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UNDERSTANDING WHY INJURIES CAN HAPPEN WITH TURN AND POSITION SYSTEMS

The injuries occurred when the turning and positioning products were used to transfer patients and/or boost them (move a patient toward the head of the bed).

The best-known products marketed in this category include the Sage Products Prevalon™ Turn & Position System and Medline Comfort Glide Repositioning Sheet. TAPS-style products usually include or offer as an add-on wedges that are used to turn the patient and offload the sacrum. This paper addresses transfer and boosting injuries and expresses no opinion on the products when used only to offload a patient's sacrum.

The Prevalon and Comfort Glide products have very similar construction: a woven nylon fabric bottom layer, a tricot top layer, and handles along the sides. The patient lies on the tricot, and the nylon rubs on the supporting surface (often a bed sheet). The use of the same materials and similar construction should mean that the products are nearly identical in slipperiness. However, Jamar Health Products, Inc., has not tested these products to verify.

Instead one can look at Sage Products' test data, which were submitted as part of its [patent application](#) to the U.S. Patent and Trademark Office. See the data pertinent to slip highlighted in Exhibit A. The first page shows the patent number and date, company owning the patent, and an abstract summarizing the product. The second page (Patent pages 9, 10) shows test methods and results. In short, Sage Products lists a static coefficient of friction (COFs) of 0.314 when the nylon is sliding on a hard, level surface covered with polycotton fabric.

The COFs indicates how slippery the product is and how much force is required to start a weight or patient lying on it moving. The lower the COFs number, the slipperier the product. When it comes to a slide sheet, a COFs of 0.314 is a high number, meaning it is not very slippery. PATRAN® slide sheets, produced by Jamar Health Products, Inc., have a COFs of about 0.15 when tested in a similar manner.¹

The formula to calculate force on a hard, flat surface is:

$$\text{weight} \times \text{COF} = \text{force}$$

For example, if a patient weighs 275.4 lbs,² the Prevelon patent-calculated force required to start the patient moving on a flat, hard surface covered with a polycotton sheet will be 275.4 x 0.314, or 86.4 lbs. By comparison, a PATRAN used as directed requires a calculated 41.3 lbs force to start a 275.4-lb patient moving on the same hard, level polycotton-covered surface.

Beds are not hard surfaces, and heavy patients sink into them. The depth a patient will sink depends on the patient's weight and the mattress construction. Most mattresses are constructed so that the center is softer than the long outside edges, thus reducing the tendency for patients to fall out of bed.

The mattress design also means patients must be moved uphill to transfer them out of bed. If that is the case, the force required must equal the flat, hard surface force plus the force required to lift the weight uphill. The slope for transfer can easily measure between 5 and 10 degrees. Moving a 275.4-lb patient up a 5% bed slope will require 110 lbs of force with TAPS and 65 lbs of force with PATRAN. If the patient sinks deeper into the mattress and must be moved up a steeper hill, more force is required.

The handles on the TAPS product make it easier for the caregiver to hold on to the product while exerting more than 35 lbs pulling force. That force is then transferred through the caregiver's shoulders, and down his or her back.

If the patient is boosted on a level mattress, the force required is often only that needed to overcome the COF. However, if the caregivers boost the patient with the head of the bed elevated, the uphill force must be added - whether using a TAPS, PATRAN, or even a product like an air-assisted/inflatable patient repositioning device. Calculating the force needed when the patient is on a bed in 30-degree reverse Trendelenburg position is easier, but similar. If the head of the bed is elevated at a 30-degree angle and a TAPS product (according to patent data) is used to boost a 275.4-lb. patient, the calculated force required would be about 224 lbs. The force required with PATRAN, or even a perfect product with a COF of zero, would be lesser, but still too great. If the head of the bed must remain elevated or the bed remain in reverse Trendelenburg more than 8 degrees during the boosting of a 275.4-lb or heavier patient, Jamar Health Products recommends using different equipment (perhaps a ceiling lift with a repositioning sling).

A safe patient handling program typically can't be accomplished with one product. In addition, it can be difficult to switch products after an investment in purchasing and training/introducing a product has occurred. A PATRAN slide sheet works very well when used under Prevalon or Comfort Glide to move patients. The PATRAN must be removed when the patient is unattended. Also, don't leave a PATRAN under the patient long-term, such as overnight. Remember, PATRAN is slippery and presents a fall hazard to unattended patients who may put the rail down.

References:

¹More information about the COFs of PATRAN is available in the white papers "Understanding Coefficient of Friction and Why Other Slide Sheet Properties Are Also Important" and "Force Required To Move Patients Using PATRAN Slide Sheets On Different Surfaces."

²According to the Centers for Disease Control and Prevention, 275.4 lbs was the 95th percentile of weight for men in 2016. View the report at https://www.cdc.gov/nchs/data/series/sr_03/sr03_039.pdf.