The sliding patient: How to respond to and prevent migration in bed

Migration can cause negative patient outcomes and caregiver injuries resulting from repositioning.

By Neal Wiggermann, PhD

In hospital settings, where the head of the bed (HOB) commonly is elevated, gravity causes patients to slide, or migrate, toward the foot of the bed. Nurses are well aware of this, as they’re regularly required to pull patients back toward the HOB if they can’t reposition themselves.

A 1995 study at one hospital found nurses pulled patients up in bed an average of 9.9 times per shift. More recent evidence suggests this activity may be even more common in some hospitals and units.

Studies show that pulling patients who’ve migrated in bed carries an extremely high risk of caregiver injury. Less research has been done on the effects of migration on patients. This article describes how migration can affect patient outcomes, outlines relevant scientific evidence, and discusses strategies for managing patient migration.
Considerations when purchasing hospital beds

Before purchasing hospital beds, clinicians and hospital purchasing staff should evaluate relevant manufacturer claims and test data to determine how well the product performs to reduce patient migration. Keep the following points in mind.

- Migration test results may vary based on methodology, so be suspicious of marketing materials that don’t describe test methods.
- Consider the relevance of test conditions to their clinical application.
- Be aware that a proper experimental design can improve test result accuracy. For example, a laboratory motion-capture system produces less error than a tape measure, and a large subject sample (10 or more) with subjects of varied heights and weights is more accurate than a small or homogenous sample.
- Make sure migration is reported with respect to the bed surface. Because the top sections of some hospital bed frames can move back relative to the floor, measuring migration relative to the floor rather than the bed surface can lead to the mistaken conclusion that a patient has migrated several inches less than he or she actually has.

Negative effects of migration

A 2013 study found that patients in traditional hospital-bed designs migrated about 13 cm (5”) when the HOB was raised to 45 degrees. Both bed movement and gravity cause patients to slide down in bed over time if the HOB is kept elevated. Such migration presumably causes friction and shear forces between the mattress and skin as the patient slides against the bed surface. Although friction and shear have been linked to pressure-ulcer formation, no research has evaluated whether friction and shear caused by migration directly contribute to pressure-ulcer risk.

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As patients migrate toward the foot of the bed, the torso elevation decreases. A pilot investigation of 10 healthy subjects lying with the HOB at 30 degrees showed their torso angle was about 30 degrees when properly aligned with the hip indicator, compared to about 12 degrees when they migrated 23 cm (9”) past the hip indicator.

Positioning the HOB at or above 30 degrees is intended to reduce the risk of ventilator-associated pneumonia (VAP) because torso elevation decreases the risk of aspirating gastric contents into the lungs. Once patients have migrated farther down the mattress, elevating the HOB may no longer reduce aspiration risk because their torsos are flatter. At that point, if they’re not repositioned, they may be at increased risk for VAP.

When patients migrate down in bed with the HOB up, they slide out away from the pivot of the HOB section and the lumbar spine goes unsupported, causing kyphosis. Kyphosis reduces lung capacity, so respiratory function may diminish in patients who’ve migrated. Although the relationship between kyphotic postures caused by migration and discomfort hasn’t been studied for hospital beds, it’s reasonable to expect migration would result in discomfort, especially in patients with low back pain or disc herniation.

Responding to patient migration

To help prevent negative outcomes associated with patient migration, be diligent in repositioning patients who’ve migrated downward. But be aware that repositioning is most likely to affect outcomes related to torso angle (such as VAP, reduced lung capacity, and discomfort)—not friction and shear linked to pressure-ulcer development.

Among patients unable to boost or reposition themselves in bed, those on mechanical ventilators and those with back pain may be most in need of repositioning by the nurse.

Repositioning patients manually is associated with a high risk of musculoskeletal injury, so always use repositioning aids for patients unable to reposition themselves. Using lift equipment, such as a ceiling-mounted or mobile lift, is the best way to reduce healthcare worker strain, according to the American Nurses Association’s Safe Patient Handling and Mobility: Interprofessional National Standards, which calls for eliminating manual lifting in all healthcare settings.

If lift equipment isn’t available, use a friction-reducing sheet and place the bed in the Trendelenburg position (if the patient can tolerate it). If the patient is on an air surface, use the “max inflate” function. Patients who can provide partial assistance should participate in mobilization by placing their feet flat on the mattress and “bridging” when being repositioned. The pa-
be aware that any method that involves manual lifting can cause injury to the nurse.

Most likely, migration caused by bed movement will continue to decrease as manufacturers develop beds more compatible with the changing geometry of the patient as the HOB rises. (See Considerations when purchasing hospital beds.)

More research is needed to confirm indications that patient migration toward the foot of the bed increases pressure-ulcer and VAP risk, causes patient discomfort, and reduces lung capacity. Many tools are available to help nurses safely reposition patients who’ve migrated. Using auto-contour when raising the HOB or the knee gatch may help prevent migration or slow its rate. Design of the bed’s articulation also affects the distance that a patient migrates.

Selected references


Bartnik UM, Rice MS. Comparison of caregiver forces required for sliding a patient up in bed using an array of slide sheets. Workplace Health Saf. 2013;61(9):393-400.


Michel DP, Helander MG. Effects of two types of chairs on stature change and comfort for individuals with healthy and herniated discs. Ergonomics. 1994;37(7):1231-44.


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