
- 6 falling.tw.
- 7 fall-related.tw.
- 8 near-fall\$.tw.
- 9 or/1-8
- 10 exp Adult/
- 11 randomized controlled trial.pt.
- 12 randomized.mp.
- 13 placebo.mp.
- 14 or/11-13
- 15 9 and 10 and 14
- 16 exp Animals/ not (Humans/ and exp Animals/)
- 17 15 not 16

We also searched the Trip Database using the following PICO search terms:

P – patients in hospital-based continuing care settings

I – falls risk assessment tool

C – control

O - falls

We also examined reference lists of relevant articles and consulted experts at the Bruyère Research Institute.

We identified 2620 articles from Medline and the Cochrane Library and 1808 articles (including 127 systematic reviews and 1247 guidelines) from Trip Data-

base on June 17 2015. Two reviewers screened the articles and identified six systematic reviews and three guidelines that met the inclusion criteria.

## Appendix 2: Quality assessment

We assessed quality using AMSTAR score for systematic reviews and AGREE score for guidelines.

The AMSTAR instrument uses the following assessment criteria:

1. Was an a priori design provided?
2. Was there duplicate study selection and data extraction?
3. Was a comprehensive literature search performed?
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion?
5. Was a list of studies (included and excluded) provided?
6. Were the characteristics of the included studies provided?
7. Was the scientific quality of the included studies assessed and documented?
8. Was the scientific quality of the included studies used appropriately in formulating conclusions?
9. Were the methods used to combine the findings of studies appropriate?
10. Was the likelihood of publication bias assessed?
11. Was the conflict of interest stated?

The AGREE II consists of 23 key items organized within 6 domains followed by 2 global rating items (“Overall Assessment”). Each domain captures a unique dimension of guideline quality.

Domain 1. Scope and Purpose is concerned with the overall aim of the guideline, the specific health questions, and the target population (items 1-3).

Domain 2. Stakeholder Involvement focuses on the extent to which the guideline was developed by the appropriate stakeholders and represents the views of

its intended users (items 4-6).

Domain 3. Rigour of Development relates to the process used to gather and synthesize the evidence, the methods to formulate the recommendations, and to update them (items 7-14).

Domain 4. Clarity of Presentation deals with the language, structure, and format of the guideline (items 15-17).

Domain 5. Applicability pertains to the likely barriers and facilitators to implementation, strategies to im-

prove uptake, and resource implications of applying the guideline (items 18-21).

Domain 6. Editorial Independence is concerned with the formulation of recommendations not being unduly biased with competing interests (items 22-23).

Overall assessment includes the rating of the overall quality of the guideline and whether the guideline would be recommended for use in practice.

### Appendix 3: Falls risk screening and assessment tools

<b>Fall risk screening tools</b>	<b>Setting</b>	<b>Number of items</b>	<b>Time to administer tool</b>
Barthel index	Hospital (Mixed)		
Berg balance scale	Subacute, Outpatient	14	15 minutes
Clinical and functional performance tool	Hospital (Mixed)		
Clinical assessment and sensory measurement data	Hospital (Mixed)		
Clinical judgment evaluation scale	Hospital (Mixed)		
Clinical risk factors	Hospital (Mixed)		
Downton fall risk index	Stroke rehabilitation		
Dynamic gait index	Hospital (Mixed)	8	15 minutes
Elderly fall screening test	Hospital (Mixed)	6	17 minutes
Fall assessment questionnaire	Hospital (Mixed)	5	
Falls efficacy scale	Hospital (Mixed)		
Fall risk assessment in Geriatric-Psychiatric Inpatients to lower events (FRAGILE) tool	Subacute		
Fall risk assessment scale for the elderly (FRASE)	Palliative care, Acute care		
Falls risk assessment tool (FRAT)	Subacute	8	
Hendrich fall risk model	Subacute	7	<1 minute
Morse fall scale	Hospital (Mixed)	6	<1 minute
Observation of wandering behavior	Subacute		

