

## Conference Paper

# Risk Factors for Cognitive Impairment after Ischemic Stroke

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## Abstract

A fall can be defined as 'an event that results in a person coming to rest inadvertently on the ground or floor or other lower level (Matarese & Ivziku, 2016). Falls can be caused by many factors. Millions of patient falls in hospitals are recorded (Lynn et al., 2014). Patient falls impact either the patients or the hospitals. It is a challenge for healthcare organization to reduce negative impact of patient falls. This article aims to describe tools used by hospitals to prevent patient falls, by reviewing systematically the literatures found in ProQuest and SCOPUS database. This systematic review refers to the protocol of PRISMA. Literatures were gathered from 'ProQuest' and 'SCOPUS' electronic databases. Prevention of patient falls can, generally, be divided in two main sections; while the first section is early detection, the second is interventions (Smith et al., 2016). The early detection of patient falls is further divided into two sections, fall-risk screening and fall-risk assessment (Matarese & Ivziku, 2016). Various screening tools have been developed to identify patients at risk of falls in hospitals. The following falls risk-screening tools are frequently used: the St Thomas risk assessment tool in falling elderly inpatients (STRATIFY); the Conley scale; the Morse Fall scale; the Falls Risk Assessment Tool (FRAT); and the NPSA scale (Matarese & Ivziku, 2016). There are several paediatric screening tools, such as General Risk Assessment for Paediatric Inpatient Falls (Graf-PIF), CHAMPS, Cummings scale, Children's National Medical Center (CNMC) scale, and the Humpty Dumpty Fall Scale (Murray et al., 2016). The NICE guideline recommends including the following factors in the hospital's multifactorial falls risk-assessment tool: cognitive and visual impairment, continence problems, a history of falls, mobility problems, medications, balance and postural problems, health problems, and syncope syndrome (Matarese & Ivziku, 2016). In addition to screening and assessment tools, there are many intervention tools used by hospitals to prevent patient falls, such as using remote video monitoring in hospitals for reducing falls (Votruba et al., 2016), using certain footwear, and using fall-reduction projects, consider measuring effect on nursing staff time, staffing ratios on budget, or changes in patient mobility as a result of the initiative (Cumbler et al., 2013). Falls are unintended accidents to the patients in hospital that happen frequently. It is a challenge for healthcare organizations to reduce negative impacts of patient falls. There are some tools used by hospitals to prevent patient falls.

**Keywords:** patient falls prevention, STRATIFY, Conley, Morse, FRAT, NPSA, Graf-PIF, CHAMPS, Cumming, CNMC, Humpty Dumpty, NICE

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## 1. Introduction

A fall can be defined as 'an event that results in a person coming to rest inadvertently on the ground or floor or other lower level. Falls can be caused by intrinsic factors related to the patient or by extrinsic factor of the patient [1]. Falls are unintended accidents to the patients in hospital. Millions of patients are experience falls annually in United States [2]. More than 200,000 falls in England and Wales were reported by acute hospitals to the National Reporting and Learning System in the 12 months to the end of September 2009 [1].

The impact of falls to the patient considerable as it can affect each patient physically and emotionally [2]. Falls in the acute care setting cause additional morbidities, are associated with psychosocial trauma, and increase mortality risk for older adults [3].

For health care organizations, patient falls result a heavy financial burden and significant cost. According to the Centers for Disease Control and Prevention (CDC), the financial cost of a fall with injury in an older adult is estimated at \$17,500 [3]. It is a challenge for health care organization to reduce negative impact of patient falls.

This article aims to describe tools commonly used by hospitals to prevent patient falls, by reviewing systematically the In the next phase, the author assessed the eligibility of the literatures one by one. The literatures gotten in ProQuest and Scopus database.

