Monash Health

Clinicians, Consumers, Evidence
Centre for Clinical Effectiveness

Rapid Review

Falls Assessment and Prevention: A Rapid Review

Citation Corey Joseph and Angela Melder. October 2019. Falls Assessment and Prevention: A Rapid Review. Centre for Clinical Effectiveness, Monash Health, Melbourne, Australia. cce@monashhealth.org

Executive Summary

Background

Monash Health has several Falls Management Procedures which require updating and consolidation into one overarching guideline. A review of current evidence about fall risk assessment and interventions (or strategies) to prevent falls was required as part of the guideline development.

Objective

The objective of this rapid review was to provide updated evidence regarding in-hospital falls risk assessment and prevention.

Method

We included the most up to date systematic reviews and clinical practice guidelines (published in the last 5 years) about patient characteristics (prone to falls), the most effective fall risk assessment tools and strategies to prevent falls.

Results

There were 10 systematic reviews included. Table 1 provides full details of all included studies.

Characteristics of fallers

The mean age of fallers was 55.75 years. There is no significant difference in fall rates per 1,000 patient days between ages 45–64 and 65–90. As a result, middle-age inpatients' should not be overlooked for fall prevention measures (Guillaume et al., 2016).

Assessment – Table 2

Standardised, patient-centred risk assessment tools validated for the specific population should be used Tools such as the Hendrich II Fall Risk Model, or the Morse Fall Risk Assessment Tool (Rowan et al., 2017).

Rather than a single measure, two assessment tools used together would better evaluate the characteristics of falls by the elderly, such as the STRATIFY or the Hendrich II Fall Risk Model, and Berg Balance Scale or Mobility Interaction Falls chart (Park et al., 2018).

The Timed “Up and Go” (TUG) is a feasible functional ability measure for falls risk for clinicians. Combining functional measures, such as TUG, the Hendrich II Fall Risk Model or Step Test, with subjective screening tools, such as STRATIFY or MORSE scale may optimise performance and accuracy of identifying falls risk (Bassett et al., 2018).

There are several pediatric falls risk assessment tools however, none have been found to be reliable and valid (DiGerilamo et al., 2017).

Table 2 also includes the risk assessment tools included in the current Monash Health procedures. This is done to provide a comparison with up to date evidence about falls prevention interventions and to enable prioritisation about could be included in updated guideline.

The Registered Nurses’ Association of Ontario Clinical Practice Guideline (RNAO, 2017) recommended the most effective ways to identify adults at risk for falls or for injury due to falls.

RNAO, 2017 risk assessment recommendations include:

1.1 Screen all adults to identify those at risk for falls. Conduct screening as part of admission processes, after any significant change in health status, or at least annually. Screening should include the following approaches:

- identifying a history of previous falls;
- identifying gait, balance, and/or mobility difficulties; and
- using clinical judgment.

1.2a For adults at risk for falls, conduct a comprehensive assessment to identify factors contributing to risk and determine appropriate interventions. Use an approach and/or validated tool appropriate to the person and the health-care setting.

1.2b Refer adults with recurrent falls, multiple risk factors, or complex needs to the appropriate clinician(s) or to the inter-professional team for further assessment and to identify appropriate interventions.

Table 2. Summary of falls risk assessment tools

Study (By publication date)	Bassett 2018	DiGerilamo 2017	Rowan 2017	Park 2018	ACSQH 2008	**MH Falls Prevention**
Age	>55 years	0-21 years	All ages	>60 years	>65 years	On admission screen all adult patients
Assessment tool						
STRATIFY				√	√	
Ontario Modified STRATIFY					√	√
PROFET					√	
Care plan assessment items					√	
FRHOP					√	
PJC-FRAT					√	
TUG	√			√		
Berg balance	√					
Functional reach	√					
Morse Fall Scale (adult)		√	√			
Hendrich II Fall Risk Model (adult)		√	√	√		
CHAMPS		√				
The Humpty Dumpty Fall Scale		√				
I'M SAFE tool		√				
Cummings et al., 2008		√				
GRAF PF		√				

Prevention – Table 3

For all age groups, Rowan 2017 reported that universal multifactorial guidelines may or may not be effective due to inconsistent practices. Single interventions have not been proven effective in the medical population, and prevention guidelines cannot be generalised to larger populations. No single intervention has been shown to be universally effective whereas, specific interventions based on a patient-centered assessment and risk reduction approach have improved outcomes in hospital environments. The most common fall prevention interventions included bed alarms (90%), rounds (70%), sitters (68%), and relocating the patient closer to the nurses' station (56%).

Patient-centered interventions in addition to tailored patient education may have the potential to be effective in reducing falls and fall rates in acute care hospitals (Avanecean et al,. 2017).

Multifactorial falls prevention designs do not prevent falls on the rate of fall-related emergency department (ED) presentations (Morello et al., 2019).

