

LINET

THE POWER OF PREVENTION: BEST PRACTICES FOR BED-RELATED IN HOSPITAL FALLS PREVENTION



BACKGROUND

In-hospital falls (IHF) remain one of the most frequently reported, preventable, and costly adverse events within healthcare environment. Therefore, numerous studies developed around the world have focused on reducing these incidents and their associated injuries. In the United States, it is estimated that between 700,000 and 1,000,000 falls occur among hospitalized patients annually (*Kafantoglia K, 2017*). Similarly, in the United Kingdom, there are over 250,000 recorded falls each year (*CSP, 2017*), with an average of 6.63 falls per 1,000 occupied bed days (OBDs) (*Morris R, 2017*). Recent studies suggest that 23% to 40% of falls result in injuries, leading to prolonged hospital stays and increased treatment costs (*Francis-Coad J, 2020*). In fact, each in-hospital fall can cost an average of £2,600 (*CSP, 2017*). Considering this information, we have completed a thorough review of IHF-related factors, falls prevention standards, and we have analysed the relationship between falls and hospital beds in order to identify potential strategies to reduce the risk of fall and fall-related injuries.

CONCLUSION

It is evident that the aetiology of falls within the hospital setting is complex, dynamic, and multidimensional, varying between individuals and even within individuals over time. To effectively prevent in-hospital falls and its injuries, a multidimensional approach is necessary, addressing not only the specific event of the patient fall, but also other potential associated causes and consequences.

A deep literature review brings to the light that patient inactivity is one of the crucial factors contributing to the risk of falls. Its consequences impact not only patients, but also caregivers and healthcare facilities' budgets as well. Prolonged periods of inactivity can worsen patients' overall condition and lead to a range of adverse events, including reduced mobility, pressure injuries, the heightened risk of falls, malnutrition, sensory deprivation, and even incontinence. These factors underscore the significance of dynamically promoting patient activity and mobility to enhance overall patient outcomes and prevent associated complications.

Based on that information, we have conducted a comprehensive review of various bed-related factors that can play a significant role in fall prevention. This review has led us to identify different *Essenza 300* solutions that enable adherence to fall prevention guidelines and provide support to both patients and caregivers.

Some common links may be found across several studies: regardless the direction of the fall, the risk of patient injury significantly increases alongside higher fall heights. There is

no wonder why general guidelines highlight the importance of adjusting the bed to its lowest position, when patients are left unattended, in order to mitigate the risk of fall-related injuries. However, this measure can potentially lead to a false sense of safety when used simultaneously with raising the siderails of the bed since it may lead patients to climb over them increasing the height in case of a potential fall. On the other hand, it is recommended in the literature that caregivers adjust the bed height to a comfortable level for themselves while caring for patients to minimize the risk of low-back injuries (*Bowers B, 2008*). In conclusion, the use of adjustable-height beds, including the option for lower positions, along with appropriate setting of siderails based on patient needs, can support the prevention of injuries for both patients and caregivers.

Even if the bed is equipped with all possible tools to enhance patient safety, caregivers still play an essential role in the implementation of falls prevention measures. However, it is important to note that caregivers often face challenges due to lack of time and shortness of staff. According to a report by EU-OSHA in 2019, 41% of caregivers experienced this situation, which was an increase of 12% compared to 2014 (*EU-OSHA, 2020*). Despite these challenges, caregivers are still expected to adhere to all standards and rules, including those related to fall prevention.

In hospital falls

Falls can be categorized into three broad groups (*Kafantogia K, 2017*):

1. Anticipated physiological falls:

- These falls are associated with factors such as age, illness, medications, medical procedures or exams.
- They could be predicted by conducting a risk assessment.
- Anticipated physiological falls are the most common type, comprising approximately 78% of all falls.

2. Unanticipated physiological falls:

- These falls are related to physiological factors.
- They are difficult to predict since they do not align with standard risk assessments.