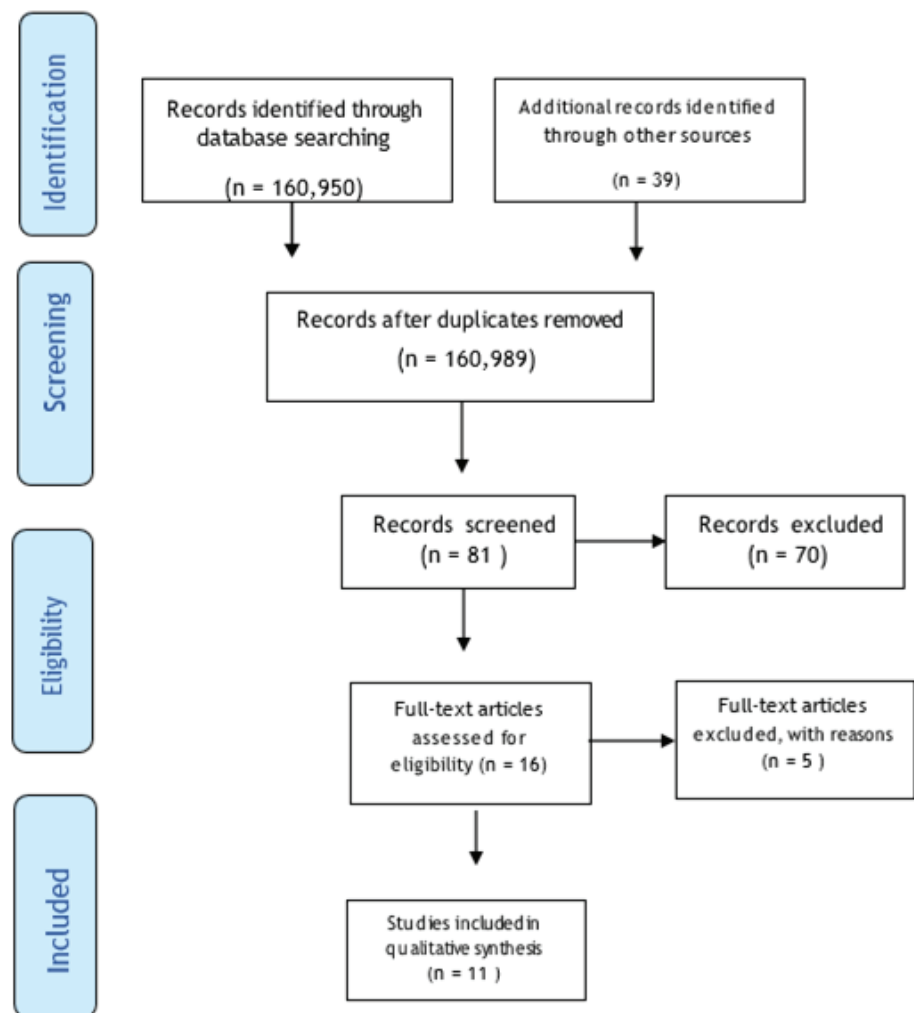
## 2. Materials and Methods

This systematic review refers to the protocol of PRISMA. Literatures were gathered from 'ProQuest' and 'Scopus' electronic database. Key words used in this identification stage were 'tools; prevent; patient; falls; hospitals'. The systematic flow of gathering literature can be seen in Figure 1. In identification phase, there were recorded 160,950 literatures in ProQuest database, and 39 literatures in Scopus database.

After went through identification stage, literatures then went to the screening stage. The criteria of screening were, the literatures should could be downloaded in full text, and the key word addition, 'hospitals'. In this screening stage, the literatures recorded by database were 81. There was no restriction of language, document type, tittle, and organization. There was also no communication with the previous author. Author excluded totally 70 literature and remained 11 literature as seen on Figure 1.

### 3. Results and Discussion

Patient falls prevention, generally, can be divided in two main section, while the first section is early detection, and the second is interventions [4]. The early detection of patient falls also divided in two section, fall risk screening and fall risk assessment. Patient falls prevention commonly designed for all patients. However, particular attention is given to patients aged 65 and over [1]. There are also patient falls prevention tools dedicated for paediatric patient, such as Humpty Dumpty fall scale [5].