In hospitals, it is uncertain of the effect of additional physiotherapy on the rate of falls or whether it reduces the risk of falling. It is uncertain of the effect of providing bed sensor alarms on the rate of falls or risk of falling (Cameron et al., 2018).

The use of bedrails do not prevent falls among hospitalised older adults (Marques 2017).

There is inconclusive evidence to support the use of non-slip socks to prevent falls among hospitalised older adults (Hartung 2017).

The Registered Nurses' Association of Ontario Clinical Practice Guideline (RNAO, 2017) recommended interventions that are effective in preventing falls and reducing the risk for falls or falls-related injury among at-risk adults.

RNAO, 2017 falls prevention recommendations include:

2.1 Engage adults at risk for falls and fall injuries using the following actions:

- explore their knowledge and perceptions of risk, and their level of motivation to address risk;
- communicate sensitively about risk and use positive messaging;
- discuss options for interventions and support self-management;
- develop an individualised plan of care in collaboration with the person;
- engage family (as appropriate) and promote social support for interventions; and
- evaluate the plan of care together with the person (and family) and revise as needed.

2.2 Provide education to the person at risk for falls and fall injuries and their family (as appropriate) in conjunction with other falls prevention interventions. This includes providing information about risk for falls, falls prevention, and interventions.

Ensure that the information is provided in a variety of formats and in the appropriate language.

2.3 Communicate the person's risk for falls and related plan of care/interventions to the next responsible health-care provider and/or the inter-professional team at all care transitions to ensure continuity of care and to prevent falls or fall injuries.

2.4 Implement a combination of interventions tailored to the person and the health-care setting to prevent falls or fall injuries.

2.5 Recommend exercise interventions and physical training for adults at risk for falls to improve their strength and balance. Encourage an individualised, multicomponent program/activity that corresponds to the person's current abilities and functioning.

2.6 Collaborate with prescribers and the person at risk for falls to reduce, gradually withdraw, or discontinue medications that are associated with falling, when the person's health condition or change in status allows. This includes the following actions:

- identify polypharmacy and medications that increase risk for falls;
- conduct a medication review, or refer to an appropriate health-care provider and/or prescriber; and
- monitor for side effects of medications known to contribute to risk for falls.

2.7 Refer adults at risk for falls or fall injuries to the appropriate health-care provider for advice about vitamin D supplementation.

2.8 Encourage dietary interventions and other strategies to optimize bone health in adults at risk for falls or fall injuries, particularly those at risk for fracture. Refer to the appropriate health-care provider for advice and individualised interventions.

2.9 Consider hip protectors as an intervention to reduce the risk of hip fracture among adults at risk for falls and hip fracture. Review the evidence, potential benefits, harms, and barriers to use with the person to support individualised decisions.

Table 3 also includes the interventions included in the current Monash Health procedures. This is done to provide a comparison with up to date evidence about falls prevention interventions and to enable prioritisation about could be included in updated guideline.

Table 3. Summary of falls prevention interventions

Study	Cameron 2018 (Cochrane)	Avanecean 2017	Marques 2017	Rowan 2017	Hartung 2017	Morello 2019	ACSQH 2008	**MH Falls Prevention**
Age	>65 years	All ages	>65 years	All ages	>65 years	>69 years	>65 years	On admission screen all adult patients
Intervention								
Hendrich II		√						
6-PACK		√						
The Falls Prevention Toolkit		√						
Non-slip socks					√			
Bed rails			√					
Medication	√					√	√	√
Exercise	√					√		
Furnishing/adaptations	√							
Communication aids	√							√
Social environment	√							
Bed alarms	√			√		√		
Sitters/supervision				√			√	√
Rounds				√				√
Patient closer to the nurses' station				√				
Physiotherapy	√						√	
Feet and footwear							√	
Floor line bed or low-low							√	√
Education	√					√		√
Referral to other services						√		√
Home modifications						√		
Other		Cumming et al (2008) Healy et al (2004)						

Current Monash Health practice comparison

Tables 2 and 3 outline the various assessment tools and prevention strategies across the studies in this review. We have attempted to then compare Monash Health with the evidence base. Subsequently, Monash Health use the Ontario Modified STRATIFY, which is consistent with the recommendations from the Australian Commission on Safety and Quality in Healthcare best practice guideline (ACSQH, 2009). However, the most commonly used tool found in the studies included in this review is the Hendrich II Fall Risk Model.

With respect to falls prevention interventions, Monash Health undertake the following interventions that are consistent with studies included in this review: medication assessment (Morello 2019; ACSQH, 2009), provision of communication aid (notes on whiteboard above patient bed) (Cameron 2018), sitter (Rowan

2017; ACSQH, 2009), rounds (Rowan 2017), floor line or low-low bed (ACSQH, 2009), education (Morello 2019) and referral to relevant services (Morello 2019).

