If your bottom could talk:
a local audit of comfort cushions to improve confidence with prescription

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Summary
It can be challenging to make an independent comparison of comfort seat cushions from the data presented. A local audit was carried out on four commonly prescribed cushions, with a repeatable methodology to guide future adjustments to the range. Pressure mapping was presented as an informative and accessible tool.

Aims and objectives
The initial objective was to test a simple methodology of capturing pressure mapping data from a small number of subjects, which would be repeatable within our local wheelchair service. These results were then used to help validate the prescriber's choice for comfort cushions, and compared with their baseline assumptions as to the preferred selection dependent on users' needs.

Background
Wheelchair cushion selection is often guided by knowledge and experience which is passed between colleagues. When a new cushion appears on the market, how do you use the data presented to compare it with cushions you are regularly prescribing? Often the decision will be 'to give it go' and await anecdotal feedback from users.

This method of equipment discovery and prescription can be frustrating for those looking for a more concrete answer. The International Organization for Standardization (ISO) has developed a standard for capturing the physical and mechanical characteristics of seat cushions which relate to tissue integrity (ISO 16840-2:2007). There has been shown to be value in the application of these standards, specifically for measuring the cushion's ability to absorb vibration and impact, but the clinical relevance of these measures is yet to be investigated further (Arias-Guzman et al, 2018).

This work was generated from the prescriber's desire to know if the cushion they were selecting for a range of entry-level users did indeed offer the benefits they assumed. Prescribers expressed a lack of confidence with interpreting the data available from manufacturers, and using them to guide their selection when addressing a user's needs.

A total of 10 subjects volunteered to assist with data capture. The following methodology was developed and trialled

- Record height, weight, and basic seating dimensions
- Choose suitable width cushions to trial (noted limitation with available sizes)
- On the seating simulator chair, width and depth set, tilt and recline recorded with standard flat foam backrest cushion
  - Cushion placed with pressure mat on top
- Armrest and footplate height adjusted to ensure appropriate contact area
  - Allow for 3 minutes settling time
  - Capture 200 frames
  - Ask for anecdotal thoughts on each cushion
- Repeat for all cushions

Some of the results that may be looked at to validate the selection of one cushion over the other include:

- Highest pressure – area of concern, key risk areas
- Sensing area – looks at redistribution of the pressure, larger area is better (Frank, 2010)
- Coefficient of variation – how evenly the pressure is distributed over the surface, lower value indicates a better distribution

Using this data to compare the four cushions will enable them to be 'ranked', and the results aligned with the risk categorisation which is dictated by the manufacturers.

Discussion

Deciphering the published information accompanying each seat cushion is difficult for many equipment prescribers. Several manufacturers report pressure mapping comparisons looking at peak pressure and average pressure. Some are completed with the cushion placed on alternative surfaces, unrelated to wheelchair usage. Others offer little to no useful technical data and may commonly expect selection to be based on weight limit, risk category, and anecdotal evidence provided in their sales documentation.

Local prescribers want to feel more confident in their cushion selection for entry-level wheelchair users, and this study helps to unpick some of the assumptions, and validate a small range of seat cushions. This was carried out to improve their knowledge for best matching equipment selection against the needs of the user.

References

International Organization for Standardization (2007). ISO 16840-2: Wheelchair seating – Part 2: *Determination of physical and mechanical characteristics of devices intended to manage tissue integrity – Seat cushions*. Geneva, Switzerland

Arias-Guzmán, S., Karg, P.E. and Brienza, D.M., 2018. *Applying ISO 16840-2: Literature Review*. In RESNA Annual Conference, Arlington, VA.

Frank A, *Pressure mapping for wheelchair seating*, Vista Medical [Accessed online: 24/01/2019] http://www.hsc.mb.ca/files/IPM_Wheelchair_10.pdf