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## Review article

## Review on prevention of falls in hospital settings

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## ABSTRACT

This review will first cover the root causes of falls, identify preventive measures associated with these falls, and provide an overview of best practice of fall prevention at leading institutions. There is significant benefit in instituting a comprehensive program to reduce falls. After analyzing the results from many successful programs, it is apparent that an integrative program that consists of patient evaluations, environmental modification, and staff training can lead to a significant reduction in the overall prevalence of falls. Such programs can be implemented at a low cost and therefore represent an improvement in care with a high return on investment.

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## 1. Introduction

Falls are defined as “an untoward event which results in the patient coming to rest unintentionally on the ground or other lower surface” and are a common and preventable complication that occurs in a hospital setting. There are 7,00,000–1,000,000 falls each year in hospital settings.<sup>1</sup> Given the compromised nature of individuals who are in hospital settings, falls often lead to other complications, such as fractures, lacerations, and/or significant internal bleeding. Thus, they increase overall healthcare utilization in a hospital system, drive up costs and adversely affect patient outcomes when a patient is admitted to a hospital.<sup>2</sup> The average increase in the length of stay for a patient after a fall has been estimated to be 12.3 days. This leads to an average cost increase of 61%.<sup>3</sup> Given the rapidly aging population in most developed countries, this problem is projected to only increase in the future. Thus, preventing falls represents an important area of hospital care that needs to be addressed to deliver clinically and cost effective care.

One of the more important aspects of preventing falls in a hospital is the use of an integrative care management system in which the design of the facility is taken into account, proper communication between the different healthcare professionals is

maximized, and a systematic review of best practices and mistakes are evaluated at a regular intervals to quantify the risk of certain triggering events for falls and review the actions taken to mitigate this risk.<sup>4</sup> As healthcare providers, nurses are one of the key components to preventing falls due to the close interactions they have with patients, as well as their role in overseeing the day-to-day operations in a hospital. Often, a nursing staff is far more attuned to the risks of an individual patients than the rest of the staff at a hospital. Thus, they represent the front line of defense against falls.<sup>5</sup>

To present a comprehensive overview of the prevention of falls in hospital settings, this review will first cover the root causes of falls and identify preventative measures associated with these falls. It will then provide an overview of best practices of fall prevention at leading institutions. It will thereby be possible to not only understand current state of the art fall prevention methods but also create frameworks by which more comprehensive programs can be formulated and implemented.

## 2. Root causes of falls

Falls are categorized into three broad categories, accidental falls, anticipated physiological falls and unanticipated physiological falls.<sup>6</sup> Falls attributed to physiology are due to age, ailments, medications or medical procedures and are reflected in risk assessment scores given to the patient. Therefore, these falls are the most easily anticipated and, thus, easiest to prevent. Unanticipated

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physiological falls are still due to physiological reasons, but are unforeseen because standard risk assessments did not identify victims of unanticipated falls. The final category, accidental falls, involve individuals who are otherwise not a risk for falls, but who actually do have falls due to environment or operational issues.

Of these three root causes, anticipated physiological falls are the most common, accounting for 78% of all falls. Accidental falls represent the second most common category, accounting for 14% of falls.<sup>7</sup> From these statistics, it is clear that the majority of cases involve situations in which the risk of falls could be foreseen and therefore prevented. This review will focus primarily on physiological falls because it is the largest category. They are also entirely preventable with careful monitoring and precautions, which allows to achieve the greatest reduction in falls at a minimum cost.

Physiologically attributable falls can be due to either intrinsic or extrinsic factors, which as listed in Table 1. Intrinsic factors involve factors that relate to the current physical fitness or level of impairment of a given patient. For example, issues such as age, acute illness, issues with vision, balance, injury from previous falls or musculo-skeletal issues are factors that can lead to falls.<sup>8</sup> Extrinsic factors are environmental factors such as clutter and poor lighting. While these are not necessarily specific to a patient, they do act as exacerbating factors that magnify the risk brought on by intrinsic factors. Thus, they play a role in the overall risk profile of patients. Therefore, reducing extrinsic risk factors also plays a significant role in reducing falls in hospitals. However, while these factors should reduce the prevalence of falls, robust studies have not been conducted to identify the level by which they are reduced. This primary limitation in studies is because they do not identify or quantify the size of an at-risk population, whereas studies on intrinsic risk factors do.