**Figure 1:** Prisma flow diagram. Source: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009).

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TABLE 1: Contents of patients falls screening tools adopted from (Matarese et al., 2015).

Risk Factors	STRATIFY	Conley	Morse Fall	FRAT	NPSA
History of falls	√	√	√	√	√
Patient agitation	√	√	-	-	-
Visual impairment	√	-	-	-	-
Frequency of toileting or altered elimination	√	√	-	-	-
Transfer and mobility abilities or gait	√	-	√	√	√
Dizziness or vertigo	-	√	-	-	-
Use of walking aids	-	√	√	-	-
Cognitive impairment or mental status	-	√	√	-	-
Disease or comorbidity	-	-	√	√	-
Therapeutic devices	-	-	√	-	-
Medication	-	-	-	√	-
Fear of Falling	-	-	-	-	√

Various screening tools have been developed to identify patients at risk of falls in hospitals. The following falls risk screening tools are frequently used: the St Thomas risk assessment tool in falling elderly inpatients (STRATIFY); the Conley scale; the Morse Fall scale; the Falls Risk Assessment Tool (FRAT); and the NPSA scale [1].

STRATIFY was developed to assess the risk of falls in the older population. It considers five risk factors: recent history of patient falls, patient agitation, visual impairment, frequency of toileting, and transfer and mobility abilities. Patients who score above 2 are identified as being at high risk of falls [6]. The Conley scale comprises six risk factors: a history of falls, dizziness or vertigo, altered elimination, the use of walking aids, cognitive impairment and agitation. A score above 2 identifies patients at risk of falls [1]. The Morse Fall scale assesses six risk factors: a history of falls, the presence of a secondary diagnosis, the use of mobility aides, intravenous therapy, patient gait and mental status. A score above 45 identifies patients at high risk of falls [7]. The FRAT assesses five risk factors: a history of falls, the number of patient medications (four or more), a history of Parkinson’s disease or stroke, problems with balance and

TABLE 2

NO.	JOURNAL TITLE	AUTHORS	METHODS	VARIABLE	ANALYSIS	RESULT
1.	Point prevalence of suboptimal footwear features among ambulant older hospital patients: implications for fall prevention	Chari, S. R. et al.	Auditors used the Footwear Assessment Form (FAF) <sup>12</sup> to assess footwear for the presence of one or more 'suboptimal' features.	Foot wear type Fall risk	Descriptive	The results of the present cross-sectional investigation suggest that older patients commonly ambulate in footwear with 'suboptimal' characteristics across both acute and subacute inpatient settings.
2.	Factors contributing to falls in hospitalized patients: post-fall aggregate analysis Carla	Lynn et al.	The institution report all fall events and fall injury using NDNQI measures. Frequencies and percentages were calculated for each variable	Nurse falls description	Descriptive	Toileting did not call, and Moving/getting up (27.8%) 2. Moving/getting up (21%) 3. Moving/getting up and did not call (20.5%) 20 4. Physiological (7.3%) 5. Toileting and Moving/getting up (5.5%)
3.	Systematic review of fall risk screening tools for older patients in acute hospitals. <i>Journal of Advanced Nursing</i>	Matarese, M. & Ivziku, D.	Describe the physical, psychological, social and economic consequences of falls for older inpatients. List the risk factors for falls for older inpatients	Risk factor for fall	Descriptive	Various screening tools have been developed to identify patients at risk of falls in hospitals. The following falls risk screening tools are frequently used in NHS hospitals: the St Thomas risk assessment tool in falling elderly inpatients (STRATIFY) (Oliver et al., 1997); the Conley scale (Conley et al., 1999); the Morse Fall scale (Morse et al., 1989); the Falls Risk Assessment Tool (FRAT) (Nandy et al., 2004); and the NPSA scale (NPSA 2007)
4.	Implementing a Pediatric Fall Prevention Policy and Program –ProQuest. <i>Pediatric Nursing</i>	Murray, E., Vess, J. & Edlund, B.	List the risk factors for falls for paediatric inpatients	Risk factor for fall	Descriptive	Several paediatric screening tools, such as General Risk Assessment for Pediatric Inpatient Falls(Graf-Pf), CHAMPS, Cummings scale, Children's National Medical Center (CNMC) scale, and the Humpty Dumpty Fall Scale.
5.	Video Monitoring to Reduce Falls And Patient Companion Costs For Adult Inpatients	Votruba, L. et al.	During the intervention phase, a dedicated telesitter was added to the central monitoring unit (CMU) 24/7 to observe up to 12 patients at high risk for falls in three adult inpatient units as an alternative to using a patient companion.	nurses were attempting to wean patients	Most data were analysed using simple descriptive statistics, except the change in falls was also analysed with paired <i>t</i> -test using a 95% confidence interval	This represented a 35% decrease in falls. Of the 828 patients selected for video monitoring, 13 (1.6%) experienced a fall. During the same time period, there were 40 falls (1.7%) among the 4,213 adult patients admitted who were not selected for video monitoring. Patient companion hours decreased 10% from an average of 1,930 hours per month to an average of 1,735 hours per month during the study period.

