Preventing Falls

Optimal Bed Height

Falls are a problem

Falls are the most commonly reported hospital adverse event[1] in the adult inpatient setting and a single fall with serious injury costs the hospital on average $13,000.[2]

Evidence-based protocols and equipment that help prevent falls improve patient safety and reduce cost.

Rethinking low-low beds

Historically, low-low beds have been indicated as a falls reduction measure. The thought is that the patient will not be able to exit a very low bed, creating a form of passive restraint, and will fall a shorter distance if rolling or sliding out of the bed.[3]

Evidence from a large, randomised controlled trial of 10,937 patients across 18 hospital wards does not support this thinking. The number of falls in the bedroom per 1,000 occupied bed days did not differ significantly between hospital units using conventional beds and those with low-low beds (Table 1). In fact, the rates of falls in the bedroom and falls with injury were slightly higher in the units with low-low beds.[3]

Table 1: Median outcome rates comparing conventional and low-low beds[3]

Per 1,000 occupied bed days	Units with low-low beds	Units without low-low beds
Falls in the bedroom	2.2	1.7
Falls with injury	1.7	1.2

While the use of low-low beds may be an appropriate strategy in some cases, they present hazards to falls risk patients, including the elderly. Biomechanical patient-based studies demonstrate that entry and egress from a low-low bed increases postural demands, putting patients at greater risk for falling.[4-6] One author concludes that the recommendation to use the lowest bed frame possible is 'inaccurate and unsafe, and is not based on patient performance.'[6] A safe solution is to provide fall risk patients with beds that are within the optimal height range.

Determining optimal bed height range

A hospital bed should adjust to a range of heights to meet the capabilities of individual patients as they move from the bed. Available range of motion determines a patient's ability to rise from the edge of a bed or chair. Adjusting the height of the bed helps patients overcome these limitations.[7]

The optimal bed height for patients with sit-to-stand difficulties, including the elderly, is 120% of the patient's lower leg length. A height less than 120% makes sit-to-stand transitions more difficult for the patient by requiring a greater range of joint motion and velocity.[7]

Norms for lower leg length, as measured from the floor to the mid-patella, range from about 41.66cm to 55.12 cm.[8] To give the greatest number of patients the optimal bed height for their lower leg length, an inpatient bed needs to provide a range of heights from 50.3 cm to accommodate almost all women and up to 66.4 cm to accommodate almost all men, as shown in Table 2. The range of 50.3 cm to 66.4 cm for optimal bed height can be measured as the distance from the floor to the buttocks of the patient when seated. The thickness of the mattress will need to be taken into consideration when determining the optimal bed height, adding it to the height of the bed frame.

Preventing falls with optimal bed height

To help improve sit-to-stand performance and reduce falls risk and related serious injuries, beds need to offer an optimal seated height no lower than 50.3 cm to accommodate almost all women and up to 66.4 cm to accommodate almost all men. Hill-Rom's Med-Surg beds with surfaces are within the optimal bed height range and when used in conjunction with a falls protocol can help reduce patient falls related to bed ingress/egress.

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Table 2: Lower leg length and optimal bed height[7,8]

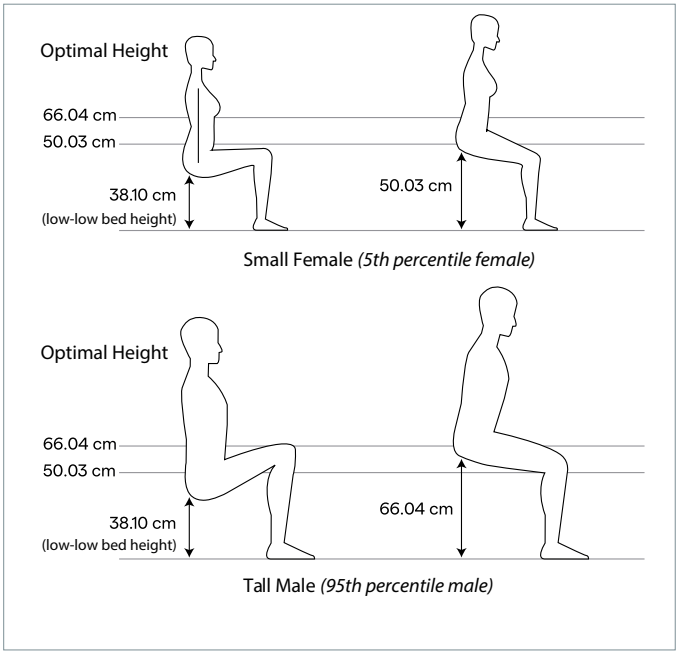
Range of optimal bed heights for sit-to-stand transition

Low of 50.03 cm to accommodate most women
High of 66.04 cm to accommodate most men

Lower leg length norms for women and men

	5th percentile female	95th percentile male
Lower leg length* (100%)	41.66 cm	55.12 cm
Optimal bed height (120%)	50.03 cm	66.04 cm

**from floor to mid-patella*



Successful Fall Prevention

Research shows that ingress and egress from low-low beds requires increased joint motion which can compromise balance, thus increasing the risk for patients that are already at risk for falls.[4-6] Multicomponent fall reduction strategies including the use of the correct equipment and programs have shown to reduce falls by as much as 30%.[9] Providing patients with beds within the optimal bed height helps reduce the risk of falling, thereby helping enhance patient safety when moving from the bed.

References

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