Conclusions

With respect to falls assessment, standardised, patient-centred risk assessment tools validated for the specific population should be used. Two assessment tools used together would better evaluate the characteristics of falls by the elderly. Combining functional measures with subjective screening tools may optimise performance and accuracy of identifying falls risk.

With respect to fall prevention interventions, no single intervention has been shown to be universally effective. It appears that multifactorial, patient-centered interventions may be of most benefit.

REPORT IN DETAIL

Background

Monash Health has several Falls Management Procedures which require updating and consolidation into one overarching guideline. A review of current evidence about fall risk assessment and strategies to prevent falls was required as part of the guideline development.

Objectives

The objective of this rapid review was to provide an understanding regarding the current state of evidence with respect to in-hospital falls risk assessment and prevention. It is anticipated that this review will inform the process of updating the Monash Health Falls Guideline.

Search strategy

See Appendix for detail.

Results

There were 11 studies included in this review. The evidence from these studies has been summarised and presented below, and in more detail in Table 1. For a summary of comparison of interventions and assessment tools, see in Tables 2 and 3.

Characteristics of fallers

45-65 years (Quality not assessed) (Guillaume 2016)

The mean age of fallers was 55.75 years. 28.7% of falls resulted in injury. Individual fallers had a mean of four comorbidities, including hypertension (46.5%), anxiety/depression (40.2%), and alcohol and drug abuse (32.9%). There is no significant difference in fall rates per 1,000 patient days between ages 45–64 and 65–90. As a result, middle-age inpatients' acute illness makes them as vulnerable for fall and injury as the older population. They should not be overlooked for fall prevention measures.

Assessment

All ages (Quality not assessed) (Rowan 2017)

Standardised risk assessment tools validated for the specific population should be used for patient assessment. Standardised, multilevel prevention measures in combination with a patient-centered assessment of individual risk areas should be employed. Tools such as the Hendrich II Fall Risk Model, or the Morse Fall Risk Assessment Tool.

>60 years (Low risk of bias) (Park 2018)

Rather than a single measure, two assessment tools used together would better evaluate the characteristics of falls by the elderly. This is because falls can occur due to a multitude of factors and more than one assessment tool may maximise the advantages of each tool for predicting the occurrence of falls.

The most desirable strategy to consider both the disease state and physical balancing ability of the elderly will be to use, in combination, STRATIFY or the Hendrich II Fall Risk Model, and Berg Balance Scale or Mobility Interaction Falls chart which has a stable specificity.

>55 years

Functional Assessment (Quality unknown) (Bassett 2018)

The Timed “Up and Go” (TUG) was identified as a feasible functional ability measure for falls risk for clinicians. It demonstrated clinical performance of fair sensitivity (56% 68%) and good specificity (74%-80%). Clinical performance of other measures (Berg Balance Scale and Functional Reach test) was not as favorable as the TUG. Combining functional measures, such as TUG, the Hendrich II Fall Risk Model or Step Test, with subjective screening tools, such as STRATIFY or MORSE scale may optimise performance and accuracy of identifying fall risk identification.

0-21 years (High to Good quality) (DiGerilamo 2017)

Though there are several pediatric falls risk assessment tools published in the literature, none have been found to be reliable and valid across institutions and diverse populations. The following assessment tools were used: Morse Fall Scale (adult); Hendrich II Fall Risk Model (adult); Change in mental status, History of falls, Age <36 months, Mobility impairment, Parental involvement, Mobility impairment. (CHAMPS); The Humpty Dumpty Fall Scale; Impairment, Medications, Sedation/anesthesia, Admitting diagnosis, Fall history, and Environment tool (I'M SAFE); Cummings; General Risk Assessment For Pediatric In-patient Falls (GRAF PF).

Clinical practice guideline (RNAO, 2017)

What are the most effective ways to identify adults at risk for falls or for injury due to falls?

Recommendation

1.1 Screen all adults to identify those at risk for falls. Conduct screening as part of admission processes, after any significant change in health status, or at least annually. Screening should include the following approaches:

- identifying a history of previous falls;
- identifying gait, balance, and/or mobility difficulties; and
- using clinical judgment.

1.2a For adults at risk for falls, conduct a comprehensive assessment to identify factors contributing to risk and determine appropriate interventions. Use an approach and/or validated tool appropriate to the person and the health-care setting.

1.2b Refer adults with recurrent falls, multiple risk factors, or complex needs to the appropriate clinician(s) or to the inter-professional team for further assessment and to identify appropriate interventions.

