Pressure Mapping Evaluation

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Specialist Seating for Posture and Pressure Care Management

Introduction

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Posture and pressure are inextricably linked. Body posture has a direct influence on the pressure going through specific body sites[1]. The body can only withstand high interface pressures for a very short period of time, and it is when the pressure is not regularly redistributed that pressure injuries can develop[2]. The impact of a pressure injury on a person's quality of life is significant, with them being affected physically, psychologically, socially, emotionally, spiritually, and financially[3]. Pressure injuries in older patients are associated with a fivefold increase in mortality[4]. The Health & Social Care Information Centre stated in their NHS Safety Thermometer report that, on average, 2,000 pressure injuries are newly acquired each month within the NHS in England[5]; the cost to the NHS of treating pressure injuries and related conditions is up to £4 billion a year[6]. With this increasing demand on the NHS, there is an ever growing need for healthcare professionals to justify the equipment they are prescribing, with evidence based practice being at the centre of modern healthcare.

CareFlex identified the need to evaluate their chairs and gather data on WaterCell Technology; a pressure relieving system used in all adult CareFlex specialist seating. CareFlex undertook pressure mapping on the 9th November 2017, with the aim of providing healthcare professionals prescribing CareFlex chairs with the evidence needed to prove product quality and effectiveness. 34 evaluations were completed in total, in a range of positions and with different seating support surfaces. For the purpose of this concise informative report, we will only be reviewing the data on standard adult CareFlex chairs with integrated WaterCell Technology in a standard upright seating position. Further evaluations can be reported in detail on request.

WaterCell Technology provides a reliable and continuous low-pressure solution for people at medium to high risk of pressure injury. It works by allowing the seat cushion to contour naturally and effectively around the chair user's body. It consists of visco-elastic memory foam, high-elastic reflex foam, and water cells working synergistically to provide support without affecting stability and functionality:

- **Visco-elastic memory foam moulds to the shape of the user, ensuring maximum surface area contact, with even weight distribution**
- **High-elastic reflex foam is resistant to full compression, providing responsive support**
- **Water cells are highly dynamic, and respond instantly to changes in movement to ensure full contact is maintained between the user and the cushion**

Independent testing has previously demonstrated the effectiveness of WaterCell Technology[7].



Method

Method

Pressure mapping was undertaken by Helen Davies (Sumed Sales Representative), an independent data collector who was involved with the aim of reducing bias. The test subject was Rebecca Dunstall (CareFlex Clinical Specialist). CareFlex Business Development Managers (BDMs) were present to deliver and set-up the chairs only. Measurements were recorded using ForeSite SS by Xsensor[8]. ForeSite SS is a powerful system for the measurement of body surface pressures that are a key factor in the development of pressure injuries. Fitted with the LX100 – a durable, cleanable, factory calibrated sensor – it provides the accuracy and resolution required by healthcare professionals. The medically-certified tablet is light, modern, & easy to use. It offers an 18"x18" sensing area and a pressure range of 5-200mmHg.

The calibration is ISO/IEC 17025 Accredited with an accuracy of +/-5% full scale. The pressure mapping scale was set at 150mmHg for all tests.

- **Helen Davies placed the pressure mapping sensor on the chair**
- **Rebecca Dunstall sat in the chair in an optimum seated posture**
- **BDMs adjusted the chair to the correct seat dimensions**
- **Rebecca Dunstall allowed to settle in to the posture for 5 minutes**
- **Helen Davies completed the pressure mapping**

Results

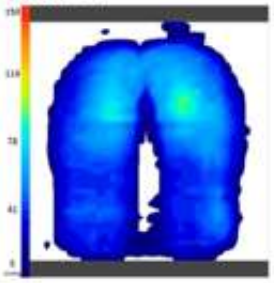
Results

Measurements were taken with the test subject in an upright sitting position, with the correct seat dimensions, and feet supported either on the floor or footrest. The reference was a standard chair with back support and armrests.

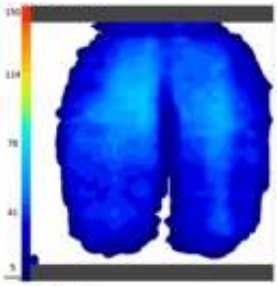
	Coefficient of Variation	Average Pressure (mmHg)	Peak Pressure (mmHg)	Area (cm^2)
Reference chair	484	35	85	1364.51
HydroCare	385	30	66	1503.22
HydroTilt	360	27	56	1498.38
HydroFlex	392	32	67	1416.13
SmartSeat	367	29	57	1424.19

Coefficient of Variation = How evenly the pressure is distributed over the surface; the lower the index the better the result.