3. Accidental falls:

- Accidental falls occur among individuals who were not initially considered at risk of falling, but experience a fall incident as a consequence of surgery or the healthcare facility's environment.
- Accidental falls represent the second most common category, accounting for around 14% of in-hospital falls.

Approximately 50% of individuals aged 65 and above rely on walking aids and supportive devices due to decreased mobility (*Tillmann BW, 2021*). If we analyse the potential risk of falls among hospitalized patients, we find that nearly 70% of them are aged 60 or above (*Fisher SR, 2010*) which means that the demand for fall prevention measures will further escalate as the population continues to age.

**Nearly 78 % of falls can be predicted
by conducting an adequate risk assessment.**

(Kafantogia K, 2017)

Bed-Related Falls in the Hospital Setting

Focus on bed-related falls is connected with long stay of patients in bed, which is in average around 92% of their time. From this point of view, we can find out that falls can occur in 85% of cases when the patient is not supervised (*Jurásková, 2003; Staggs VS, 2014*) Additionally, 26.7% of falls happen when patients attempt to leave the bed (*Jurásková, 2003*). Moreover, in almost 62% of cases where falls occur, there may be a missing record regarding the bed height. (*RCP, 2021*) Even when it is known that the bed was a contributor factor for the patient fall, it is still challenging to prevent falls due to different patients requiring customized approaches to bed settings, depending on their condition, the time of day, the type of activity, amongst other variants. Thanks to new bed designs and the implementation of new technologies, patients and healthcare providers can now approach falls from a different perspective and reduce the risk of fall-related injuries.

Fundamentals of Falls Prevention

Reducing falls in healthcare settings remains a common and tough challenge (*Kafantogía K, 2017*). The prevention of falls is a multifactorial discipline, as falls may be influenced by both intrinsic and extrinsic factors. Whilst intrinsic factors encompass the overall physical condition and the level of incapacity of the patient, extrinsic factors involve environmental aspects such as inadequate lighting, poor floor conditions or improper walking aids and assistive devices. The complex interplay between all of these factors makes it challenging to pinpoint the primary cause of a fall and, therefore, to prevent it.

Accordingly, a multifactorial falls risk assessment should be executed by an appropriately skilled and experienced clinician to all individuals aged 65 years and over who are unable to perform or perform poorly on the Timed Up & Go test and/or the Turn 180° test (*Kafantogía K, 2017*). Falls risk assessment is a process that evaluates patients who are at risk of falls and it should be the starting tool for its prevention. It includes the use of risk screening tools to identify patients at an increased risk of falls, as well as risk assessment tools that identify a patient's risk factors for falls.

Research and statistics have established that IHFs are preventable and are often caused by external factors. Although the thorough literature review conducted on reducing fall incidents and their severity, there has not been enough evidence to support the claim that the bed itself can reduce the incidence of falls. On the other hand, several studies suggest a reduction in the severity of fall-related injuries under certain conditions. As a result, healthcare systems are prioritizing fall prevention strategies and implementing technologies aimed at reducing injuries resulting from IHFs.

26.7% of falls happen when patients attempt to leave the bed.

(Jurásková, 2003)

How in hospital falls affect patients and health care environment

To support the information related to IHFs, we conducted a comprehensive review and analysis of relevant studies, guidelines, articles, and statistics. The main purpose was to understand and to describe the potential consequences of IHFs for patients, caregivers and the healthcare environment itself.

IHF's POTENTIAL CONSEQUENCES

FOR PATIENT

FOR CAREGIVER

FOR HOSPITAL CARE FACILITY

One of the main consequences of IHFs can be a prolonged hospital stay by an average of 11.5 days in case of injury. (Dunne TJ, 2014)

Falls have the potential to diminish self-esteem and confidence, resulting in a decrease in active participation in physical activities.

The adjustment of activities with the aim of reducing exposure to risk may prove beneficial, as long as an individualized and delicate balance is struck between risk reduction and maintenance of quality of life and independence. (Kafantogia K, 2017)

Caregivers need to mobilize patient and provide physical and emotional support.

