

Mattress 1		Area (cm ²)	Peak (mmHg)	Average (mmHg)
CAR676	Tight	3145	45.83	22.45
	Loose	2953	44.16	21.78
PER200	Tight	2832	42	23.26
	Loose	3225	45.31	22.54
PER406	Tight	3135	42.24	21.94
	Loose	3064	42.08	22.38
END409	Tight	3034	42.77	22.38
	Loose	3094	42.79	22.43

Mattress 2		Area (cm ²)	Peak (mmHg)	Average (mmHg)
Standard		3256	41.57	20.93
CAR676	Tight	3256	44.48	21.89
	Loose	3497	42.98	20.57
PER200	Tight	3165	39.4	20.32
	Loose	3145	38.91	19.64
PER406	Tight	3175	43.87	21.1
	Loose	3296	41.13	20.62
END409	Tight	3185	40.88	20.74
	Loose	3457	40.09	20.57

	Peak Pressure (mm Hg)		Difference (mm Hg)
	Max	Min	
Mattress 1	45.83	42	3.83
Mattress 2	44.48	38.91	5.57
Mattress 3	45.42	38.64	6.78

Mattress 3		Area (cm ²)	Peak (mmHg)	Average (mmHg)
Standard		3377	45.42	21.11
CAR676	Tight	3215	40.14	20.6
	Loose	3296	41.24	20.17
PER200	Tight	3044	38.64	19.22
	Loose	3014	39.18	19.31
PER406	Tight	3064	40.97	20.09
	Loose	3205	41.15	20.02
END409	Tight	3084	41.17	19.9
	Loose	3316	42.34	20.31

- The difference between best and worst fabrics was greater for the more “technical” mattress.
- The “best” combination was different for each mattress.
- For the low stretch fabrics, loose covers gave lower peak pressure and lower average pressure.
- For the high-stretch fabrics, the results were very similar.
- The average pressure was largely independent of fabric.

CONCLUSIONS

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This initial study concludes that for a mattress system to reach its optimal potential, the performance of the mattress cover will depend on its compatibility with the mattress core. Where these separate parts are designed together, the mattress will perform to its full potential.

Furthermore, it could be concluded that if the mattress cover needs replacing during its operational life, it is important for a like-for-like replacement to take place – both for material of the cover and fit – to ensure the integrity of the healthcare bed system is retained.

There is limited research around the benefits of choosing the right medical support surface and the impact that different surfaces can have on patient care when they come into contact with the

skin. Therefore, this initial study requires further research to further investigate the relationship between material selection and design, and pressure redistribution.

It is recognised that pressure mapping is subject to user variability and to overcome this due to its widespread use in clinical environments, the ISO Wheelchair Standards Group (ISO TC173/WG11) has created guidelines on its use⁶.

In the best medical devices, the mattress cover and core work harmoniously for the best patient outcome, and more research is required to demonstrate the positive effects of the mattress and cover working together.



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where
skin
meets
fabric

A comparison of the effects of pressure redistribution properties in mattresses when covered with different types of polyurethane-coated fabric

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ABSTRACT

To date, the attention surrounding mattress performance has focused almost exclusively on the mattress contents, such as the properties of foam, the type of air system utilized, etc. with minimal attention being paid to the cover, except in regards to cleaning and care.

Using a pressure map, Dartex measured key physical properties using a range of mattresses and different fabrics, to demonstrate how the mattress's pressure redistribution properties are influenced when the fabric selection is altered.

It was found that the difference between best and worst fabrics was greater for the more "technical" mattress. For the low stretch fabrics, loose covers gave lower peak pressure and lower average pressure. The best results were obtained using stretch fabrics.

The results infer that in the best medical devices, the mattress cover and core work harmoniously for the best patient outcome, and more research is required to demonstrate the positive effects of the mattress and cover working together.

CLINICAL RELEVANCE

Pressure redistribution – demonstrating how the mattress cover can have an impact on the redistribution of pressure, depending on the structure of the fabric¹.

Extent of immersion and envelopment influenced by the properties of fabric – e.g., the stretch properties in conjunction with the mattress core.

Microclimate characteristics – how different material structures perform in regards to maintaining or altering the moisture and temperature of the patient.

INTRODUCTION

Pressure redistribution has often been reported in relation to medical support surfaces. As far back as 1993, mattress covers were shown to have an impact².

However, to date, the attention surrounding mattress performance has focused almost exclusively on the mattress contents, such as the properties of foam or the type of air system utilized, with minimal attention being paid to the cover, except in regards to cleaning and care³.

But can the fabric choice also have an impact on the pressure redistributing properties of the mattress?

This paper explores how pressure redistribution alters when the mattress core and ticking material is changed, and how the performance of the final assembly is determined not just by the material choice but by design features such as cover, fit, etc.

Using the terms set out by NPUAP⁴, Dartex measured key physical properties of a range of mattresses and different fabric covers using a pressure map to demonstrate how the mattress's pressure redistribution properties are influenced when the fabric selection is altered⁵.

METHOD

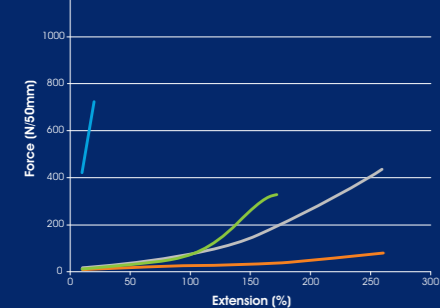
Three different mattresses were specified for the experiment:

- Mattress 1** High specification foam mattress
- Mattress 2** Castellated high specification foam mattress
- Mattress 3** Foam and gel hybrid mattress

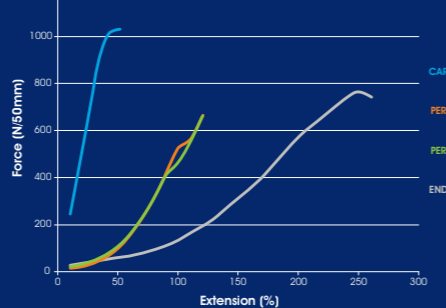
Covers for the mattresses were made using four fabrics:

- CAR676** Low stretch fabric
- PER200** 2 way stretch fabric (high stretch, low modulus)
- PER406** 4 way stretch (high modulus)
- END409** 4 way stretch (high stretch, high modulus)

Force/Extension Curves – Width



Force/Extension Curves – Length



For each mattress we made two covers; a tight cover and a loose cover.

The mattresses were pressure mapped using an XSENSOR ForeSite SS pressure mapping system, using a 73kg adult male subject.

RESULTS

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PRESSURE MAPS KEY:

5 15 25 35 45