<b>Fall risk screening tools</b>	<b>Setting</b>	<b>Number of items</b>	<b>Time to administer tool</b>
Peter James Centre Fall Risk Assessment Tool (PJC-FRAT)	Subacute	8	
Royal Melbourne hospital risk assessment tool	Stroke rehabilitation	9	
St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY)	Subacute	9	
The Ontario modified STRATIFY	Subacute		
Timed up and go (TUG) test	Outpatient, Acute	1	<1 minute
Tinetti performance oriented mobility scale tool	Hospital (mixed)	9	20 minutes
<b>Fall risk assessment tools</b>			
Assessment for high risk to fall	Hospital (Mixed)	13	17 minutes
Fall assessment questionnaire	Hospital (Mixed)	10	
Fife fall risk tool	Hospital (Mixed)	7	
Falls risk assessment tool (FRAT)	Subacute	8	
Falls Risk for Hospitalised Older People (FRHOP)	Subacute		
Fall prediction index	Stroke	8	
Resident Assessment instrument	Residential long-term care	99	80 minutes
Patient fall questionnaire	Hospital (Mixed)	5	
Post-fall index	Residential long-term care		
Peter James Centre Fall Risk Assessment Tool (PJC-FRAT)	Subacute	8	

## STRATIFY Risk Assessment Tool(2)

STRATIFY risk screen		
Did the patient present to hospital with a fall or has he or she fallen on the ward since admission?		Yes = 1 No = 0
<b>Do you think the patient (Questions 2-5):</b>		
2	Is agitated?	Yes = 1 No = 0
3	Is visually impaired to the extent that everyday function is affected?	Yes = 1 No = 0
4	Is in need of especially frequent toileting?	Yes = 1
5	Has a transfer and mobility score of 3 of 6?	Yes = 1 No = 0
Transfer		Mobility
0 = unable - no sitting balance, mechanical lift		0 = Immobile
1 = major help (one strong, skilled helper or two normal people; physical), can sit		1 = wheelchair independent, including corners, etc
2 = minor help (one person easily or needs supervision for safety)		2 = walks with help of one person (verbal or physical)
3 = independent (use of aids to be independent is allowed)		3 = independent (but may use any aid, eg cane)
<b>Total score</b>		<b>/5</b>

## Ontario modified STRATIFY Risk Assessment Tool(2, 4)

Ontario Modified STRATIFY risk screen		
Falls history	1. Did the patient present to hospital with a fall or has he or she fallen in the ward since admission? If not, has the patient fallen within the past 2 months?	Yes = 1 No = 0
Mental status	2. a. Is the patient confused (ie unable to make purposeful decisions, disorganised thinking, and memory impairment)? b. Is the patient disorientated (ie lacking awareness, being mistaken about time, place or person)? c. Is the patient agitated (ie fearful affect, frequent movements, and anxious)?	Yes = 1 No = 0 (on at least one question)
Vision	3. a. Does the patient require eyeglasses continuously? b. Does the patient report blurred vision? c. Does the patient have glaucoma, cataracts or macular degeneration?	Yes = 1 No = 0 (on at least one question)
Toileting	4. Are there any alterations in urination (ie frequency, urgency, incontinence, nocturia)?	Yes = 1 No = 0
Transfer and mobility	5. Transfer and mobility score of 3 of 6?	Yes = 1 No = 0
Transfer		Mobility
0 = unable - no sitting balance, mechanical lift		0 = Immobile
1 = major help (one strong, skilled helper or two normal people; physical), can sit		1 = wheelchair independent, including corners, etc
2 = minor help (one person easily or needs supervision for safety)		2 = walks with help of one person (verbal or physical)
3 = independent (use of aids to be independent is allowed)		3 = independent (but may use any aid, eg cane)
<b>Total score</b>		<b>/5</b>

For each item, 0 (no risk) or 1 (risk) is substituted in the equation:

$$R = 6 \text{ (falls history)} + 14 \text{ (mental status)} + 1 \text{ (vision)} + 2 \text{ (toileting)} + 7 \text{ (transfer and mobility)}$$

## Morse Fall Scale(17, 18)

Item	Item Score	Patient Score
1. History of falling (immediate or previous)	No 0 Yes 25	_____
2. Secondary diagnosis ( $\geq 2$ medical diagnoses in chart)	No 0 Yes 15	_____
3. Ambulatory aid None/bedrest/nurse assist Crutches/cane/walker Furniture	0 15 30	_____
4. Intravenous therapy/ heparin lock	No 0 Yes 20	_____
5. Gait Normal/bedrest/wheelchair Weak* Impaired†	0 10 20	_____
6. Mental status Oriented to own ability Overestimates/forgets limitations	0 15	_____
Total Score‡: Tally the patient score and record. <25: Low risk 25-45: Moderate risk >45: High risk		_____

\* Weak gait: Short steps (may shuffle), stooped but able to lift head while walking, may seek support from furniture while walking, but with light touch (for reassurance).