Intrinsic risk factors can be easily assessed from the medical history of a given patient and should, therefore, trigger immediate preventive actions that would, in most cases, reduce the risk of falls for these individuals. The primary shortcoming in mitigating the risk of these falls is lack of communication between different health care providers that interact with the patient, as well as a lack of standard operating procedures when these patients have been identified as having significant risks of falls. Hospital systems in which communication is improved and standard operating procedures are implemented have been observed to have a significantly decreased fall incidence. In many cases, the reduction of falls can be greater than 60%.<sup>9</sup>

### 3. Evaluation of fall prevention

An analysis of existing trials studying fall prevention has been inconclusive. Various studies have shown different levels of

reduction, while other studies have shown no significant reduction in an overall rate of falls. However, it should be noted that these studies only encompass situations in which fall prevention programs have been instituted. Therefore, they are poorly controlled for the type of programs that have been instituted. Furthermore, additional complications arise from an assessment of the success of a program. While most evaluations focused on the number of falls per N patient years, other studies focused on if programs instituted led to a lower incidence of complications due to falls.<sup>10</sup>

In general the reduction in fall ranged from 19% to 77% in the studies that reported a reduction in the number of falls.<sup>11</sup> While these results are inconclusive, a formal meta-analysis has shown that the implementation of a formal falls prevention program does, in fact, reduce falls by a statistically significant amount, though the overall magnitude remains questionable.<sup>11</sup> However, while the magnitude of the effect may be in question, with a more careful analysis of these studies, it is possible to determine which factors exist that lead to successful falls reduction programs.

After examining 12 different studies and meta-analyses, our conclusion is that one of the most critical aspects that lead to a reduction of falls is the use of a patient-risk assessment. The presence of a risk assessment procedure was found to be the most significant factor that led to a reduction in the number of falls because it allowed a hospital or nursing home care team to devote additional attention to individuals who were at risk of falling. This alone was found to reduce the rate of falls by approximately 19%.<sup>10</sup>

Trials that showed a greater reduction in the risk of falls generally combined risk assessment strategies with integrative communication within a care team and standard operating procedures for dealing with patients who were at a higher risk of falling.

### 4. Risk assessment

Risk assessments are the cornerstone of any falls prevention program because they allow for a more efficient use of resources as well as focusing the attention of an individual's care team when they are at a high risk of falling. The process of risk assessment consists of scoring each patient with various scales to identify those who are at a high risk of falling. The two most common scales are the Morse fall scale and the St. Thomas Risk Assessment Tool in Falling (STRATIFY). While there are other scales,<sup>12</sup> this review will focus only on the Morse fall scale and the STRATIFY scale because they are the most widely used in clinical and research settings.<sup>13,14</sup>

In terms of assessing risk, the most widely used metric is the Morse fall scale. The Morse Fall scale has the advantage of being a relatively simple instrument to administer. It has been shown to be effective in gauging the risk of falls in a variety of different settings.

**Table 1**  
Examples of risk factors associated with falls.

Intrinsic risk factors in order of high to low risk	Additional intrinsic risk factors	Extrinsic risk factors
Lower extremity weakness	Chronic illness	Lack of grab bars in the bath or toilet
History of falls	Orthostatic hypotension	Poor lighting
Gait/Balance deficits	Postural hypotension	Height of bed or chairs
Use of assistive devices	Urinary incontinence	Improper use of assistive devices
Vision deficit	Mental/Cognitive deficit	Inadequate assistive devices
Arthritis	Medication/Polypharmacy	Poor condition of flooring surfaces
Impaired ADLs	<ul style="list-style-type: none"> <li>• Antidepressants</li> <li>• Antipsychotics: zolpidem</li> <li>• Benzodiazapine</li> <li>• Calcium channel antagonists</li> <li>• Diuretics</li> <li>• Hypoglycemics</li> <li>• Laxatives</li> <li>• Nonsteroidal anti-inflammatory agents</li> <li>• Sedatives/hypnotics</li> </ul>	Improper footwear
Depression		

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