Caregivers support needed increases alongside the reduction of patient autonomy due to IHFs.

Patient can get injured.

23%-40% of falls can lead to injury, 4-8% of these injuries are classified as moderate or severe including hip fracture (Francis-Coad J, 2020)

One the most severe injury is femoral (hip) fracture. Most inpatient femoral fractures (IFF) occur on medical wards, almost twice as many as on older people's wards and in 83% of cases patient was alone when they fell. (RCP, 2021).

Prolonged care for patient, who got injured because of an IHF.

Increased cost caused by an IHF.

In UK NHS estimated the cost of patient fall is £2.600 in average. (CSP, 2017)

Longer healing process.

Caregivers need to spend unplanned time with patients.

After a fall, patients are categorized into a higher category of risk.

Furthermore, it is expected that caregivers will need to provide more support to these patients during daily tasks.

Each injury caused by an IHF negatively affects the Healthcare facility' quality indicator.

Factors that Contribute Positively to Falls Prevention

Low Height and Optimal Height to Standing Up Procedure

Understanding when to set the bed at a low height for each patient is a crucial factor in falls prevention. Several guidelines recommend leaving the bed in its lowest position when the patient is alone (FDA, 2017), however they do not specify the exact measurement for the lowest height position of the bed. Hospital beds characteristics, dimensions and functionalities may vary significantly, with some capable of reaching heights below 40 cm and others even lower than 30 cm. Determining the optimal height for a patient at any given moment depends on factors such as the patient's condition, mobility, and the specific activity they wish to engage in.

Setting up the bed at its lowest height can be suitable for patients who are unable to stand on their own but still attempt to leave the bed. In such cases, it can be challenging to prevent falls successfully, however the severity of injuries can be reduced by using an ultra-low bed height. Increasing the height of the bed raises exponentially the risk of injury, as noted in Bowers' study in 2008. (Bowers B, 2008)

To prevent the injuries from bed-associated falls, the results of the mentioned study recommend:

- positioning the bed to the lowest-possible height
- placing a floor mat of adequate length and width beside the bed
- avoiding increasing height of fall due to siderail use

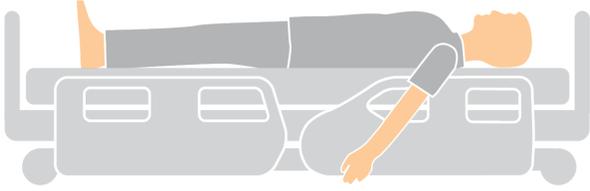
However, for specific patients, a lowest height can be dangerous, especially for those who are capable of getting out of bed independently. Furthermore, this finding is supported by the studies conducted by Morse and Christman. (Morse, 2015; Christman M, 2015).

Morse's study (2015) examined the relationship between the safety of hospital beds, patient falls, and mobility. The study measured patients' movements during bed ingress and egress. The results demonstrated that bed height, somatotype (body shape), and physical function significantly influence safe patient mobility, as evidenced by changes in lower extremity moments. Lower bed heights increased hip and knee moments, requiring more physical strength and stability to stand up from a seated position. Patients also provided feedback on the stability of ingress and egress from the bed, with most preferring a mid-height bed (Morse, 2014). The ideal mid-height position may vary depending on the patient's height and mobility.

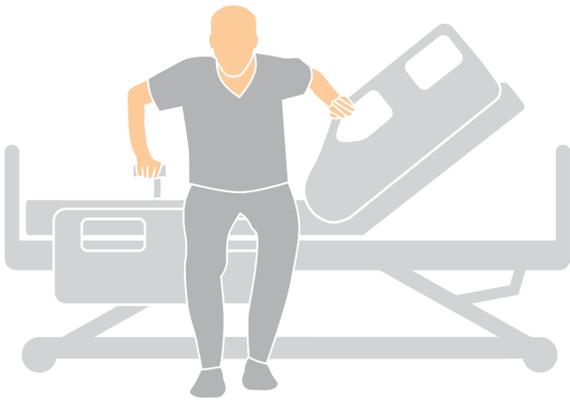
Christman's study (2015) provides additional support to the qualitative literature findings by suggesting that low bed heights may not effectively reduce fall risks during bed exit and could potentially worsen them. The study also presents evidence indicating that fall risks in high-risk populations could be diminished by adjusting the bed platform height to align with the balance strategies employed to compensate for strength and mobility deficits (Christman M, 2015).

