FloorBed™

Resident Falls Analysis:

Interim Report

February | 2019

LUTHERAN HOME
INSPIRING THE BEST SINCE 1892.

800 West Oakton Street
Arlington Heights, Illinois 60004

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Executive Summary

Lutheran Home is a non-profit Senior Living Community in Arlington Heights, Illinois, which includes short-term rehabilitation, assisted living, memory care and residential healthcare options. In order to reduce the risk of injury associated with falls in the residents' bedrooms, particularly from the bed, the Senior Management team elected to evaluate a floor level bed, the ***FloorBed***™ (Accora Inc.).

Pre-evaluation data

The residents of Lutheran Home are representative of an elder population in that they present a significant risk of falls. Nine of the twelve high-risk residents selected for evaluation had fallen on at least one occasion and five were repeatedly falling. Of the 23 separate fall episodes, 78% occurred in their bedroom (n=15) or bathroom (n=3). Where residents fell from the bed (n=7), two were associated with the use of low-air-loss mattresses.

Of the 23 reported falls, most were associated with no injury or required nothing more than first aid for cuts and bruises. There were two exceptions: one resident (C) was transferred to the local community hospital for a CT-Scan of the head despite having no obvious injury, the scan was negative. A second resident fell from a bed and initially complained of pain. Although injury was not evident at the time, a subsequent X-Ray revealed a pelvic fracture.

Equipment and Implementation

During Fall 2018, ten ***FloorBeds*** were provided to Lutheran Home and staff were familiarized with the functionality and safe use of the bed, including the handset lockout and 'safety stop' functionality; these specific controls were identified by the Lutheran team as an essential safety feature. When the bed lowers to 7" from the floor it stops automatically. Two buttons have to be pressed simultaneously in order lower the bed into the floor level position, this prompts the caregiver to assess for the risk of entrapment injury during the final lowering. Caregivers were advised to keep the bed in its floor level position when in use, to lock the handset to prevent unintentional height adjustment and, if floor mats (crash mats) were already in use, to retain them.

Results

The average evaluation period was 12 weeks, during which time fewer residents fell (n=5) and on fewer occasions, (n=13) representing a reduction of 44% and 43% respectively. The number of falls within the bedroom space was also lower, with just three residents falling in their bedrooms (80% reduction). Five residents incurred low (n=4) or moderate (n=1) injury; some required first aid but none required additional diagnostic or treatment interventions. No injury was incurred in the bedrooms

The FloorBed was associated with a 100% reduction in the number of falls from the bed, compared to the standard bed, with no residents falling from the bed during the evaluation period.

Discussion

In terms of managing falls risk there will always be a compromise between safety and restraint and this is particularly true when residents are resting in bed. Rather than using side rails, an alternative approach, as adopted by Lutheran Home, is to remove side rails and place the bed at its lowest height. Bed exits are not necessarily prevented, but simply become harmless rolls from the bed onto a judiciously placed mat. Risk will continue to exist once the resident stands from the bed, but injuries associated with headfirst falls from height may be reduced.

Discussion (continued)

In the pre-evaluation period, two residents fell from a bed fitted with a low-air-loss mattress. It might be worth considering an active support surface (alternating air) with inflated or firm side bolsters or a specialist foam mattress if the individual can't or doesn't make significant postural changes when in bed.

Summary

So far as current data interpretation allows, it would appear that the addition of the ***FloorBed*** to the Lutheran Home has been associated with positive outcomes as demonstrated by fewer falls in the bedroom environment, no injuries and no falls from the bed. Residual falls were mostly associated with sitting or seat-seat transfer.

While falls cannot be completely eliminated, Lutheran Home is providing an excellent standard of protective care for a high-risk population, while enabling residents to live life to the full.

Opportunity

Lutheran Home is a non-profit Senior Living Community in Arlington Heights, Illinois, which includes short-term rehabilitation, assisted living, memory care and residential healthcare options.

As with any residential aged care (RAC) facility, the demographic characteristics of the resident population present a significant risk of falls.[1] Senior management recognize that, despite having a high staff-resident ratio, an advanced level of staff training and systems in place to target falls management, some residents fall and some will incur significant injury. While the risk cannot be fully mitigated, it can be managed through facility-wide systems of care, such as those recommended by the Centers for Disease Control and Prevention (CDC) STEADI initiative.[2] The STEADI protocol advocates three key preventative elements (i) assess fall risk, (ii) assess for modifiable risk factors and (iii) target the use of specialist interventions. When combined, these elements can have a substantial impact on reducing falls, improving health outcomes, and reducing healthcare expenditure.

