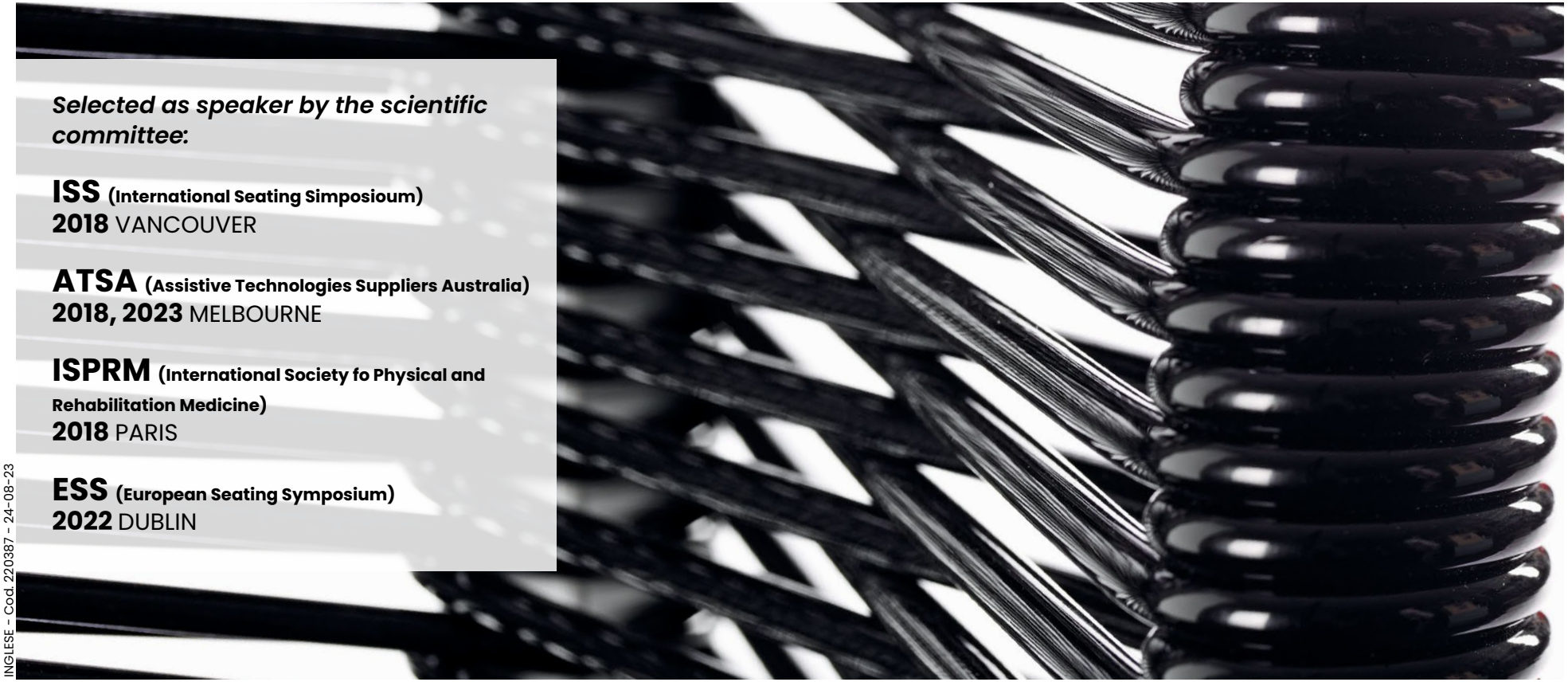
How are the Surfaces and Shape important to Prevent Pressure Sores

"Presentation of how Juditta can contribute effectively to preventing from pressure sores"



Selected as speaker by the scientific committee:

ISS (International Seating Simposioum)
2018 VANCOUVER

ATSA (Assistive Technologies Suppliers Australia)
2018, 2023 MELBOURNE

ISPRM (International Society fo Physical and Rehabilitation Medicine)
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2022 DUBLIN

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Juditta

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Introduction:

The **shape of the contact surfaces** and the used **materials** are **key elements** to better understand the **consequences of the integrity of skin** of users seated on a wheelchair. Furthermore, we have to consider how the **contact with the surface** can **ensure breathability and absence of moisture**, in order to **avoid the increase in body temperature** (skin) and **local moisture**.

