

CASE STUDY

Advanta™ 2 Bed Performance: Shear and Interface Pressure

History

Hill-Rom is introducing a new bed into Acute care facilities. Prior to the project launch, extensive lab testing was completed in Hill-Rom's state-of-the-art testing facility in Batesville, IN. This recent lab testing indicates that the Advanta 2 frame with the AccuMax Quantum™ VPC surface provides superior performance when compared to a Stryker S3 frame with the same surface:

- 65% Reduction in Shear
- 7% Lower Peak Sacral Pressure
- 60% Less Patient Migration

Findings

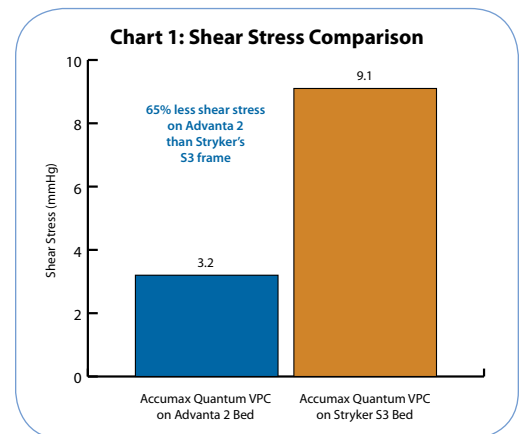
Shear Stress

Shear is one of the external (non patient related) factors that can contribute to skin breakdown. Think of shear just like pressure – force per unit area that can be measured in lbs per square inch or mmHg but directed parallel to the skin (instead of perpendicular to it as with pressure). There are various external and internal shear stresses exerted on the patient while in bed. Frame articulation is one of the many product variables that can influence shear on the patient. As the head of bed is raised, the patient can either be 'cradled' to maintain position or pushed toward the foot section of the bed. Shear and friction forces increase the more a patient moves during frame articulation; thus, optimizing frame articulation is key in minimizing shear stress.

The shear stress was quantified by positioning a 50th percentile sensed mannequin on the bed in the flat position with the hips properly aligned. A total of 10 shear sensors were mounted along the torso and seat section. The shear stress was measured from the flat position to 45° head of bed elevation with the AccuMax Quantum VPC surface on the Advanta 2 and Stryker S3 frames.

The sustained shear stress was recorded three minutes after the head of bed elevation was reached. The procedure was repeated for a total of 9 trials per product. The overall average shear stress for the sacral shear sensor was reported for each frame on Chart 1.

The Advanta 2 frame produced significantly lower shear stress than Stryker's S3 frame at a 95% confidence level.



Sustained shear stress from flat to 45° head of bed, n=9

Shear Mannequin



Shear sensor measurement location



Shear measurement in progress

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Patient Migration – Another Cause of Shear

The movement of the patient toward the foot section of the bed when the head of bed is being elevated contributes to an increase in shear on the patient. It is critical to minimize the migration of the patient to reduce the shear and friction exerted on the tissue.

Chart 2 shows two examples of patient migration with the AccuMax Quantum™ VPC surface on the Advanta 2 and Stryker S3 frames. The distance the hip moved toward the foot section of the bed was quantified over five articulation cycles from flat to 45° head of bed elevation with a 73" 300lb male test subject remaining still throughout articulation. The overall average distance was reported for each frame.

The Advanta 2 frame produced statistically less patient migration than the S3 frame at a 95% confidence level.

Impact of the Frame on Interface Pressure

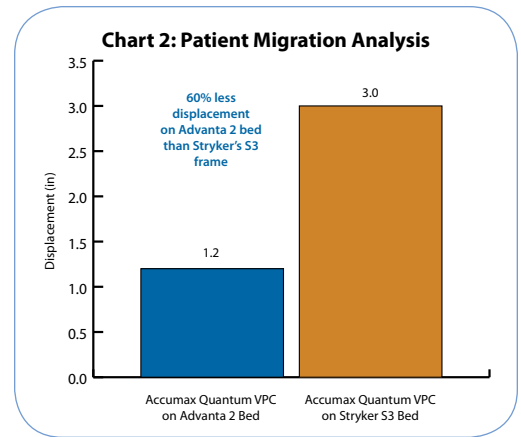
When the head of bed is elevated there is an increase in pressure and shear along the torso and in the seat section as the patient migrates toward the foot section of the bed. It is critical to minimize the pressure, shear and friction on the patient, as these are the non patient related risk factors that can contribute to skin breakdown. The frame articulation can contribute to an increase in pressure, as show in the pressure maps to the right.

An interface pressure test was performed with two test subjects (73" 300 lb male and 72" 324lb male) with the AccuMax Quantum VPC surface on the Advanta 2 and Stryker S3 frames. The interface pressure was measured from the flat position up to 45° head of bed elevation with the test subject remaining still throughout articulation. The procedure was repeated for a total of 72 trials per product. The final overall average peak sacral pressure in the seat section was reported for each frame on Chart 3.

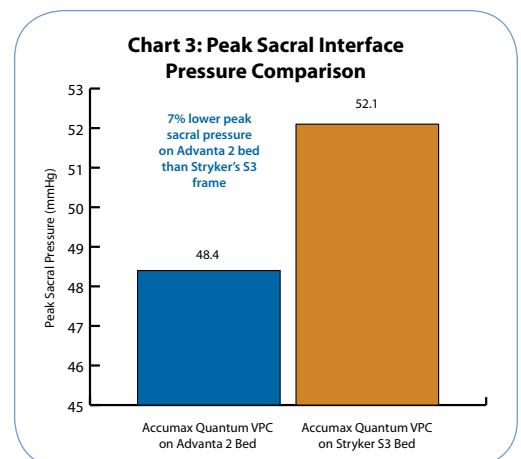
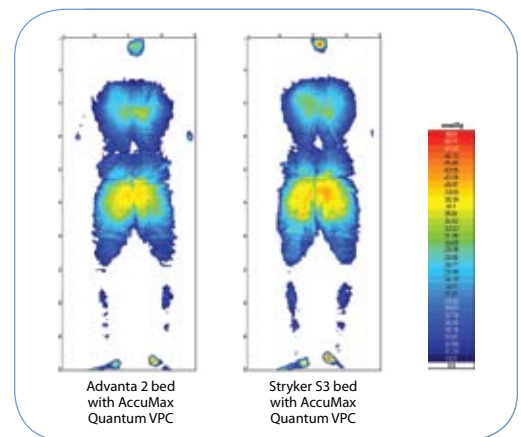
The Advanta 2 frame produced statistically lower peak sacral pressure when compared to Stryker's S3 frame at a 95% confidence level.

Conclusion

Lab testing demonstrates that the Advanta 2 frame with the AccuMax Quantum VPC surface provides superior performance when compared to a Stryker S3 frame with the same surface with 65% reduction in shear, 7% lower peak sacral pressure and 60% less patient migration.



Displacement toward the foot end of the bed during articulation from flat to 45° head of bed, n=5



Two test subjects from flat to 45° head of bed position, n=72

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