Wheelchair Stability

This workshop was presented by Craig Kirkwood, Bioengineer in Dundee.

Patients can be injured or even die in falls involving wheelchairs so the stability of wheelchairs is very important. The Reference Document is 'The Guidance on Stability of Wheelchairs. Some basic knowledge of mechanics is required. Mechanics is the state of rest or motion of bodies under the action of forces. Forces can push or pull and have both magnitude and direction. A moment is the Force multiplied by the distance- so the bigger the distance the less the force is required.

The centre of mass is the point around which a person is balanced. It is higher for men than women because of their shape. Stability can be either static (still) or dynamic (moving). When the line of force acts outside the centre of mass the situation becomes unstable. When the line of action of the centre of mass is within the base of the support, the situation is stable

A wheelchair is less stable with the brakes on - if the brakes are off and the patient moves slightly backwards the wheelchair can move backwards to restore stability. If you have a patient who tends to rock in their wheelchair, they will be safer left with the brakes off on a level surface.

A wide base increases stability. Added loads make the chair more unstable. An added load at the front makes the chair more difficult to push. The castors stick and the person can go forward out of the chair. Kids with bags on the back of their chairs tend to tip backwards. On the other hand patients have to live from the chair, so a compromise may have to be reached- for rough terrain, bigger castors set forward make the chair more stable but it is then more difficult to turn.

The needs of the user and the capability of the carer must be carefully considered when setting up the chair. How much can the user move forward or back in the chair when using ramps? What is the environment, what requires to be added to the chair? There may have to be a compromise between safety and performance. A totally safe chair may be unusable.

Your documentation for risk assessment must show that you exercised professional judgment in line with current practice. It is important to show how your decision was reached- the problems, the options considered, the solution provided and supporting documentation.