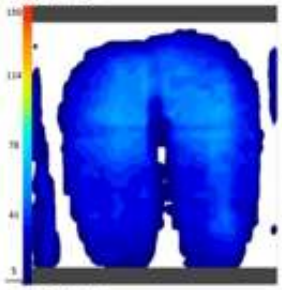
Reference chair



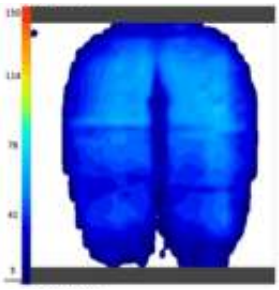
HydroCare



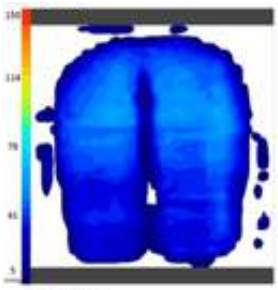
HydroTilt



HydroFlex



SmartSeat



The results indicate that CareFlex specialist seating with WaterCell Technology offers considerably lower peak pressures (generally over the ischial tuberosities) than the reference chair. The average pressures were lower than the reference chair in all CareFlex chairs evaluated. The coefficient of variation and area measurements also improved once test subject was seated in the CareFlex chairs.

Limitations

Limitations

The information provided by pressure mapping is limited to vertical interface pressure and does not account for friction, shear or moisture, which are all contributory factors to pressure injury risk. Pressure mapping provides one aspect of information, which needs to be interpreted by a skilled healthcare professional in order to be useful. Pressure mapping should be used in conjunction with a healthcare professional's skills, knowledge, and experience, with an emphasis on holistic person-centred practice.



Discussion

Discussion

Literature suggests that the acceptable limits of peak pressure (generally over the ischial tuberosities) are 40-80mmHg[9-12], if pressure is regularly relieved. This evaluation indicates that WaterCell Technology can give peak pressure measurements under 80mmHg. Seminal work by Kosiak states that average pressures of 60-70mmHg for 1-2 hours may lead to soft tissue pressure injury[13]. A recent study by Kim & Chang showed average pressures for foam cushions as 61.92mmHg and air adjustable cushions as 60.95mmHg[14]. This evaluation indicates that WaterCell Technology can offer lower average pressures, with a range between 27-32mmHg.

The results from this evaluation are backed up by a recent study completed by the University of Salford; independent trials were undertaken by an Occupational Therapist, Carol Bartley, and a Senior Tissue Viability Nurse, Melanie Stephens and the results are published in the Journal of Tissue Viability[15]. Three CareFlex chairs were used during the trial with users presenting with reduced mobility and who were reflective of a population at risk of pressure injury: the HydroTilt, SmartSeat and SmartSeatPro. This study showed that WaterCell Technology offered lower average pressures than those reported to increase the risk of pressure injury.

There was also a significant difference between the mean peak pressure index at day seven on the chairs, and at day one it was approaching significance. The mean peak pressure index was 136.28mmHg across all three chairs, which was comparable to findings by Gil-Agudo *et al*. that showed measurements of 102-207.5mmHg[16] for the well-known and accepted pressure relieving support surfaces: low-profile air, high-profile air, dual-compartment air, and gel and firm foam cushions.

Evidence also suggested that comfort is extremely important and that the healthcare professional involved in assessing and prescribing seating should consider the individual's perception of their own comfort, how they feel about their own posture, and their view of the aesthetics of the equipment. Regardless of clinical benefits, a chair may not be used if the user is not comfortable. 92% of participants reported the CareFlex chairs as being comfortable; they described this by reporting positive feelings, such as falling asleep in the chair (50%), the chair being at the right temperature, feelings of stability, and their body feeling more at ease. While they were seated in the CareFlex chairs, 80% of participants also reported being able to do more than they would usually do in terms of activities and leisure pursuits, such as watching TV, reading, and knitting.

Conclusion

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Achieving good seated posture is vital for health and wellbeing. Without appropriate postural management, an individual is at risk of reduced independence, discomfort, and fatigue, and is at an increased risk of health complications, including pressure injuries. Ultimately, they are likely to experience limited quality of life.

CareFlex specialist seating with WaterCell Technology can offer users lower pressures than those considered acceptable for reducing the risk of pressure injury when used holistically as part of a posture and pressure management care plan.

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For the purpose of this report, the term 'pressure injury' is used to describe any form of injury to the skin that falls under the pressure ulcer, pressure sore and pressure damage terminologies.