

# SHEAR

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## DEFINITION

Shear force is “an action or stress resulting from applied forces which causes or tends to cause two contiguous internal parts of the body to deform in the transverse plane” (NPUAP). In wheelchair seating, shear forces occur when a client moves parallel to the seating surfaces, such as during a transfer or when sliding into a posterior pelvic tilt. External shear is sometimes referred to as friction, and internal shear is sometimes referred to as shear strain (NPUAP). Even if the client appears to maintain a static seated position, shear forces can occur as the body moves slightly in relation to the materials within the cushion and against the resistance of the cushion cover. Shear can also occur during recline, when the seat to back angle opens and disrupts alignment with body surfaces. Much of a power reclining system’s design is an attempt to reduce this shear as much as possible.

## TISSUE DEFORMATION

Recent research has demonstrated that pressure injuries are not only caused by tissue compression leading to a lack of oxygen (ischemia) but also by soft tissue deformation (This is addressed in the Clinical Perspective article on page 34). Shear forces can both deform and compress soft tissue, leading to pressure injuries. Deformation, particularly when shear forces are high, can lead to injury in as little as minutes to hours.

Per the National Pressure Ulcer Advisory Panel (NPUAP), “shear is a normal mechanical force with physiological effects.” Shear occurs even when lying completely flat. Any change in position will create shear both internally and externally. If pressure remains constant and shear forces increase, tissue deformation will also increase. Unfortunately, shear is very difficult to measure currently and it is unclear exactly how shear damages tissues. As a result, current research does not inform us as to which clients are at greater risk of shear injury.

## GENERAL INTERVENTIONS

So what can we do to reduce shear forces? According to NPUAP, the following can reduce shear:

- A stable posture;
- Reducing sliding in the bed or wheelchair; and
- Lifting, rather than dragging, during transfers.

Although there is much more to learn regarding shear, it is clear that reducing shear is critical in reducing overall pressure injury risk. Shear reduction is essential in assessment, product development and product use. As shear can occur on any surface and during transfers, it is important to assess all potential sources of shear.

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## REFERENCES:

NATIONAL PRESSURE ULCER ADVISORY PANEL  
([WWW.NPUAP.ORG](http://WWW.NPUAP.ORG))

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