Prevention

All ages

General prevention strategies (Quality not assessed) (Rowan 2017)

Universal multifactorial guidelines may or may not be effective due to inconsistent practices. Single interventions have not been proven effective in the medical population, and prevention guidelines cannot be generalised to larger populations. No single intervention has been shown to be universally effective whereas, specific interventions based on a patient-centered assessment and risk reduction approach have improved outcomes in hospital environments. The most common fall prevention interventions included bed alarms (90%), rounds (70%), sitters (68%), and relocating the patient closer to the nurses' station (56%).

Patient centered interventions (Limited high quality evidence) (Avanecean 2017)

Patient-centered interventions in addition to tailored patient education may have the potential to be effective in reducing falls and fall rates in acute care hospitals. Interventions such as:

- Hendrich II Falls Risk Model and a 30-minute patient education session tailored to individual risk factors in addition to usual care.
- 6-PACK program
- The Falls Prevention Toolkit
- Cumming et al (2008). Nurse education and physiotherapist designed exercises specific to patient's needs, and focused on balance, safety mobility and activities of daily living.
- Healy et al (2004). Brief fall risk factors screen assessing eyesight, medication assessment, assessment for postural hypotension, urinalysis, environmental assessment and nurse call bell.

>69 years

Multifactorial designs in the Emergency Department (Mixed quality)(Morello 2019)

There is no significant effect of multifactorial designs to prevent falls on the rate of fall-related emergency department (ED) presentations. Subgroup analyses did not identify any difference in the numbers of fractures, ED presentations or hospitalisations. This systematic review and meta-analysis of randomised controlled trials found little evidence to support the use of multifactorial falls prevention programs for older adults that present to ED with a fall.

>65 years

General (High risk of bias) (Cameron 2018)

In hospitals, it is uncertain of the effect of additional physiotherapy on the rate of falls or whether it reduces the risk of falling. It is uncertain of the effect of providing bed sensor alarms on the rate of falls or risk of falling. Multifactorial interventions may reduce rate of falls, although subgroup analysis suggests this may apply mostly to a subacute setting; it is uncertain of the effect of these interventions on risk of falling.

Bed rails (Quality not assessed) (Marques 2017)

There is no scientific evidence comparing the use of bedrails in preventing falls among hospitalised older adults to no use of bedrails or any type of physical restraints.

Non-slip socks (Quality not assessed) (Hartung 2017)

There is inconclusive evident to support the use of non-slip socks to prevent falls among hospitalised older adults. Non-slip socks do not possess the properties of adequate footwear and have the potential to spread infection. The patient's personal footwear from home is the safest footwear option while admitted into hospital.

Clinical practice guideline (RNAO, 2017)

What interventions are effective in preventing falls and reducing the risk for falls or falls-related injury among at-risk adults?

Recommendation

2.2 Engage adults at risk for falls and fall injuries using the following actions:

- explore their knowledge and perceptions of risk, and their level of motivation to address risk;
- communicate sensitively about risk and use positive messaging;
- discuss options for interventions and support self-management;
- develop an individualised plan of care in collaboration with the person;
- engage family (as appropriate) and promote social support for interventions; and
- evaluate the plan of care together with the person (and family) and revise as needed.

2.2 Provide education to the person at risk for falls and fall injuries and their family (as appropriate) in conjunction with other falls prevention interventions. This includes providing information about risk for falls, falls prevention, and interventions.

Ensure that the information is provided in a variety of formats and in the appropriate language.

2.3 Communicate the person's risk for falls and related plan of care/interventions to the next responsible health-care provider and/or the inter-professional team at all care transitions to ensure continuity of care and to prevent falls or fall injuries.

2.4 Implement a combination of interventions tailored to the person and the health-care setting to prevent falls or fall injuries.

2.5 Recommend exercise interventions and physical training for adults at risk for falls to improve their strength and balance. Encourage an individualised, multicomponent program/activity that corresponds to the person's current abilities and functioning.

2.6 Collaborate with prescribers and the person at risk for falls to reduce, gradually withdraw, or discontinue medications that are associated with falling, when the person's health condition or change in status allows. This includes the following actions:

- identify polypharmacy and medications that increase risk for falls;
- conduct a medication review, or refer to an appropriate health-care provider and/or prescriber; and
- monitor for side effects of medications known to contribute to risk for falls.

2.7 Refer adults at risk for falls or fall injuries to the appropriate health-care provider for advice about vitamin D supplementation.

2.8 Encourage dietary interventions and other strategies to optimize bone health in adults at risk for falls or fall injuries, particularly those at risk for fracture. Refer to the appropriate health-care provider for advice and individualised interventions.

2.9 Consider hip protectors as an intervention to reduce the risk of hip fracture among adults at risk for falls and hip fracture. Review the evidence, potential benefits, harms, and barriers to use with the person to support individualised decisions.