Usually the risk level for the occurrence of skin pressure sores depends on the individual and on his medical history; the inherent factors can identify it reliably and the analysis of these elements is subject to the use of evaluation scales of risk. The most common are Braden, Norton, Waterlow, Knoll, Exoton-Smith; the **inherent factors** that consider these scales are the **clinical history, the patient mobility, the cognitive performance, the ability to walk,** etc. Considering the most used scales of risk, and examining 14 items, only **2 of them are common to all: moisture and incontinence.**

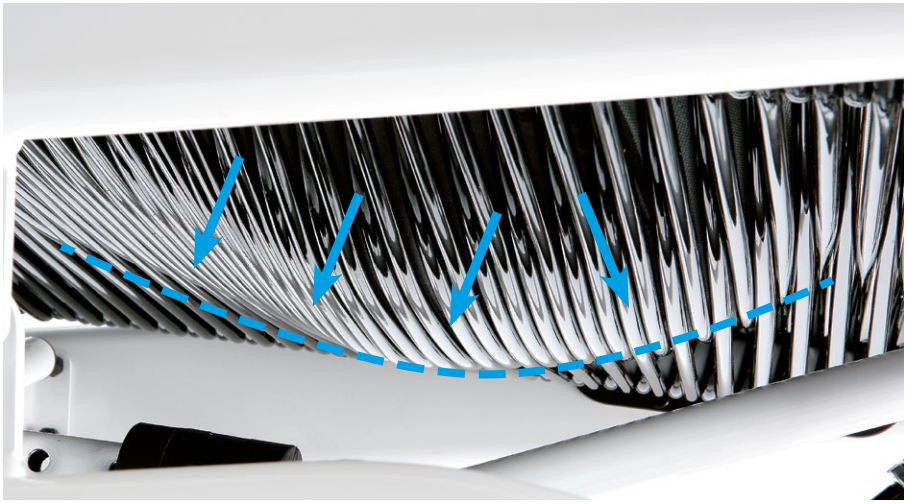
Moisture is part of those extrinsic elements (together with pressure, shear force, friction, temperature, foreign particular matters) that can be operated by caregivers and users. **Moisture control** allows a **better temperature management of skin**, avoiding any sweat stagnation and skin maceration, which is considered to be one of the main causes of pressure sores.

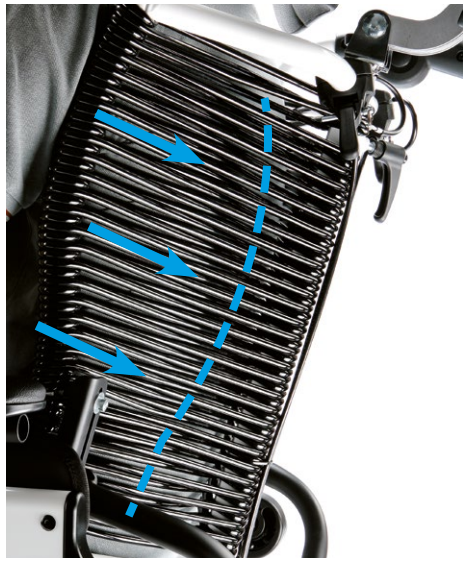
In this evaluation we pointed out that a **particular shape of backrest and a particular material used** for the backrest and seat can **function effectively reducing pressures of interface on the user's skin considerably**, even without using a specific pressure-relief cushion (for Users without a high level of risk, shown by the evaluation scales such as Braden and Waterlow). Moreover this kind of material makes it highly breathable thus allowing to manage and control the above mentioned extrinsic factors, such as skin temperature and moisture.

Pressure relief area

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.

The reaction of the material used for the seat and backrest is very similar to the one of 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.





Evidently, in support to the behaviour of the material there is also the possibility to change the postural attitude easily (tilting, recline, footrest height adjustment) while the user is on the wheelchair.


