

Biomechanical Testing Of Secure® Floor Mats

Funded By: Personal Safety Corporation

Testing Conducted By:

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Overview

VSI completed a biomechanical evaluation of PSC's Beveled Edge Safety Mat (SBEV-1) and Bedside Safety Mat (SBSM-1) in February 2010. Specifically, VSI evaluated the biomechanics associated with sideways falls from various heights, reflective of a sideways fall from an adjustable hospital or nursing home bed, and evaluated the effectiveness of the safety mats at reducing fall-related injury risk to various body regions.

Testing Methodology

The control condition for this testing was an unpadded, flat concrete rigid floor surface. Three drop heights were evaluated for each floor/mat impact condition: 18", 24" and 30" drop heights were selected based upon the expected range of adjustable beds from which a patient or resident could fall out of in a sideways manner. Three drop impacts were performed for each mat at each drop height for the purposes of testing repeatability. A minimum of five minutes between repeat mat impacts was allowed for recovery of the mat's foam material.

Test Equipment

The Department of Transportation's Side Impact Dummy (SID) was used for all testing. The standard SID head and neck was replaced with the Hybrid III head and neck for purposes of obtaining biofidelic (human-like) lateral neck flexion and head impact response.

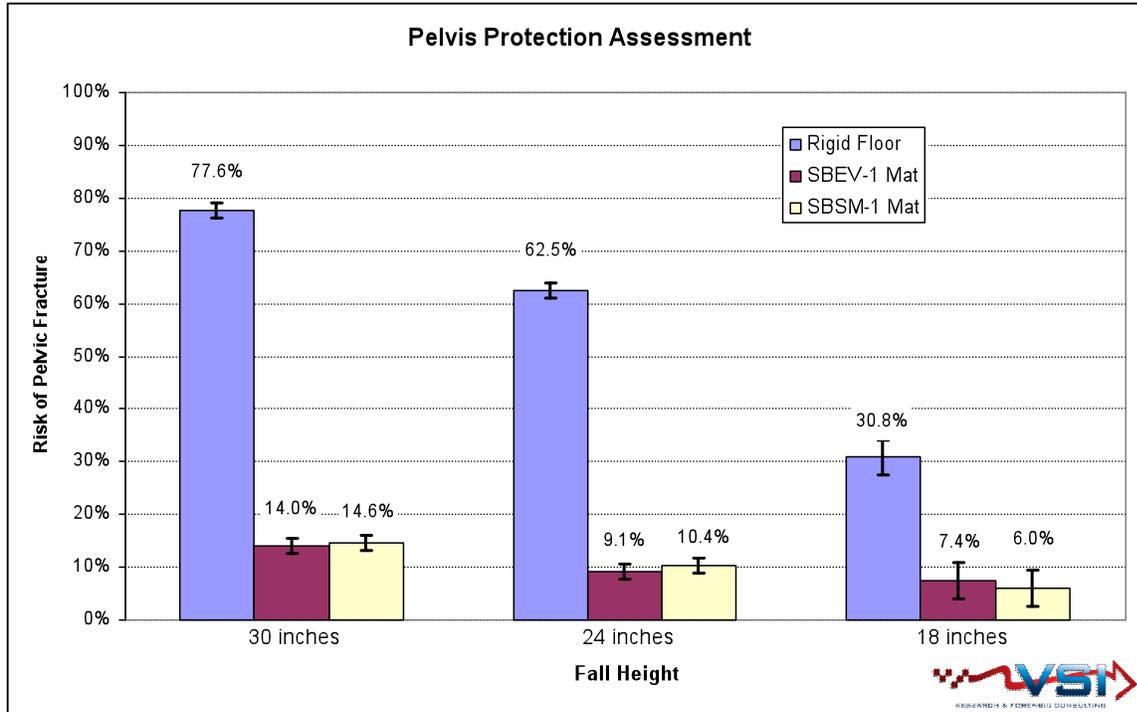
Test Equipment Instrumentation For Body Regions

The SID was instrumented with accelerometers in the head, thorax (chest upper and lower ribs), lower spine and pelvis to capture impact loads to these body regions. Injury criteria were calculated for the head and chest for comparison to biomechanical injury risk charts. For the head, the Head Injury Criterion (HIC) is the most widely used measurement of head injury risk and is currently incorporated into Federal Motor Vehicle Safety Standards for head protection in automotive impacts.