Current Monash Health practice comparison

Tables 2 and 3 outline the various assessment tools and prevention strategies across the studies in this review. We have attempted to then compare Monash Health with the evidence base. Subsequently, Monash Health use the Ontario Modified STRATIFY, which is consistent with the recommendations from the Australian Commission on Safety and Quality in Healthcare best practice guideline (ACSQH, 2009). However, the most commonly used tool found in the studies included in this review is the Hendrich II Fall Risk Model.

With respect to falls prevention interventions, Monash Health undertake the following interventions that are consistent with studies included in this review: medication assessment (Morello 2019; ACSQH, 2009), provision of communication aid (notes on whiteboard above patient bed) (Cameron 2018), sitter (Rowan 2017; ACSQH, 2009), rounds (Rowan 2017), floor line or low-low bed (ACSQH, 2009), education (Morello 2019) and referral to relevant services (Morello 2019).

Conclusion

With respect to falls assessment, standardised, patient-centred risk assessment tools validated for the specific population should be used. Two assessment tools used together would better evaluate the characteristics of falls by the elderly. Combining functional measures with subjective screening tools may optimise performance and accuracy of identifying falls risk.

With respect to fall prevention interventions, no single intervention has been shown to be universally effective. It appears that multifactorial, patient-centered interventions may be of most benefit.

Table 1. Characteristics of the included studies.

Study	Age	Scope	Summary	Tool or intervention	Quality of evidence
Cameron 2018 (Cochrane)	>65 years	Prevention	In hospitals: we are uncertain of the effect of additional physiotherapy on the rate of falls or whether it reduces the risk of falling. We are uncertain of the effect of providing bed sensor alarms on the rate of falls or risk of falling. Multifactorial interventions may reduce rate of falls, although subgroup analysis suggests this may apply mostly to a subacute setting; we are uncertain of the effect of these interventions on risk of falling.	Exercise Medication Environment/assistive technology Furnishing/adaptations Communication aids Social environment Knowledge Multifactorial	The majority of trials were at high risk of bias, mostly relating to lack of blinding. With few exceptions, the quality of evidence for individual interventions in either setting was generally rated as low or very low. Risk of fracture and adverse events were generally poorly reported and, where reported, the evidence was very low quality, which means that we are uncertain of the estimates.
Avanecean 2017	All ages	Prevention. Patient centered interventions.	Patient-centered interventions in addition to tailored patient education may have the potential to be effective in reducing falls and fall rates in acute care hospitals.	Hendrich II Falls Risk Model and a 30-minute patient education session tailored to individual risk factors in addition to usual care. 6-PACK program The Falls Prevention Toolkit Study nurse provided education to patients and families, arranged for appropriate walk aides, eyewear, modifications to bedside environment and increased supervision with mobility and customized mobility alarms. The study nurse communicated with staff nurses regarding potential changes to patient's medication regimens. The physiotherapist designed exercises specific to patient's needs, and focused on balance, safety mobility and activities of daily living. Intervention consisted of a brief fall risk factors screen that assessed eyesight, medication assessment,	There is limited high quality evidence demonstrating the effectiveness of patient-centered fall prevention interventions.

				assessment for postural hypotension, urinalysis, environmental assessment and nurse call bell.	
Bassett 2018	>55 years	Assessment. Functional tests.	Timed “Up and Go” (TUG) was identified as a feasible fall risk functional ability measure for clinicians; it demonstrated clinical performance of fair sensitivity (56% 68%) and good specificity (74%-80%). Clinical performance of other measures (Berg Balance Scale and Functional Reach test) was not as favorable as the TUG. Functional ability measures are underutilized in the acute care setting, potentially due to limited knowledge and training on administration. Combining functional measures with subjective screening tools may optimize performance and accuracy of identifying fall risk identification.	Study nurse provided education to patients and families, arranged for appropriate walk aides, eyewear, modifications to bedside environment and increased supervision with mobility and customized mobility alarms. The study nurse communicated with staff nurses regarding potential changes to patient’s medication regimens. The physiotherapist designed exercises specific to patient’s needs, and focused on balance, safety mobility and activities of daily living.	Not clearly stated.
Guillaume 2016	45-65 years	Characteristics	The mean age was 55.75 years. 28.7% (n = 126) of falls resulted in injury. Individual fallers had a mean of four comorbidities, including hypertension (46.5%), anxiety/depression (40.2%), and alcohol and drug abuse (32.9%). There was no significant difference in fall rates per 1,000 patient days between ages 45–64 and 65–90. Middle-age inpatients' acute illness makes them as vulnerable for fall and injury as the older population. They should not be overlooked for fall prevention measures.		Not assessed.
DiGerilamo 2017	0-21 years	Assessment	Though there are several pediatric falls risk assessment tools published in the literature, none have been found to be reliable and	Morse Fall Scale (adult) Hendrich II Fall Risk Model (adult) Change in mental status, History of	All articles reviewed were of high to good quality.