Jaditta

Users

Two users were considered::

User 1: female, 59 years, ESA report from cerebral aneurysms associated with a non-responsiveness period, weight: 45 kilos.

User 2: male, 69 years, report of ischemic and haemorrhagic Stroke associated with a non-responsiveness period, Weight: 78 kilos.

Materials and methods:

User 1 examined in the following setup:

With upholstery

- *No tilting*
- *20° tilting*
- *Max tilting*
- *Max tilting and recline of backrest (36°)*
- *Max tilting and recline of backrest, elevate legrest (-10°)*

Without upholstery

- *No tilting*
- *20° tilting*
- *Max tilting*
- *Max tilting and recline of backrest (36°)*
- *Max tilting and recline of backrest, elevate legrest (-10°)*

Data were obtained immediately after positioning the User on the wheelchair and after 10 minutes of her stay in the seated position.

User 2 examined in the following setup:

With upholstery

- *No tilting*
- *20° tilting*
- *Max tilting*
- *Max tilting and recline of backrest (36°)*
- *Max tilting and recline of backrest, elevate legrest (-10°)*

Without upholstery

- *No tilting*
- *20° tilting*
- *Max tilting*
- *Max tilting and recline of backrest (36°)*
- *Max tilting and recline of backrest, elevate legrest (-10°)*

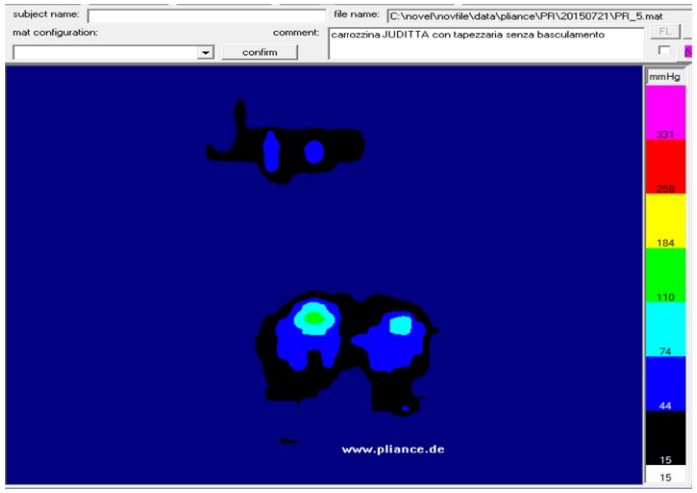
Data were obtained immediately after positioning the User on the wheelchair, after 10 minutes and after 1 hour and a half of his stay in the seated position.

The Users were positioned on Juditta tilting wheelchair which has a postural support system and adjustable configuration

Data of interface pressure were acquired by the **Pliance System Sensor (novel.de)**. The system consists of a flexible and elastic sensor, a multi-channel unit, a calibration device and a software to interface it to a personal computer. The device **can measure pressure distribution on hard, soft and curved surfaces.**

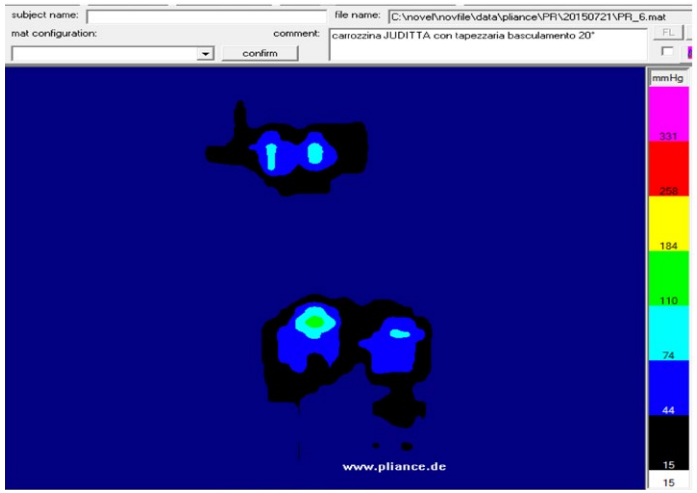
Evaluations were performed at the **Rehabilitation Medicine Department of the Hospital in Valduce of Como, at "Villa Beretta"** in Costamasnaga (LC), in the gait Analysis Medical Lab.