† Impaired gait: Short steps with shuffle; may have difficulty arising from chair; head down; significantly impaired balance, requiring furniture, support person, or walking aid to walk.

‡ Suggested scoring based on Morse JM, Black C, Oberle K, et al. A prospective study to identify the fall-prone patient. Soc Sci Med 1989; 28(1):81-6. However, note that Morse herself said that the appropriate cut-points to distinguish risk should be determined by each institution based on the risk profile of its patients. For details, see Morse JM, , Morse RM, Tylko SJ. Development of a scale to identify the fall-prone patient. Can J Aging 1989;8:366-7.



## Hendrich II Fall Risk Model(19)

Confusion Disorientation Impulsivity		4	
Symptomatic Depression		2	
Altered Elimination		1	
Dizziness Vertigo		1	
Male Gender		1	
Any Administered Antiepileptics		2	
Any Administered Benzodiazepines		1	
<b>Get Up &amp; Go Test</b>			
Able to rise in a single movement – No loss of balance with steps		0	
Pushes up, successful in one attempt		1	
Multiple attempts, but successful		3	
Unable to rise without assistance during test (OR if a medical order states the same and/or complete bed rest is ordered) * If unable to assess, document this on the patient chart with the date and time		4	
<b>A Score of 5 or Greater = High Risk Score</b>		<b>Total</b>	
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**Peter James Centre Fall Risk Assessment Tool (PJC-FRAT):  
risk assessment tool for the subacute rehabilitation setting(2)**

The Peter James Centre Fall Risk Assessment Tool (PJC-FRAT) is a multidisciplinary falls risk assessment tool. It was used as the basis for developing intervention programs in a randomised controlled trial in the subacute hospital setting that successfully reduced patient/resident falls. Permission to reproduce this tool was granted by Peter James Centre and BMJ Publishing Group.

Acknowledgment is required if the tool is used by your organisation. Contact details for further information:

Peter James Centre  
Mahoney's Road  
Burwood East VIC 3151  
Phone: 03 9881 1888  
Fax: 03 9881 1801

<b>Peter James Centre Fall Risk Assessment Tool (PJC-FRAT): Falls risk Assessment Tool</b>	
<i>(To be completed on admission)</i>	Name: UR/MR number: Ward/Unit: Date of birth: Gender: Admission Date: <i>Place UR sticker here or add patient details:</i>
<i>Tick box or add number as appropriate</i>	
<b>Medical</b>	
Does the patient suffer from frequent falls with no diagnosed cause?	* à Refer for hip protector.
Is the patient suffering from an established medical condition that is currently unable to be adequately managed, that may cause a fall during their Inpatient stay (e.g. drop attacks due to vertebro-basilar artery insufficiency)?	* à Refer for hip protector.
Is the patient taking any medications/medication amounts/medication combinations that you anticipate may directly contribute to a fall (e.g. sedatives)?	* à Refer for hip protector.
	Signature: _____ Date: _____
<b>Nursing</b>	
Toileting (day) F.I.M.	* à Document level of assistance required in patient/resident record/file.
Toileting (night) F.I.M.	* à Document level of assistance required in patient/resident record/file.
Would this patient benefit from a Falls Risk Alert Card and a Falls Prevention Information Brochure?	* à Refer for a Falls Risk Alert Card and a Falls Prevention Information Brochure
	Signature: _____ Date: _____

<b>Peter James Centre Fall Risk Assessment Tool (PJC-FRAT): Falls risk Assessment Tool</b>	
<b>Physiotherapy</b>	
Gait F.I.M. (Gait aid + distance)	* à ( _____ / _____ )
Transfer (bed <—> chair F.I.M)	*
Would this patient benefit from attending a Balance Exercise Class?	* à Refer for Balance Exercise Class.
	Signature: _____ Date: _____
Falls Risk Assessment Tool	
<b>Occupational Therapy</b>	
Bathing F.I.M	
Dressing F.I.M.	
Would this patient benefit from attending a Falls Prevention Education Program?	
<b>All disciplines</b>	
Has the patient demonstrated non-compliance or do you strongly anticipate non-compliance with the above prescribed level of aids/ assistance/ supervision such that the patient becomes unsafe?	* à Refer for hip protector.  Signature: _____ Date: _____
<b>The Modified Functional Independence Measure (F.I.M.)</b>	
(7) Independent with nil aids. (6) Independent with aids. (5) Supervision/prompting (4) Minimal assistance required (patient greater than 75% of the task).	(3) Moderate assistance required (patient performs between 50% and 75% of the task). (2) Maximal assistance required (Patient performs between 25% and 50% of the task). (1) Fully dependent (patient performs less than 25% of the task).
Falls Risk Assessment Tool — Amendment sheet	
	Name: UR/MR number: Ward/Unit: Date of birth: Gender: Admission Date: <i>Place UR sticker here or add patient details:</i>
This amendment section of the Falls Risk Assessment Tool is to be used when a patient's condition changes such that the employment of interventions is now indicated or now no longer indicated. For example, if a patient's confusion due to a UTI is now resolved, they may no longer require a hip protector.	