problems rising from a chair. A score of 3 or more identifies patients at risk of falls [8]. The NPSA scale evaluates four factors: a general history of falls, a fall that occurred during the current hospitalization, unsteady or unsafe patient mobility with or without walking aids when the patient is trying to walk alone and fear of falling. A 'yes' to any of these factors identifies the patient as being at risk of falls [1].

There are several paediatric screening tools, such as General Risk Assessment for Pediatric Inpatient Falls (Graf-PIF), CHAMPS, Cummings scale, Children's National Medical Center (CNMC) scale, and the Humpty Dumpty Fall Scale [5].

A multifactorial falls risk assessment is typically performed using specific tools that cover a range of risk factors. There are no standardized multifactorial falls risk assessment tools. Therefore, healthcare organisations may develop their own tools based on research evidence and national guidelines. The NICE guideline recommends including the following factors in the hospital's multifactorial falls risk assessment tool: cognitive and visual impairment, continence problems, a history of falls, mobility problems, medications, balance and postural problems, health problems, and syncope syndrome [1].

In addition to screening and assessment tools, there are many intervention tools used by hospitals to prevent patient falls. Several organizations have published or presented quality improvement data on the success of remote video monitoring in hospitals for reducing falls and patient companion costs. A study of Foturba et al. (2016) found that using video monitoring to prevent patient falls result decreasing of the number of falls significantly from 85 to 53 ( $p < 0.0001$ , 95% CI) comparing 9 months of baseline data to 9 months of intervention data on the three units [3]. Some studies show linking certain footwear styles with falls among wearers. Footwear features that positively affect balance and postural factors are often referred to as 'optimal' characteristics, and it is commonly inferred that the adoption of footwear with more optimal characteristics may reduce the risk of falls among seniors [9]. A study of Jennifer, R. S. et al. (2013) shows that For fall reduction projects, consider measuring effect on nursing staff time, staffing ratios on budget, or changes in patient mobility as a result of the initiative [10].

## 4. Discussion

Age is a risk factor for cognitive impairment after ischemic stroke in accordance with reported studies [10–13]. A stroke that occurs in to an elderly may increase the risk of cognitive impairment than the one occurs to a younger person. This is due to other

cerebrovascular pathology in the elderly's brain that may occur because of stroke that one had ever suffered from or diseases other than ischemic stroke [14].