			valid across institutions and diverse populations.	falls, Age <36 months, Mobility impairment, Parental involvement, Mobility impairment. (CHAMPS) The Humpty Dumpty Fall Scale I'M SAFE tool Cummings GRAF PF	
Marques 2017	>65 years	Prevention – bed rails	There is no scientific evidence comparing the use of bedrails in preventing falls among hospitalized older adults to no use of bedrails or any type of physical restraints.	Bedrails as a restraint to prevent falls among older adults in non-ICUs compared to no use of bedrails or any type of physical restraints.	Assessment of methodological quality was not conducted as no articles were identified that met the inclusion criteria.
Rowan 2017	All ages	Assessment, prevention, adherence, evaluation.	Standardized risk assessment tools validated for the specific population should be used for patient assessment. The total risk assessment score has limited validity as the sole predictor of falls in medical patients at low or moderate risk and in young or middle-aged populations who are typically more active and may not perceive risks because of changing physical conditions or medications. Universal multifactorial guidelines may or may not be effective due to inconsistent practices. Single interventions have not been proven effective in the medical population, and prevention guidelines cannot be generalized to larger populations. Successful fall reduction programs include both standard interventions based on total risk assessment and individualized risk reduction interventions based on specific patient risk categories.	Not specifically stated.	Not assessed.

			The review supports an individualized patient-centered approach to interventions with a structured falls program that evaluates adherence and performance, and regulation standards.		
Hartung 2017	>65 years	Prevention. Non-slip socks.	The results suggested that there is inconclusive evident to support the use of non-slip socks to prevent falls among hospitalized older adults. Non-slip socks do not possess the properties of adequate footwear and have the potential to spread infection. The patient's personal footwear from home is the safest footwear option while admitted into hospital.	Non-slip socks.	Not assessed.
Park 2018	>60 years	Assessment.	We concluded that rather than a single measure, two assessment tools used together would better evaluate the characteristics of falls by the elderly that can occur due to a multitude of factors and maximize the advantages of each for predicting the occurrence of falls. The most desirable strategy to consider both the disease state and physical balancing ability of the elderly will be to use, in combination, STRATIFY or the Hendrich II Fall Risk Model, which has a high sensitivity, and Berg Balance Scale or Mobility Interaction Falls chart which has a stable specificity.	Hendrich II Fall Risk Model St. Thomas's Risk Assessment Tool in Falling elderly inpatients Timed Up and Go test	31/33 articles (93.9%) had a low risk of bias in all domains and items.
Morello 2019	>69 years	Prevention in the Emergency Department.	The pooled data demonstrate no significant effect on the rate of fall-related ED presentations.	4 individual RCTs.	Study quality varied from 5-8 on the PEDro scale.

		Multifactorial designs only.	Subgroup analyses did not identify any difference in the results for fractures, ED presentations or hospitalisations. This systematic review and meta-analysis of RCTs found little evidence to support the use of multifactorial falls prevention programmes for older adults that present to ED with a fall.		
ACSQH 2008 (MH guideline based on)			Screening and assessment • Document the patient's history of recent falls or use a validated screening tool to identify people with risk factors for falls in hospital. • Use falls risk screening and assessment tools that have good predictive accuracy, and have been evaluated and validated across different hospital settings. • As part of a multifactorial program for patients with increased falls risk in hospital, conduct a systematic and comprehensive multidisciplinary falls risk assessment to inform the development of an individualised plan of care to prevent falls. • When falls risk screens and assessments are introduced, they need to be supported with education for staff and intermittent reviews to ensure appropriate and consistent use.	<u>Assessment</u> *Elderly* STRATIFY Ontario Modified STRATIFY *Emergency department* FROP-Com PROFET *Acute hospital setting* Care plan assessment items *In the subacute or rehabilitation setting* FRAT FRHOP PJC-FRAT <u>Interventions</u> Balance & mobility limitations Cognitive impairment Continence Feet and footwear Supervision	

				Medications Floor line bed	
MH Falls Prevention	On admission screen all adult patients	Assessment and prevention	<u>Procedure</u> 1. Provide standard care for all patients refer Falls prevention standard care tool 2. Be aware of local environmental hazards eg. steps, ramps, and changes in flooring (falls can occur when a patient moves from one type of flooring such as carpet to linoleum); modify if possible. 3. Consider medications (especially recent dose changes or additions) and their contribution to falls and harm from falls. 4. Discuss any concerns with medical staff and/or pharmacist. Refer to Falls Risk and Medications Implementation Tool 5. Offer the patient, family and/or carer the Monash Health patient information sheet “Staying Safe to Prevent Falls”. Outpatient areas to have the information sheet displayed. Inpatients 6. On admission screen all adult patients for their falls risk by completing the Falls Prevention form MRI33 7. A clinician can increase the patient risk score eg. if a patient scores as a low risk but the clinician feels this does not accurately reflect the patient’s true risk then the clinician can score the patient as a medium or high risk.	<u>Assessment</u> Ontario Modified STRATIFY <u>Prevention</u> Low risk - Complete the bedside mobility chart / communication board - Discuss the level of risk with patient/family/carers and all staff involved in care Medium and high risk - Complete the bedside mobility chart / communication board - Discuss the level of risk with patient/family/carers and all staff involved in care - Supervise / assist with all transfers and ambulation - Bed rails NOT TO BE USED - Medication review documented - Referral to relevant allied health team High risk Place patient in an area of enhanced visibility and supervision - Low-low bed - Floor line bed	Not applicable