As part of an on-going quality improvement initiative, and in collaboration with Accora Inc., Lutheran Home identified an opportunity to reduce the number and severity of falls occurring within the residents' bedroom space. A senior management team, lead by Lori Nolden, Director of Healthcare Services, elected to evaluate the clinical and practical utility of the FloorBed™, for the care of residents identified as repeat or high-risk fallers.

The ***Floorbed,*** a floor level bed manufactured to IEC 60601-52 standards, has particular safety features considered essential to the Lutheran team. Firstly, caregivers can lock the handset so that residents can access comfort functionality without being able to raise the height of the bed. The overall expectation is that physical injury could be reduced if a resident exited the bed unintentionally by converting a fall from height to a simple sideways roll onto a catchment mat. In addition, the FloorBed has 'safety stop functionality'. When the bed is lowered to 7" from the floor it pauses automatically. Two buttons then have to be pressed simultaneously in order lower the bed further into the floor level position. This allows the caregiver to assess for the risk of entrapment and injury during the final lowering function.

Figure 1: ***FloorBed1***

Methodology

In order to provide a reference point for the bed evaluation, and determine a reasonable time frame for data collection, safety data were harvested from local electronic medical records (EMR) for a three-month period prior to the planned installation of the ***FloorBed***. Data included the number of falls, location (within the home) and the severity of injury. From this dataset, twelve high-risk residents were identified for the first phase of the evaluation. Further falls risk assessment, using the Morse[3] tool, was carried out to confirm each individual's high-risk status.

From this information, a period of three months was considered a reasonable duration for an initial pilot evaluation. Subsequent fall and injury reports were collated using the existing EMR system; no additional data were collected.

Equipment and Implementation

During Fall 2018, ten ***FloorBeds*** were provided to Lutheran Home and staff were familiarized with the functionality and safe use of the bed, including the handset lockout and 'safety stop' functionality; these specific controls had been identified by the Lutheran team as an essential safety feature.

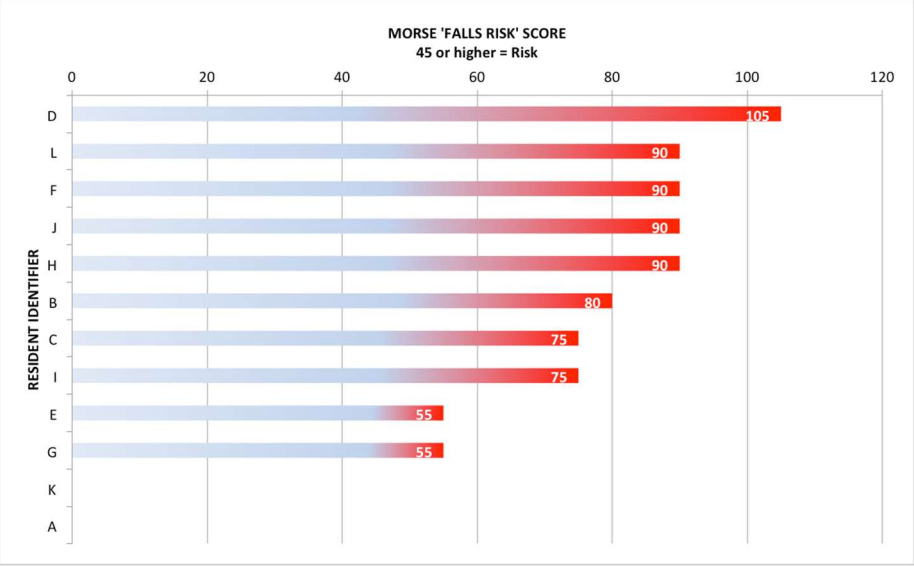
Caregivers were advised to keep the bed in its floor level position when in use, to lock the handset to prevent unintentional height adjustment and, if floor mats (crash mats) were already in use, to retain them.

Baseline: Population risk profile

Risk assessment

A Morse score was available for 10 of the 12 residents and the results confirmed them to be at very high risk: the mean score was 80.5 (range 55 -105) with 45 and above indicating high risk (Figure 2).