Results of data acquisitions: user 1



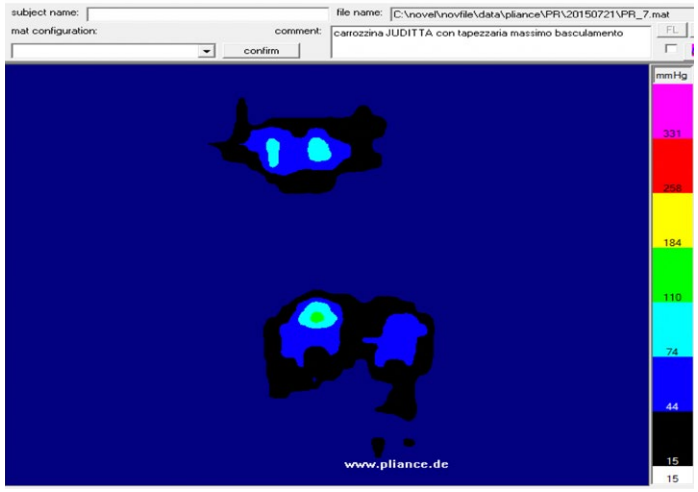
User 1

with upholstery, without tilting.



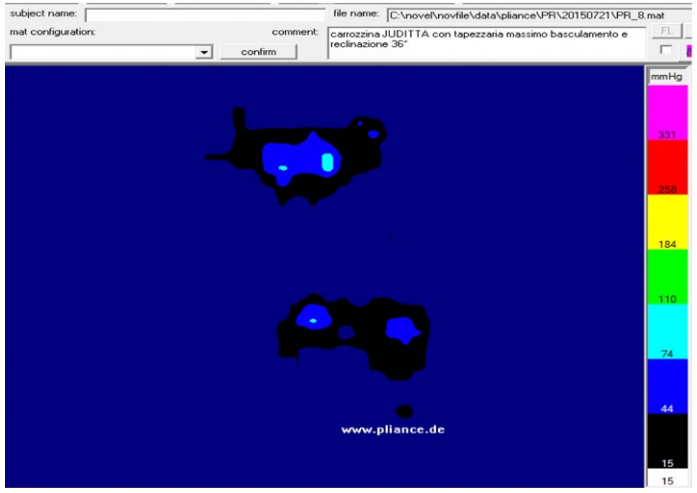
User 1

with upholstery, 20° tilting.



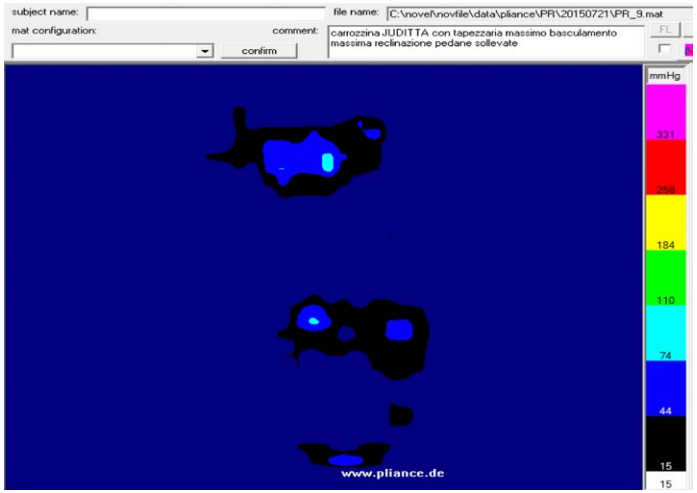
User 1

with upholstery, max tilting.