Women have a greater risk for cognitive impairment because of the role of endogenous sex hormone level in changes in cognitive function. Low level of oestradiol in the body is associated with decreased general cognitive function and verbal memory. Oestradiol is thought to be neuroprotective and can limit damage due to oxidative stress and is regarded as protector of nerve cells from amyloid toxicity in patients with cognitive impairment [15]. These results are in accordance with the results of research conducted by Knopman et al. [13] and Desmond et al. [16].

Level of education is a risk factor for after ischemic stroke cognitive impairment. The higher the level of education can increase tolerance for the incidence of cognitive impairment in stroke patients [17]. According to Evans et al. [18], education can improve skills and strategies of problem solving so as to reduce the incidence of cognitive impairment after ischemic stroke.

Exposure to cigarette smoke is not a risk factor for cognitive impairment after ischemic stroke. It is in contrary to previous studies that have been conducted [19, 20]. Nicotine in cigarettes will react in the brain in 10 seconds after inhaling cigarette smoke. Nicotine will bind to nicotinic receptors that facilitate the release of adrenergic neurotransmitters, this process is important in cognitive function, memory, alertness, and reducing appetite [19]. This may occur because exposure to cigarette smoke is one of the risk factors of ischemic stroke. Therefore, most ischemic stroke patients in the study are exposed to cigarette smoke.

Record of hypertension is not a risk factor for cognitive impairment after ischemic stroke. The results of this study correspond with previous studies [21, 22]. Results of previous studies were not consistent with the research conducted by Arntzen et al. [23]. The process of cognitive decline in people with hypertension begins with pathological changes in the blood vessels of the brain. Pathological changes in the brain will cause abnormalities in the brain vessels. Abnormalities and damage to the brain vessels will lead to an increased risk for cognitive impairment [23, 24].

The association between sleep disorders and risk factors for vascular disease such as stroke has been well documented but not widely known. Sleep disorders may contribute to vascular pathology through direct and indirect mechanisms. The consequences of sleep disorders that are not treated immediately leads to cognitive impairment and a slow stroke rehabilitation process [25].

Medication adherence is a risk factor for after ischemic stroke cognitive disorders. According to Glader et al. [26], medication adherence in stroke patients is often poor,

50% of patients discontinue treatment for up to two years after stroke. According to Mellon et al. [27], medication adherence is a secondary prevention to the incidence of cognitive impairment in post-stroke patients.

## 5. Conclusion

Falls are unintended accidents to the patients in hospital which frequently happen. Patient falls can impact not only for patients but also for the hospitals. Falls in the acute care setting cause additional morbidities, and for health care organizations, patient falls result a heavy financial burden and significant cost. It is a challenge for health care organization to reduce negative impact of patient falls.

Patient falls prevention, generally, can be divided in two main section, while the first section is early detection, and the second is interventions. The early detection of patient falls also divided in two section, fall risk screening and fall risk assessment. The following falls risk screening tools are frequently used: the St Thomas risk assessment tool in falling elderly inpatients (STRATIFY); the Conley scale; the Morse Fall scale; the Falls Risk Assessment Tool (FRAT); and the NPSA scale. There are several paediatric screening tools, such as General Risk Assessment for Pediatric Inpatient Falls (Graf-PIF), CHAMPS, Cummings scale, Children's National Medical Center (CNMC) scale, and the Humpty Dumpty Fall Scale.

A multifactorial falls risk assessment is typically performed using specific tools that cover a range of risk factors. There are no standardized multifactorial falls risk assessment tools. Therefore, healthcare organizations may develop their own tools based on research evidence and national guidelines. The NICE guideline is recommended.

There are many intervention tools use by hospitals to prevent patient falls. Using remote video monitoring in hospitals for reducing falls and patient companion costs [3] has evident to prevent patient falls result decreasing of the number of falls significantly. Using certain footwear to prevent falls among wearers is another example. Other falls reduction projects consider measuring effect on nursing staff time, staffing ratios on budget, or changes in patient mobility as a result of the initiative.

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