Figure 2: Population Risk Profile



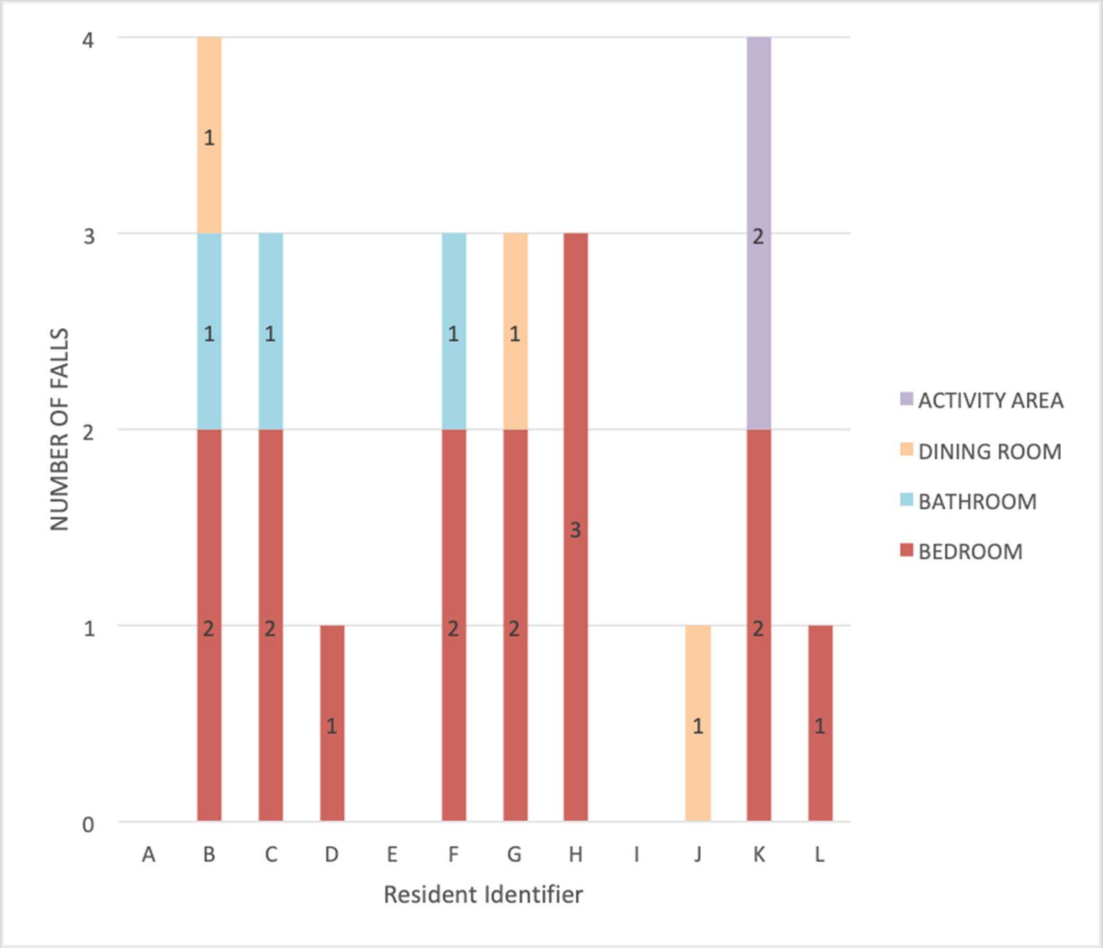
Note: A further resident had a Morse assessment completed but, as no indication of bed allocation or other data were available at the time of this report, the assessment score has not been included.

Baseline: Number and location of falls

Risk was further established by analyzing fall data for the selected residents as reported between the 12th June and 1st October 2018.

Of the 12 residents assessed, 9 (75%) had experienced one or more falls (n=23; range 1-4) (Figure 3).

Figure 3: Number and location of pre-implementation falls



Location of falls

Of the 23 falls recorded, the majority (65%; n=15) occurred in the residents' bedroom with a further 3 falls (13%) occurring in or around the bathroom.

The remaining five falls occurred in the dining room or activity area.