The Thoracic Injury Index "kernel" (TTId) is the injury criterion utilized with the SID device. Until recently this was the government standard for assessing thoracic injury risk in side impacts. The TTId may be related to the human impact tolerance for a given age and weight, referred to as simply TTI:

$$TTI=1.4* \text{age} + TTI * \text{Mass}/\text{Mass}(\text{std})$$

For this study, the weight of 115 pounds was utilized along with 75 years, which was felt to be representative of the target hospital or nursing home population at risk (i.e., small females).



Complete [Biomechanical Testing Of Secure® Floor Mats Report](#) available upon written request

Secure® Bedside Safety Mat (SBSM-1)

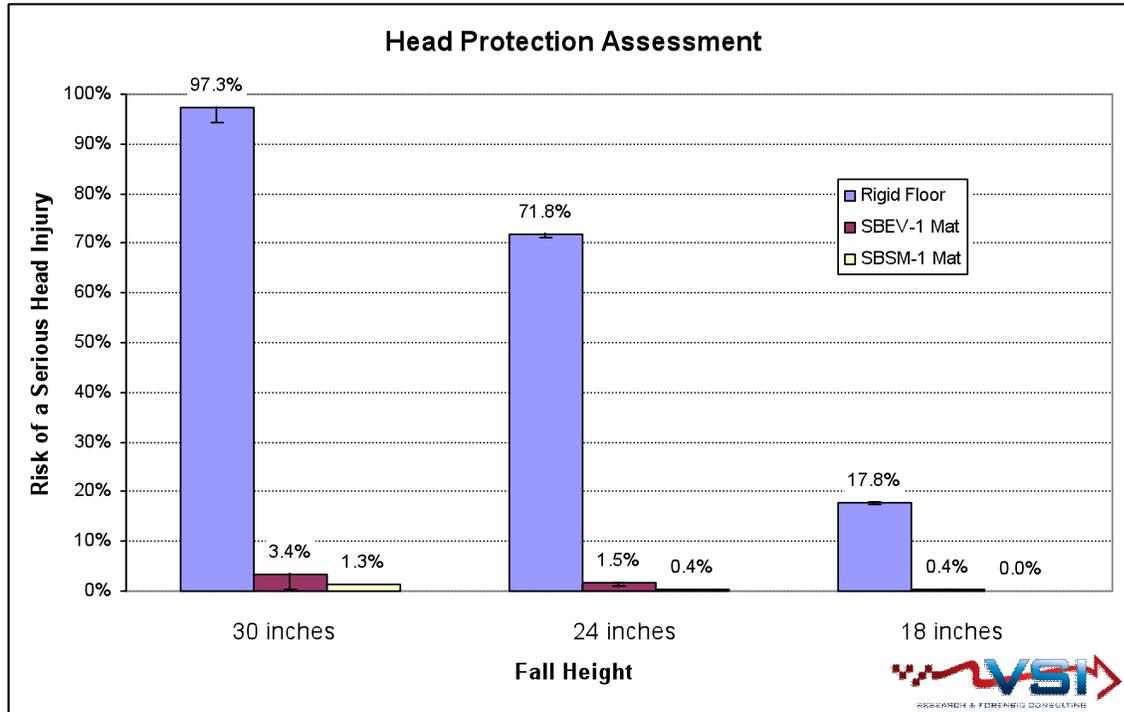
Reduces The Risk Of A Pelvic Fracture Versus A Fall On A Hard Surface Floor:

- ❖ To 6.0% In A Sideways Fall From An 18” Height Bed
- ❖ To 10.4% In A Sideways Fall From A 24” Height Bed
- ❖ To 14.6% In A Sideways Fall From A 30” Height Bed

Secure® Beveled Edge Safety Mat (SBEV-1)

Reduces The Risk Of A Pelvic Fracture Versus A Fall On A Hard Surface Floor:

- ❖ To 7.4% In A Sideways Fall From An 18” Height Bed
- ❖ To 9.1% In A Sideways Fall From A 24” Height Bed
- ❖ To 14.0% In A Sideways Fall From A 30” Height Bed



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Secure® Bedside Safety Mat (SBSM-1)

Reduces The Risk Of Serious Head Injury Versus A Fall On A Hard Surface Floor:

- ❖ To .0% In A Sideways Fall From An 18” Height Bed
- ❖ To .4% In A Sideways Fall From A 24” Height Bed
- ❖ To 1.3% In A Sideways Fall From A 30” Height Bed

Secure® Beveled Edge Safety Mat (SBEV-1)

Reduces The Risk Of Serious Head Injury Versus a Fall On A Hard Surface Floor:

- ❖ To .4% In A Sideways Fall From An 18” Height Bed
- ❖ To 1.5% In A Sideways Fall From A 24” Height Bed
- ❖ To 3.4% In A Sideways Fall From A 30” Height Bed