How are the surfaces and shape important to prevent pressure ulcers?

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Summary
The contact surfaces shape, and the material type which the sitting system are made from, are very crucial issues to figure out better their consequences on the skin integrity of the users sitting on a wheelchair. [1,3,4]

Aims & Objectives
In order to evaluate these elements we did a clinical trial in cooperation with one of the most important rehab centres for brain injuries as well as neurological diseases patients in Italy. We involved a group of 10 very compromised people, and two of them were very suggestive cases: both of them had had a stroke.

Background
The subject #1 was a female with a diagnosis of sub-aracnoid haemorrhage after brain aneurism followed by a no response period; the subject #2 was a male with a diagnosis of stroke ischemic-haemorrhagic followed by a no response period.

All of the people involved (so these two patients) had a mid-risk Braden score (13/14). We used the comfort wheelchair Juditta, a very particular wheelchair with a V shape backrest (not flat) and a unique polymer as sitting system material as well as its disposable on the chassis. For the pressure record we used a pressure mapping sensor, the Pliance System, with a soft and flexible mat for the evaluation. We put two flexible sensors on the surfaces, one between the back and the backrest, the other between the seat and the bottom. Then we started the observation in different postures: with no tilting, with 20° of tilting, with max tilting, with max tilting and max backrest recline, with max tilting and max recline and raised leg support (up to minus 10° of knee flexion).

The pressure was recorded with a different timing while the patients were seated; from one to 90 minutes.

A good distribution of the interface pressures was noted without any significant increase under the ischial tuberosities:
• Thanks to the backrest upholstery a uniform pressure is distributed all down the back of the users
• Without upholstery, the part of the spine is completely relieved with no significant increase of pressure on the shoulder section
• Particularly No.1 user (weighing less than the other one and so potentially more at risk) shows an optimal distribution of pressure in all her achieved postural attitudes
- The particular layout with the “strings” disposal, allows the better breathability, so important to keep the skin dry [1,3,5]

We chose these two patients because of their very particular clinical characteristics; but the same results about pressure was clear for the other users too.

Discussion

The shape of the backrest allows a pressure of interface relief from the spine, avoiding any contact between the spinous apophysis and the backrest (much more visible without the upholstery). This effect of pressure relief is also noted on the sacral fascia of the spine. Usually when you increase the backrest recline the ischial tuberosities are discharged, but the spine is overloaded. This shape of the backrest makes sure that there is no increase in the interface pressure on the pre-sacral area. Besides, the reaction of the material used for the seat and backrest is very similar to the visco-elastic foam:

after a considerable time from positioning, the data acquisition by the pressure mapping sensor shows how pressure is distributed on a wider surface, and so its peak values decrease.

References

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