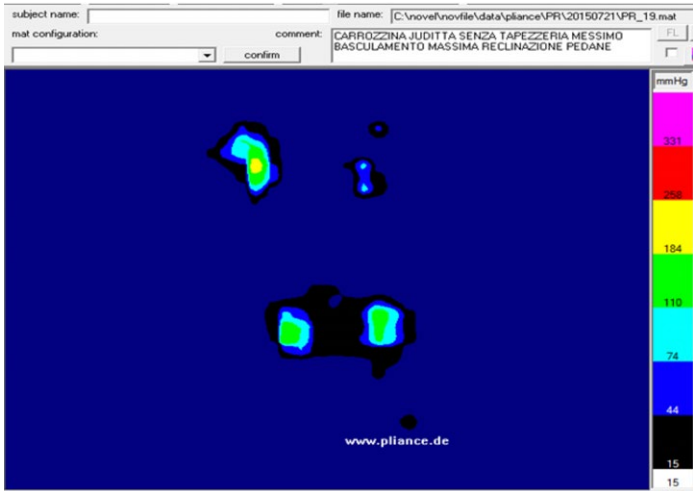
User 1

with upholstery, max tilting, max recline.



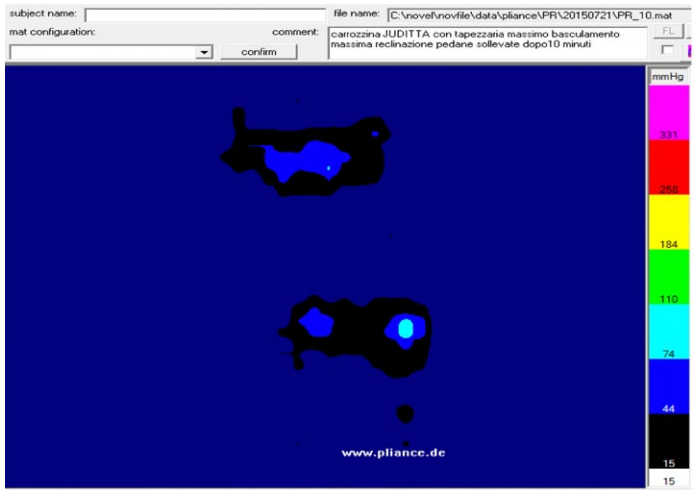
User 1

with upholstery, max tilting and max recline, elevated legrest.



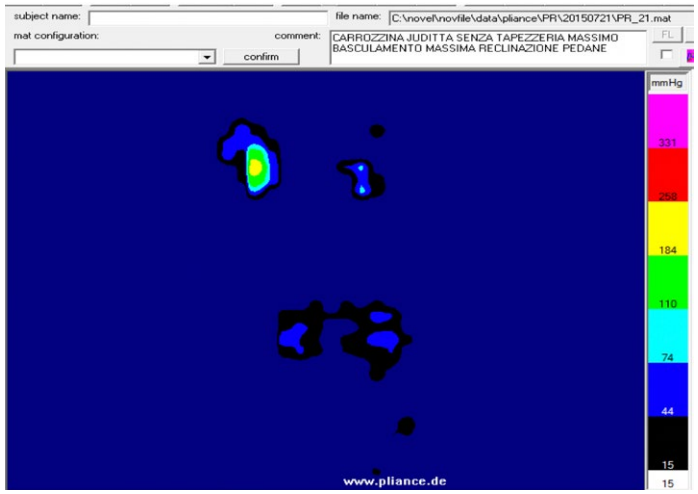
User 1

without upholstery, max tilting and max recline, elevated legrest.



User 1

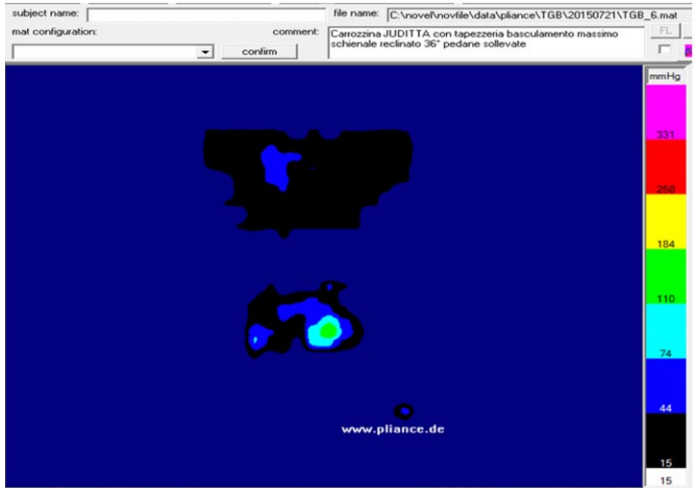
with upholstery, max tilting and max recline, elevated legrest, after 10 minutes.