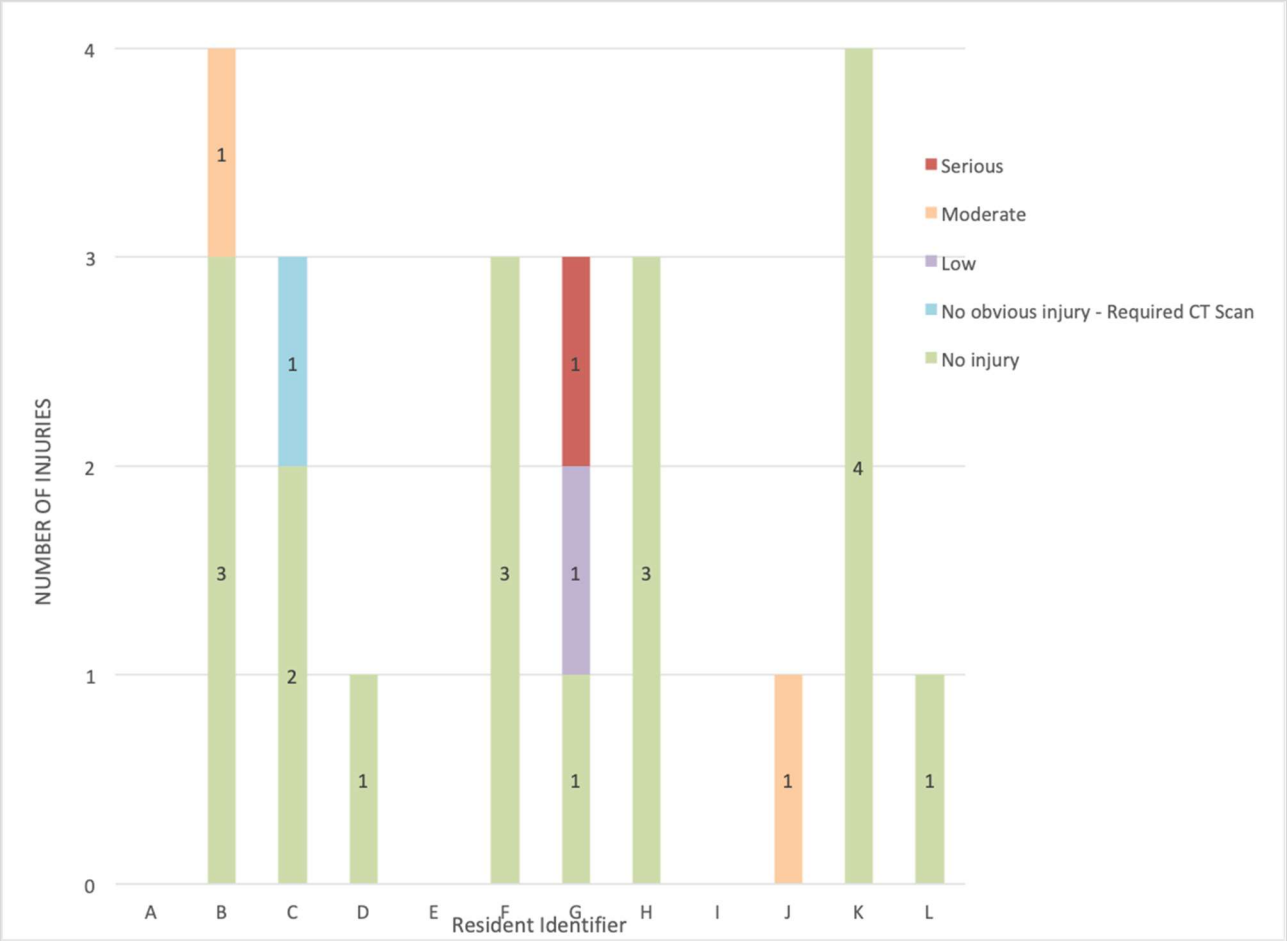
Baseline: Severity of injury

Initial records indicate that four residents fell in the pre-evaluation period incurring low to moderate injury, some requiring first aid.

However, one of the four residents who fell from the bed (resident G) complained of pain and, although injury was not established at the time, a subsequent X-Ray revealed significant pelvic injury.

A fifth resident fell from a commode. Although there was no obvious injury at the time, the resident (C) was transferred to the Community Hospital for a CT-Scan of the head; the results were negative (**Error! Reference source not found.**).