In summary, the height of the bed is one of the key factors reducing the risk of fall-related injuries. However, achieving the lowest possible bed height does not necessarily serve as a preventive measure for all patients. Ensuring patient safety requires individualized assessments and decision-making regarding the appropriate bed height.

ESSENZA 300 INCORPORATES THE FOLLOWING SOLUTIONS RELATED TO HEIGHT ADJUSTMENT:



LINET bed Essenza 300 can achieve a low height range from 255 – 318 cm (depending on the configuration of the bed).



For ingress and egress Essenza 300 offers adjustable height and Mobi-Controls solutions that intend to support the patient when exiting the bed.



The green light indicator assists caregivers in quickly identifying the bed's position when it is set at its lowest height.

Bed Siderails: Protection or Patient Restriction?

Adjustable siderails were developed as early as the first half of the 19th century (Ghersi I, 2016). While the design and features of siderails have evolved over time, their primary purpose has always been to protect patients and reduce the risk of falls from the bed. However, due to instances of entrapment, injuries and patient fatalities, there are now regulations in place to ensure correct dimensions and minimize harm to patients caused by their design. It is important to note that these regulations do not specifically address how to use siderails according to individual patient needs. Instead, the usage of siderails is guided by fall prevention guidelines established by hospitals, local authorities, or country regulations.

According to these guidelines, siderails are still mainly applied as protective elements, particularly for patients with reduced sensory perception or during rest stages. However, the recognition that siderails should not be a restrictive barrier for patients it starts to be also widely discussed. To address this, specific siderails are being designed with an escape route, allowing the patient to exit the bed through that same space. Without such route, patients would attempt to climb over the siderails (HSE), leading to potential severe injuries resulting from falls from a greater height (FDA, 2017). A biomechanical evaluation of falls from various bed heights was performed to investigate this hypothesis and has revealed that raised siderails can increase the risk of injuries related to falls by 40% (Bowers B, 2008).

In summary, siderails continue to serve as a protective barrier against falls, but their usage needs to be carefully considered based on the individual patient's condition. If siderails are used improperly, they can become a source of injury for the patient, as they may be perceived as a restriction or barrier rather than a form of protection.

ESSENZA 300 INCORPORATES THE FOLLOWING SOLUTIONS RELATED TO SIDERAILS:



Full split siderails provide the option to cover the entire length of the bed or half of it in order to support patients exiting the bed safely. These siderails include patient controllers that allow adjusting the bed height, as well as manipulating the backrest and thighrest for enhanced patient comfort and convenience.



Telescopic siderails offer the flexibility to cover the bed in either its full length or half length. Their see-through design helps patients feel less restricted. Additionally, telescopic siderails allows configuring the bed to achieve a low height of 255 mm.



Single collapsible siderails cover three-quarters of the bed, ensuring a safe route for the patient to exit the bed in any situation. The simple design enables caregivers to easily lift or drop down the entire siderail with a single movement. By using single collapsible siderails, the bed can be configured to achieve a low height of 255 mm also.

