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

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

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n 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

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> 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.

> As patients migrate toward the foot of the bed, the torso eleva-

tion 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 ventilatorassociated 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 patient also may pull on traction equipment, a trapeze bar, or the bed side rails, if available.

However, be aware that any method that involves manual lifting can cause injury to the nurse. One researcher found that based on the postures adopted when handling patients, caregivers who lift with forces above 16 kg (35 lb) are at increased risk of injury. The most effective way to prevent selfinjury when repositioning patients is to use a ceiling-mounted or mobile lift. An air-assisted lateral transfer device also can be used to reposition the patient up in bed.

#### **Preventing migration**

Despite the impact of migration on patients and caregivers, little research exists on how to prevent it. The bed's contribution to migration has been investigated in laboratory studies, but patient movement has yet to be studied.

To limit migration when articulating the bed, use auto-contour (a knee gatch that rises automatically and simultaneously as the HOB rises) to reduce migration by up to 2.5 cm (1"). If the bed doesn't have auto-contour, raise the knee gatch before raising the HOB. Besides limiting migration from bed articulation, keeping the patient's knees raised also may help limit migration over time. Of course, these strategies can be used only if the patient can tolerate knee bending.

Design of the bed-frame articulation seems to have an even bigger effect than auto-contour on the amount of patient migration. For example, across three different bed-frame designs, mean cumulative movement (total amount of sliding when raising and lowering the HOB) ranged from 13 to 28

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cm (5" to 11"). 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 autocontour 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 5 migrates.

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