Figure 4: Severity of injury

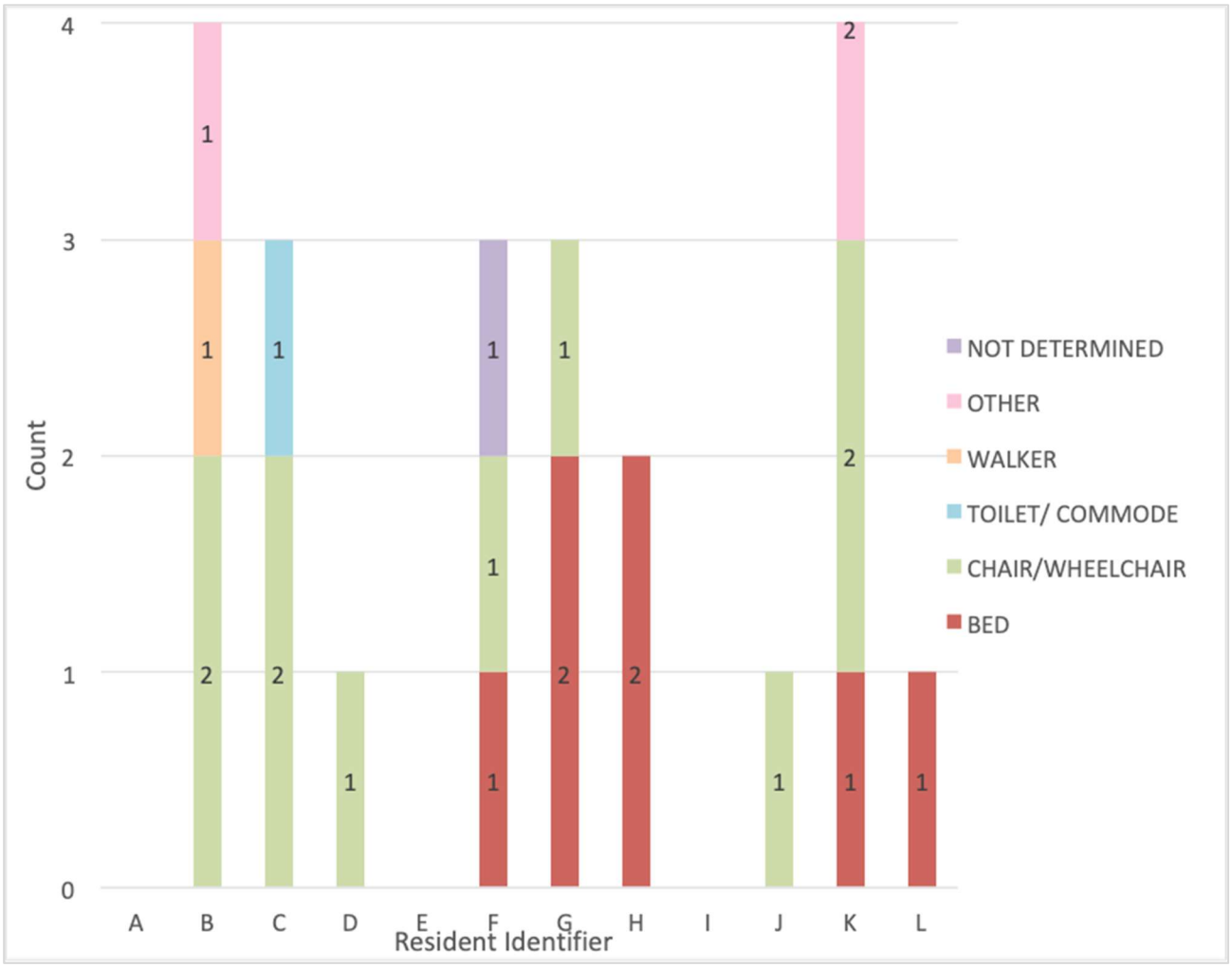


Baseline: Equipment associated with falls

Seven of the twenty-three falls were from the bed and a further fall was not determined but the resident was found sitting on the floor near the bed (**Error! Reference source not found.**).

Two bed falls were associated with the use of low-air-loss mattresses and these, typically, have collapsible edges that offer little or no support during transfers.

Figure 5: Equipment in use at the time of fall



Baseline: Equipment associated with severity of injury

Further analysis considered the type of equipment associated with a fall and the subsequent severity of injury; this can provide insight into the possible environmental hazards.

The most serious injury resulted in a fall from the bed (Table 1).

Table 1: Equipment and injury level

Severity of injury	Bed	Chair/couch	Commode	Other
No	**6**	**8**	**1***	**4**
Low		**1**		
Mod		**1**		**1 (Using walker)**
Serious	**1 (Fractured pelvis)**			

** The resident had no obvious injury but was transferred to the local hospital for a CT-Scan (head) = negative*

Results

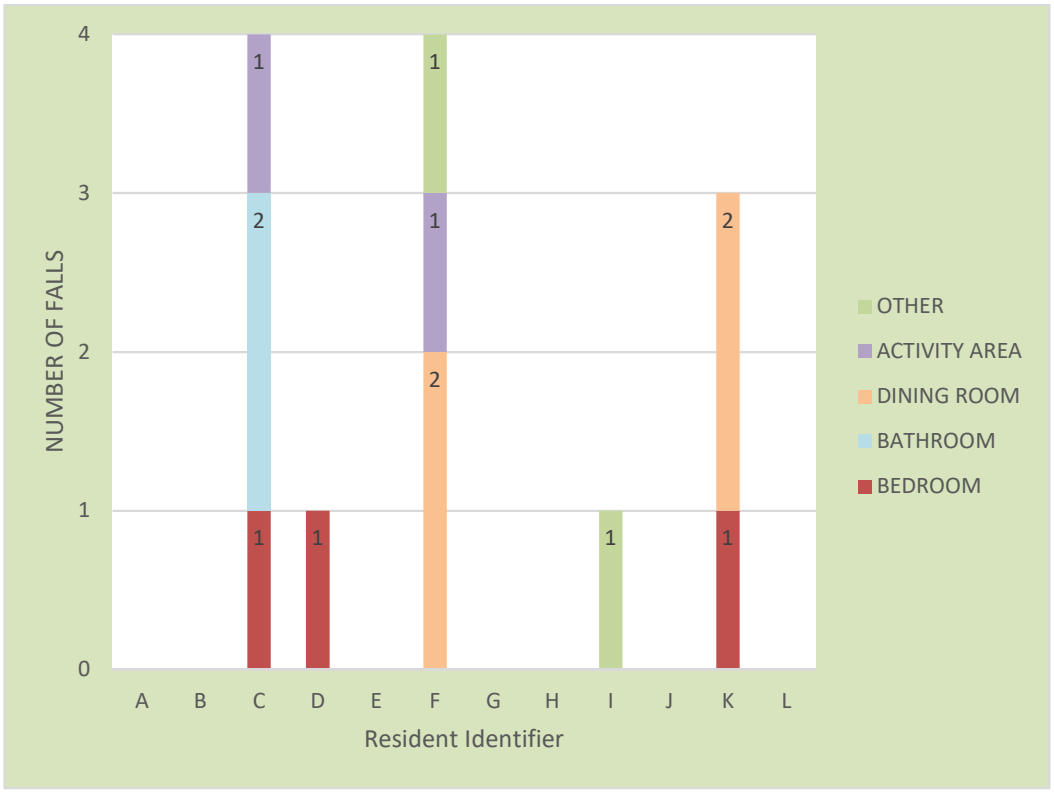
Between 17th October 2018 and the 22nd January 2019 (data download) twelve residents had been allocated a ***FloorBed***. The average evaluation period was 12 weeks (range 4-17 weeks; mode 13 weeks).