			Clinicians are not authorised to reduce the patient's falls risk score. 8. If the patient is a medium or high falls risk ensure there is a mobility chart above their bed 9. Develop falls prevention plan in partnership with patient and carers and document appropriate falls reduction strategies on the care plan (MRI33). Implement these interventions and document appropriate falls reduction strategies on the care plan and implement these interventions to decrease the risk of falls or harm from falls. Refer to the Falls prevention and management background . 10. Required frequency of on-going screening to assess falls risk: 10.1. All patients must have their falls risk reassessed if any of the following occurs - a fall - a deterioration in their condition e.g. becoming increasingly confused - a change in treatment e.g. post operatively, medication change 10.2. Patients admitted to acute wards reassess falls risk at least daily 10.3. Patients admitted to subacute wards reassess falls risk daily for the first 5 days then at least weekly 11. Communicate the falls risk and interventions to the multidisciplinary team. The same procedure for risk assessment, implementation of strategies and communication is followed by staff in Emergency	- Bed/chair/floor alarm/sensors - Constant supervision by staff/family/carers - Constant supervision by CPO	

			Departments and entered into Symphony 12. Ambulatory care for patients; 12.1 for overnight admission follow the above procedure 12.2 admitted for day procedure or treatment, if the above procedure is not followed then follow steps 1 – 4 and complete a risk assessment and submit to the Monash Health Falls Committee for approval		

Table 2. Summary of falls assessment tools

Study **(By publication date)**	Bassett 2018	DiGerilamo 2017	Rowan 2017	Park 2018	ACSQH 2008	MH Falls Prevention
Age	>55 years	0-21 years	All ages	>60 years	>65 years	On admission screen all adult patients
Assessment tool						
STRATIFY				√	√	
Ontario Modified STRATIFY					√	√
PROFET					√	
Care plan assessment items					√	
FRHOP					√	
PJC-FRAT					√	
TUG	√			√		
Berg balance	√					
Functional reach	√					
Morse Fall Scale (adult)		√	√			

Hendrich II Fall Risk Model (adult)		√	√	√		
CHAMPS		√				
The Humpty Dumpty Fall Scale		√				
I'M SAFE tool		√				
Cummings et al., 2008		√				
GRAF PF		√				

Abbreviations: STRATIFY - St Thomas Risk Assessment Tool in Falling Elderly In-patients, TUG – timed up and go, FRHOP - Falls Risk for Hospitalised Older People, PJC-FRAT Peter James Centre Fall Risk Assessment Tool, CHAMPS - change in mental status, history of falls, I'M SAFE - Impairment, Medications, Sedation/anesthesia, Admitting diagnosis, Fall history, and Environment; GRAF PIF - General Risk Assessment For Pediatric In-patient Falls.

Table 3. Summary of falls prevention interventions

Study	Cameron 2018 (Cochrane)	Avanecean 2017	Marques 2017	Rowan 2017	Hartung 2017	Morello 2019	ACSQH 2008	MH Falls Prevention
Age	>65 years	All ages	>65 years	All ages	>65 years	>69 years	>65 years	On admission screen all adult patients
Intervention								
Hendrich II		√						
6-PACK		√						
The Falls Prevention Toolkit		√						
Non-slip socks					√			
Bed rails			√					
Medication	√					√	√	√
Exercise	√					√		
Furnishing/adaptations	√							
Communication aids	√							√
Social environment	√							
Bed alarms	√			√		√		
Sitters/supervision				√			√	√
Rounds				√				√
Patient closer to the nurses' station				√				
Physiotherapy	√						√	
Feet and footwear							√	
Floor line bed or low low							√	√
Education	√					√		√
Referral to other services						√		√
Home modifications						√		
Other		Cumming et al (2008) Healy et al (2004)						

References

Guillaume, D., Crawford, S., & Quigley, P. (2016). Characteristics of the middle-age adult inpatient fall. *Applied Nursing Research*, *31*, 65-71.

Rowan, L., & Veenema, T. G. (2017). Decreasing falls in acute care medical patients: An integrative review. *Journal of Nursing Care Quality*, *32*(4), 340-347.