Promoting Patient Mobilization to Build Muscle Strength and Balance

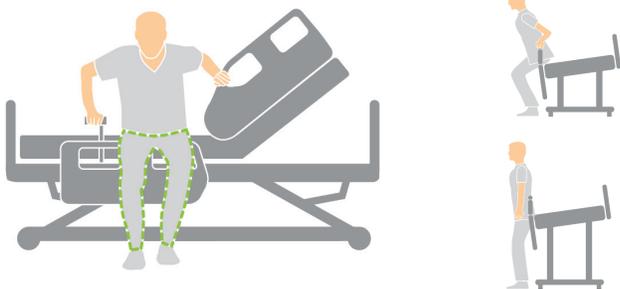
Reduced patient mobility is a significant factor that increases the risk of falls and fall-related injuries. Patients with limited mobility often restrict their activities due to fear of falling, which further diminishes their muscle strength and balance. Many patients choose to limit their activities as they prefer not to ask for assistance and attempt tasks independently, and the facts support this reality. Several studies have researched the co-relation between mobility and falls, indicating that a significant number of falls occur when patients are leaving the bed (*Jurásková, 2003*). In a more recent study, which has analysed patient falls in critical care units, it was found that 35% of incidents occurred when patients attempted tasks without assistance, and 33% of falls happened during patient standing and sitting procedures. (*Thomas AN, 2021*)

Promoting patient mobilization not only reduces the risk of falls but also leads to a shorter length of stay in acute care departments by approximately 1.5 days (*UK, 2018; Lisi C, 2017*). Prolonged bed rest can impact more than just mobility, it can lead to a reduction of circulatory volume, muscle strength, functional residual capacity, skin integrity, dignity, self-confidence, independence, choice and quality of life. These physiological effects caused by bed rest are called deconditioning syndrome. (*Arora A, 2021*).

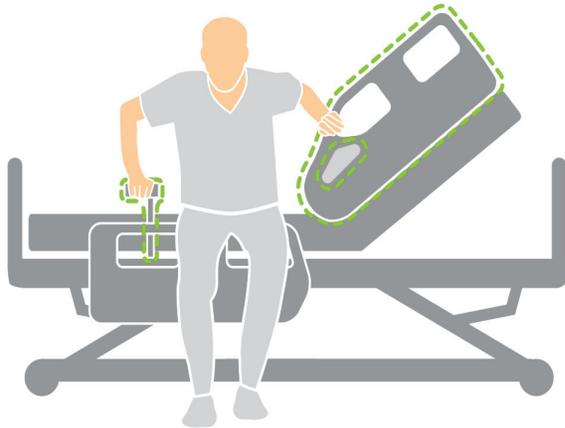
When assisting patients in getting out of bed, it is crucial to have an appropriate bed height and provide support to facilitate the standing up movement and maintain an appropriate balance. Morse's study (2014) found that patients with mobility issues utilized various parts of the bed, such as the surface or siderails, to increase stability during the procedure (*Morse, 2014*). The optimal bed height for ingress and egress is discussed in the chapter of this white paper called: LOW HEIGHT AND OPTIMAL HEIGHT TO STANDING UP PROCEDURE.

In summary, promoting patient mobility according to individual patient capacity is a crucial factor of falls prevention and healthcare promotion. Patients often limit their activities due to the fear of falling, which can further increase the risk of injuries. Implementing mobilization programs for patients has shown to reduce in-hospital falls by up to 37% (UK, 2018). The process of getting out of bed can be physically demanding, which is why it is important for patients to have the option of setting the bed to a mid-height position and utilizing tools to support the standing procedure and maintain balance.

ESSENZA 300 INCORPORATES THE FOLLOWING SOLUTIONS RELATED TO PATIENT MOBILIZATION:



The Essenza 300 bed is equipped with solutions such as the Mobi-Lift® and Mobi-Pad. Mobi-Pad enables patients to control the height of the bed themselves during the standing procedure. This decreases the physical efforts during the standing up procedure. Additionally, the bed can be equipped with a lateral tilt function, which has shown a reduction up to 63% of the muscular force required for standing when used in combination with Mobi-Lift®. (*Lebeda, 2021*).



The Mobi-Grips are ergonomically shaped handles integrated into the plastic siderails. These grips provide an easy and secure hold for patients and can be used to support various mobilization procedures, including standing, sitting, moving around the bed, transferring from the bed to a chair, or mobilization within the bed. Patients can actively assist caregivers during these mobilization activities.