Post *FloorBed*: Number and location of falls

Five (42%) residents fell during the evaluation period resulting in 13 separate falls. One resident (K) denied having fallen, but is still included as a fall (**Error! Reference source not found.**).

Of these 13 falls, less than one quarter (23%) occurred in the residents' bedrooms (n=3).

Figure 6: Evaluation period - falls location



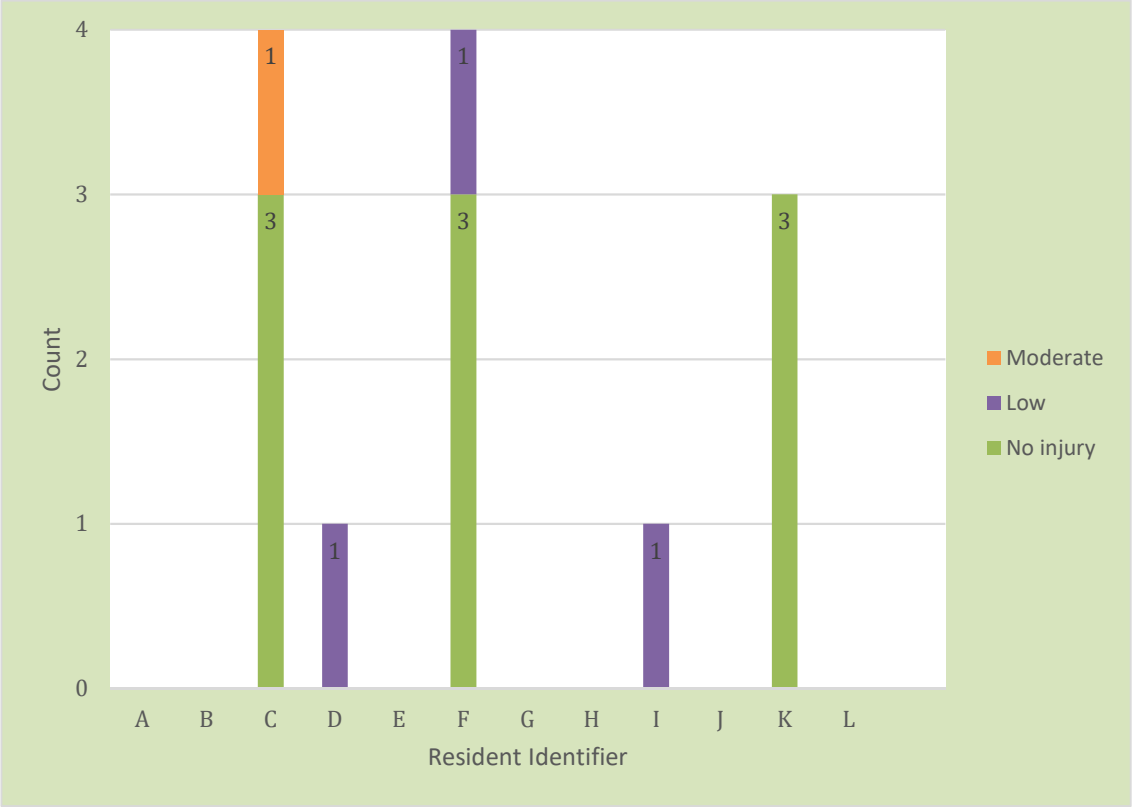
Post *FloorBed*: Severity of injury

A total of 13 falls were recorded during the evaluation period (**Error! Reference source not found.**); all falls were from a chair, wheelchair or toilet. There were no falls from a bed (Figure 8).