User 1

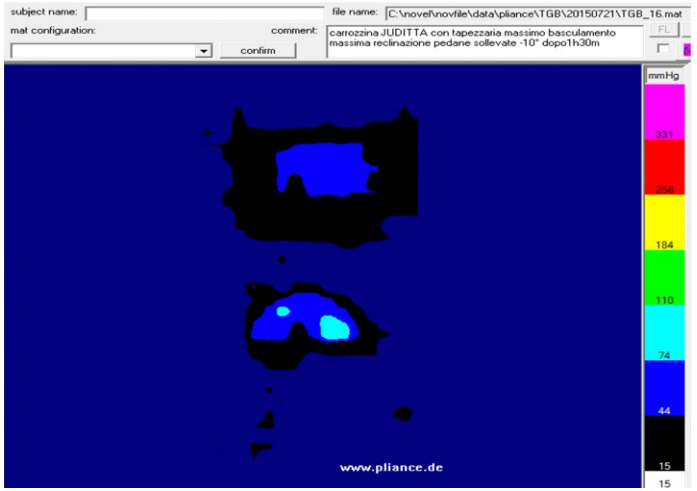
without upholstery, max tilting and max recline, elevated legrest, after 15 minutes.

Results of data acquisitions: user 2



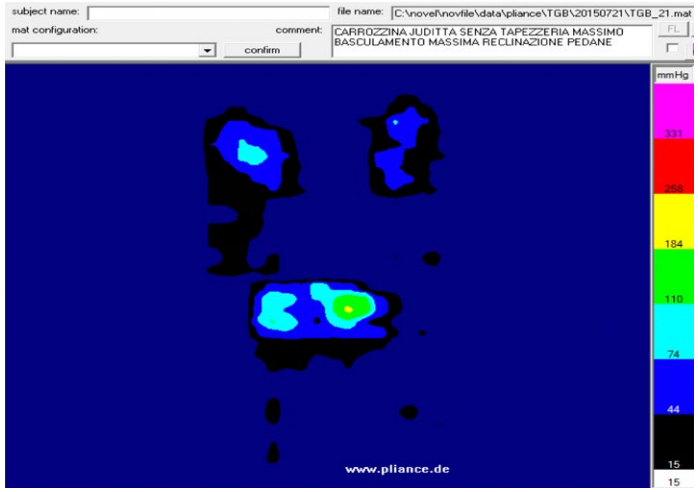
User 2

with upholstery, max tilting and max recline, elevated legrest.



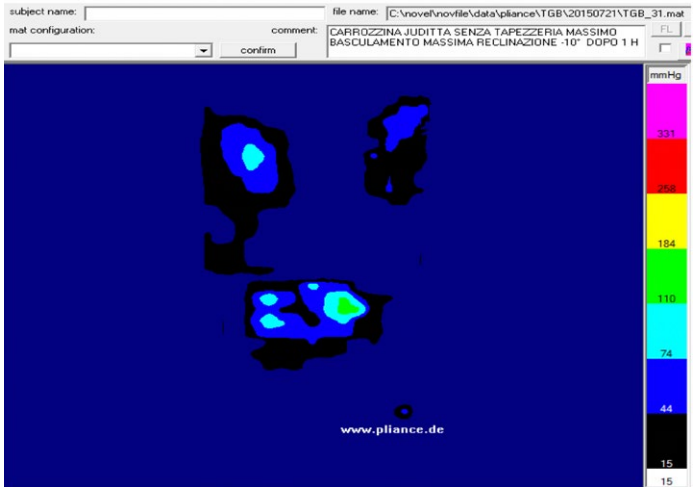
User 2

with upholstery, max tilting and max recline, elevated legrest, after 1 hour.



User 2

without upholstery, max tilting and max recline, elevated legrest.



User 2

without upholstery, max tilting and max recline, elevated legrest, after 1 hour.

Conclusions:

- 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 User.
- 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.

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