The Mobi-Controls, including the Mobi-Lift, Mobi-Pad, and Mobi-Grips, not only facilitate the mobilization procedures but also can provide patients with a sense of autonomy and independence when entering and exiting the bed.

Enhancing Patient Safety During Nighttime

As revealed by the studies, a significant number of falls occur in unwitnessed situations (Jurásková, 2003; Staggs VS, 2014). Van Rensburg's study (2020) has concluded that 61% of falls occurred during the night (van Rensburg RJ, 2020), which can be attributed to factors such as dimmed or turned-off lights for sleeping and a reduced number of personnel on the ward. These conditions create an environment where falls are more likely to happen without immediate observation or intervention.

ESSENZA 300 INCORPORATES THE FOLLOWING SOLUTIONS RELATED TO LIGHT CONDITION:



An integrated night light located underneath the bed frame. The night light can be turned on when needed to provide illumination in the area next to the bed, especially when the patient attempts to leave the bed or requires better visual perception. The light is directional, shining downward to avoid disturbing other patients.



Additionally, the patient controller is equipped with a light that can be used as a torch to further enhance lighting conditions.

Real-Time Patient Monitoring: Supporting Proactive Care and Timely Interventions

Anticipated physiological falls are the most common type of falls, accounting for approximately 78% of all falls (Kafantogja K, 2017). These falls can be predicted through patient risk fall assessments to identify those at risk. Patients who are prone to anticipated physiological falls require close supervision and support during their daily activities. However, many departments struggle to maintain an adequate number of caregivers due to high nurse-to-patient ratios and a shortage of nurses, exacerbated by the aging patient population. This is a global issue affecting healthcare facilities, where nurse-patient ratios are often high, and the average age of nurses is increasing. As a result, the reduction of falls is dependent on the amount of attention and care that caregivers can provide to their patients. It is evident that falls can still occur despite the implementation of well-established fall prevention standards.

ESSENZA 300 INCORPORATES THE FOLLOWING MONITORING SOLUTIONS:

SafeSense 3 provides the following notifications to caregivers:

- **Bed exit alarm:** It alerts the caregiver when a patient leaves the bed. For independent patients, a timer can be set up to notify caregivers only if the time out of the bed exceeds a certain limit.
- **Movement notifications:** It notifies caregivers if patients at risk of developing pressure injuries are not moving enough. This helps in identifying the need for patient repositioning.
- **Wetness indicator:** SafeSense 3 can be equipped with a wetness pad, which informs caregivers about increased moisture, urine, or feces under the patient.



These features of SafeSense 3 aim to assist caregivers in monitoring patient movements, detecting potential pressure injuries, and responding to the needs of patients in a timely manner, especially in situations where constant monitoring by nurses may not always be possible due to their workload and the number of patients they need to care for.

Leveraging Bed Brakes as Fall Prevention Measures

Fall prevention guidelines state that caregivers should lock the wheels of the bed and set it to the lowest position (FDA, 2017). However, due to the demands of continuous multitasking, caregivers may occasionally forget to perform these tasks even if the bed is equipped with brake mechanisms.

ESSENZA 300 INCORPORATES THE FOLLOWING SOLUTIONS RELATED TO FALL PREVENTION MEASURES:



Essenza 300 is equipped with a brake alarm that generates an audible sound to alert the caregiver to engage the bed brakes. This solution helps to ensure that the bed remains securely locked in place. It is important to note that the brake alarm is activated only when the bed is connected to an electrical power source. This helps to prevent unnecessary alarms when the bed is not in use or when it is being moved without the need for braking. The brake alarm serves as an additional safety measure to remind caregivers to engage the brakes and maintain a secure environment for the patient.

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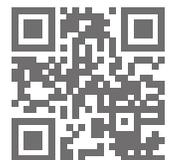


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