The majority of falls (n=9) resulted in no injury.

Three residents received a low level injury e.g. minor cuts, bruising, swelling A single resident (C) fell from a chair in the dining room and required first aid for an injury categorized as 'moderate'. No resident suffered injury requiring medical or diagnostic interventions.

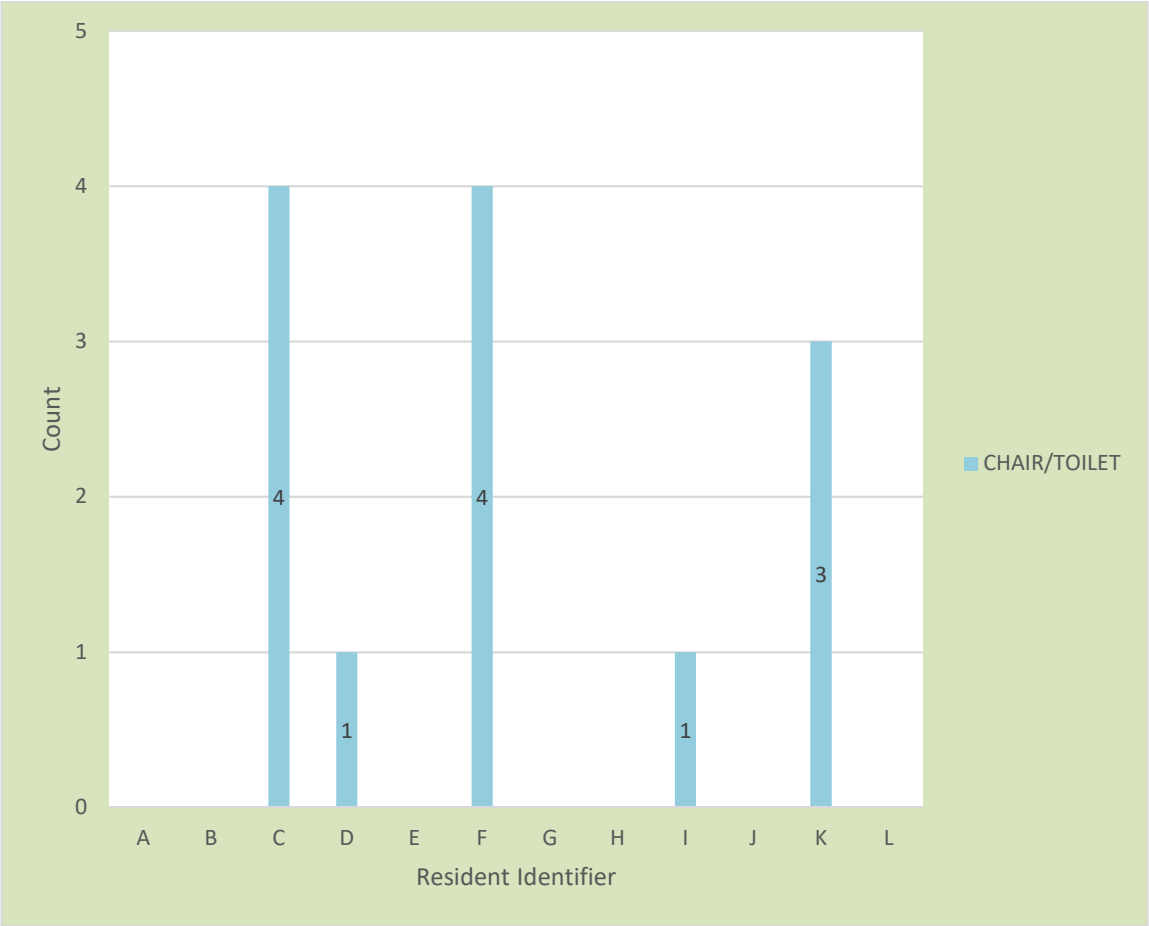
Figure 7: Evaluation Period - Severity of Injury



Post *FloorBed*: Equipment in use at the time of fall

Of the 13 reported falls, all were associated with falls from sitting position or when transferring from one sitting position to another e.g. wheelchair to toilet (Figure 8).

Figure 8: Evaluation Period- Equipment in Use



Post *FloorBed*: Equipment associated with severity of injury

Of the 13 sit-related falls reported most (n=9) resulted in no or minimal (n=3) injury (Table 2).