<b>Peter James Centre Fall Risk Assessment Tool (PJC-FRAT): Falls risk Assessment Tool</b>	
<b>Has the patient's condition changed such that the patient:</b>	
• Does now require a hip protector:	* à Refer for hip protector.
• Does no longer require a hip protector:	* à Note in record and make appropriate change
• Would now benefit from balance exercise class:	* à Refer for balance exercise.
• Would now benefit from a falls prevention education class:	* à Refer for falls prevention education.
• Would now benefit from a falls risk alert card and information brochure:	* à Refer for falls alert card.
	Signature: _____ Date: _____
<b>Has the patient's condition changed such that the patient:</b>	
• Does now require a hip protector:	* à Refer for hip protector.
• Does no longer require a hip protector:	* à Note in record and make appropriate change
• Would now benefit from balance exercise class:	* à Refer for balance exercise.
• Would now benefit from a falls prevention education class:	* à Refer for falls prevention education.
• Would now benefit from a falls risk alert card and information brochure:	* à Refer for falls alert card.
	Signature: _____ Date: _____

## Appendix 4: Glossary

Definitions (RNAO Reducing falls and injuries from falls Getting Started Kit) [www.saferhealthcarenow.ca](http://www.saferhealthcarenow.ca)

### What is a Fall?

A fall is defined as: an event that results in a person coming to rest inadvertently on the ground or floor or other lower level, with or without injury.

This would include:

- Unwitnessed fall - where the client is able/unable to explain the events and there is evidence to support that a fall has occurred.

### What is a Near Fall?

A near-fall is a slip, trip, stumble or loss of balance such that the individual starts to fall but is either able to recover (witnessed or unwitnessed) and remains upright because their balance recovery mechanisms were activated and/or caught by staff/other persons, or they were eased to the ground or floor or other lower level, by staff/other persons (e.g. could not stop or prevent falling to the ground, floor or lower surface).

### What is a Fall Injury?

A fall injury is defined as an injury that results from a fall, which may or may not require treatment. The injury can be temporary or permanent and vary in the severity of harm.

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### **Other definitions**

#### **A multifactorial intervention**

An intervention with multiple components that aims to address the risk factors for falling that are identified in a person's multifactorial assessment.

A multifactorial assessment may include:

- cognitive impairment
- continence problems
- falls history, including causes and consequences (such as injury, older person's perceived functional ability and fear of falling, home hazards)
- footwear that is unsuitable or missing
- health problems that may increase their risk of falling (such as osteoporosis)
- Medication
- postural instability, mobility problems and/or balance problems
- syncope syndrome
- visual impairment
- neurological examination.

#### **Client education**

Education on identified risk factors and risk-reduction strategies:

- what measures they can take to prevent further falls

- how to stay motivated if referred for falls prevention strategies that include exercise or strength and balancing components
- the preventable nature of some falls
- the physical and psychological benefits of modifying falls risk
- where they can seek further advice and assistance
- how to cope if they have a fall, including how to summon help and how to avoid a long lie.

#### **Staff education**

To improve workflow and enhance the development of routine practices related to fall prevention:

- Conduct educational sessions during staff orientation at regular intervals on:
  - The prevention of falls and fall injuries
  - Safe mobility, risk assessment, risk management, post fall follow up, alternatives to restraints, etc.
  - Promoting safe mobility risk assessment, risk management, including post fall follow up alternatives to restraints, sensory impairment, continence education, etc.
- Include falls injury prevention strategies (i.e., lifting a resident after a fall or safe transfer)
- Identifying resources for falls prevention and regulatory requirements.

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