Park, S. H. (2018). Tools for assessing fall risk in the elderly: a systematic review and meta-analysis. *Aging Clinical and Experimental Research*, *30*(1), 1-16.

Bassett, A. M., Siu, K. C., & Honaker, J. A. (2018). Functional measures for fall risk in the acute care setting: a review. *Western Journal of Nursing Research*, *40*(10), 1469-1488.

DiGerolamo, K., & Davis, K. F. (2017). An integrative review of pediatric fall risk assessment tools. *Journal of Pediatric Nursing*, *34*, 23-28.

Avanecean, D., Calliste, D., Contreras, T., Lim, Y., & Fitzpatrick, A. (2017). Effectiveness of patient-centered interventions on falls in the acute care setting compared to usual care: a systematic review. *JBI Database of Systematic Reviews and Implementation Reports*, *15*(12), 3006-3048.

Morello, R. T., Soh, S. E., Behm, K., Egan, A., Ayton, D., Hill, K., ... & Redfern, J. (2019). Multifactorial falls prevention programmes for older adults presenting to the emergency department with a fall: systematic review and meta-analysis. *Injury Prevention*.

Cameron, I. D., Gillespie, L. D., Robertson, M. C., Murray, G. R., Hill, K. D., Cumming, R. G., & Kerse, N. (2012). Interventions for preventing falls in older people in care facilities and hospitals. *Cochrane Database of Systematic Reviews*, (12).

Marques, P., Queirós, C., Apóstolo, J., & Cardoso, D. (2017). Effectiveness of bedrails in preventing falls among hospitalized older adults: a systematic review. *JBI Database of Systematic Reviews and Implementation Reports*, *15*(10), 2527-2554.

Hartung, B., & Lalonde, M. (2017). The use of non-slip socks to prevent falls among hospitalized older adults: A literature review. *Geriatric Nursing*, *38*(5), 412-416.

Registered Nurses' Association of Ontario. (2017). *Preventing Falls and Reducing Injury from Falls*. Fourth Edition. Toronto, ON: Author.

Cumming RG, Sherrington C, Lord SR, Simpson JM, Vogler C, Cameron ID, et al. Cluster randomised trial of a targeted multifactorial intervention to prevent falls among older people in hospital. BMJ 2008;336(7647): 758–60.

Healey F, Monro A, Cockram A, Adams V, Heseltine D. Using targeted risk factor reduction to prevent falls in older inpatients: a randomised controlled trial. Age Ageing 2004;33 (4):390–5.

Australian Commission on Safety and Quality in Health Care. (2009). *Preventing Falls and Harm From Falls in Older People Best Practice Guidelines for Australian Hospitals.*

Appendix - Search strategy and results

TRIP database: falls prevention assessment hospital from:2014 = 71 results

TRIP database: “falls prevention” “falls assessment” hospital from:2014 guidelines only = 4 results

NHMRC “falls” = 0 results

Pubmed (("Accidental Falls/prevention and control"[majr] OR ((Fall prevention[tw] OR fall risk[tw] OR Falls prevention[tw] OR Falls risk[tw] OR ((fall[ti] OR Falls[ti] OR Falling[ti] OR Fallers[ti]) AND (risk[ti] OR prevent*[ti] OR safety[ti])) NOT medline[sb])) AND eng[la] AND (health services administration[mh] OR hospital[mh] OR hospital*[tw] OR inpatient*[tw] OR outpatient*[tw]) AND “last 5 years”[dp])) NOT (animals[mh] NOT humans[mh]) AND review

Pubmed (based on Cochrane paper)

Search	Query	Items found
#13	Search (#12) AND #11 Filters: Publication date from 2012/01/01	47
#12	Search review Filters: Publication date from 2012/01/01	1149442
#11	Search ((#9) AND #6) AND #5 Filters: Publication date from 2012/01/01	281
#10	Search ((#9) AND #6) AND #5	505
#9	Search "Inpatients"[Mesh]	20165
#6	Search (falls) OR faller	64979
#5	Search "Accidental Falls"[Mesh]	22710

Inclusion/Exclusion Criteria

Table 1. Inclusion/Exclusion criteria

Population	**Include:** Adults **Exclude:** Paediatric
Interventions	**Include:** Falls assessment tools or fall prevention strategies
Outcomes	Any
Context	**Include:** Inpatient **Exclude:** Outpatient, community, residential
Types of evidence	**Include:** Reviews
Limits	**Date**: Since 2014 **Language:** Publications in English.

Search strategy

Study Selection

Papers identified were screened using inclusion and exclusion criteria established *a priori.* Searches of Pubmed, TRIP database, and the NHMRC website were screened by one reviewer in consultation with colleagues as necessary. Literature was included based on the above criteria.

Quality Appraisal

Not conducted.