Table 2: Sit-related injury

Severity of injury	Bed	Chair/wheelchair	Toilet
No		**8**	**1**
Low		**3**	
Mod		**1**	
Serious			

PRE-POST Intervention Comparison

The following trend analysis indicates a reduction in the number of residents falling in their bedrooms and, in particular, falling from the bed. However, these positive trends should be treated with caution given the relatively low number of ***FloorBed*** interventions

It would appear that once bed fall risk is mitigated as far as possible, addressing the risks associated with a sitting position becomes the priority.

	Baseline	Post *FloorBed*	Trend
Residents who fell	**9 (of 12)**	**5 (of 12)**	**↓ 44%**
Number of falls	**23**	**13**	**↓ 43%**
Notable Injury and/or required diagnostic/medical intervention	**2**	**0**	**↓100%**
Falls in bedroom space (exc. Bath)	**15**	**3**	**↓ 80%**
Falls in bathroom	**3**	**2**	**↓ 33%**
Falls from the bed	**7**	**0**	**↓ 100%**

Discussion

Falls are the most common form of harm that result in injury[4] with up to 50% of falls in the elderly resulting in minor injuries, including bruises, abrasions, and lacerations.[5] However, an estimated 10% of all falls in seniors cause serious injury, with head injury occurring in one third of cases.[6] National data identified falls across the USA as the leading cause of traumatic brain injury-related deaths in persons aged 65 or older,[7] while up to 1% of all falls in this population result in hip fractures, which poses a significant risk for post-fall morbidity and mortality.[8] [9]

The residents of Lutheran Home are therefore representative of the wider elder population. Of the 12 high-risk residents included in the evaluation, nine individuals had fallen on at least one occasion and five were repeatedly falling. Fortunately, most falls reported were associated with no injury and, where injury did occur, it tended to require nothing more than first aid for cuts and bruises. There were two exceptions in the pre-evaluation period: one bed fall resulted in significant pelvic fracture. A second resident was transferred to a local Community Hospital for head CT-Scan despite having no apparent injury; the results were negative.

Falls that result in injuries that require more then simple first aid, particularly computed tomography (CT) imaging, are associated with increased healthcare cost[10] as well absorbing staff resources. Besides the additional cost of diagnostic and inpatient care, a fall of any sort is distressing for the resident, their family and the staff who may have witnessed the event but been unable to prevent it. In terms of managing falls risk, there will always be a compromise between safety and restraint and this is particularly true when residents are resting in bed. Until recently, side rails may have been advocated in the hope of preventing accidental bed exit and, where this due to restlessness during sleep, there is no doubt they do offer some protection. However, the more serious falls are likely to be due to intentional bed exit, perhaps to use the bathroom or to just get up out of bed. Sometimes this intention is associated with confusion and agitation and, as such, causes the individual to place themselves at increased risk of harm from climbing over side rails and so falling from a greater height, or by risking entrapment in the mechanism. One such mitigation is to remove side rails[11] and place the bed at its lowest height. Bed exits are not necessarily prevented, but simply become rolls from the bed onto a judiciously placed catchment mat. However, this then presents another hazard if the individual tries to stand from the floor height and then topples; this is a recognized risk but is considered less likely to result in injury than a 'head first' fall from a greater height.

Another consideration linked to the bed is the type of mattress. While residents with significantly limited movement may require the use of a pressure redistribution support surface to reduce the risk of pressure injury, it is important to recognize that many of these surfaces increase the risk of falls. Powered surfaces add trip hazards in the bed zone and increase the height of the bed, while low air loss surfaces (associated with two resident falls) compress quickly when weighted and so make for a very unstable edge. A soft edge can increase the risk of falling[12] as a person rises to a sitting position in preparation for transfer to a chair, it can also make it very difficult to stand from an edge-sitting position, which is further hindered by typically having a cover with a low friction coefficient. It might be worth considering an active support surface (alternating air) with inflated or firm side bolsters as an alternative or reassessing whether or not a support surface is needed – if the individual can and does make significant postural changes the addition of a specialist support surface may not be needed.

Within the limits of this pilot evaluation, the data appear to validate the clinical utility of the ***FloorBed***. In particular, the additional safety features designed to reduce the risk of accidental height adjustment (handset lock) and entrapment injury (auto safety stop), which compliment an overall falls reduction strategy. Outcomes were positive across all key metrics. Fewer residents fell and the number of falls occurring in residents' bedrooms was also reduced substantially.

Conclusion

While falls reduction is a credible aspiration, it is not possible to completely eradicate the risk and to attempt to do so is likely to limit a resident's independence and quality of life. A priority for care in the third age is to promote and maintain levels of activity with the limit of each individual's physical and cognitive ability and to accommodate, wherever possible, an individual's lifestyle choice. Falls management will always be a compromise but, if risks cannot be completely eliminated, the strategic use of equipment, such as the ***FloorBed***, is likely to be a clinically efficient and cost effective option; the possible benefits of such a device have been illustrated in this pilot evaluation.

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