

Emerging research in pressure redistribution support surfaces

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Queensland
Government

Learning objectives

- Be aware of emerging research around pressure mattresses for wound healing for adults living in their own homes.
- Be aware of emerging research around the performance of pressure cushions on recliners versus standards-based (hard base) surfaces.



Are All Pressure Mattresses the Same?

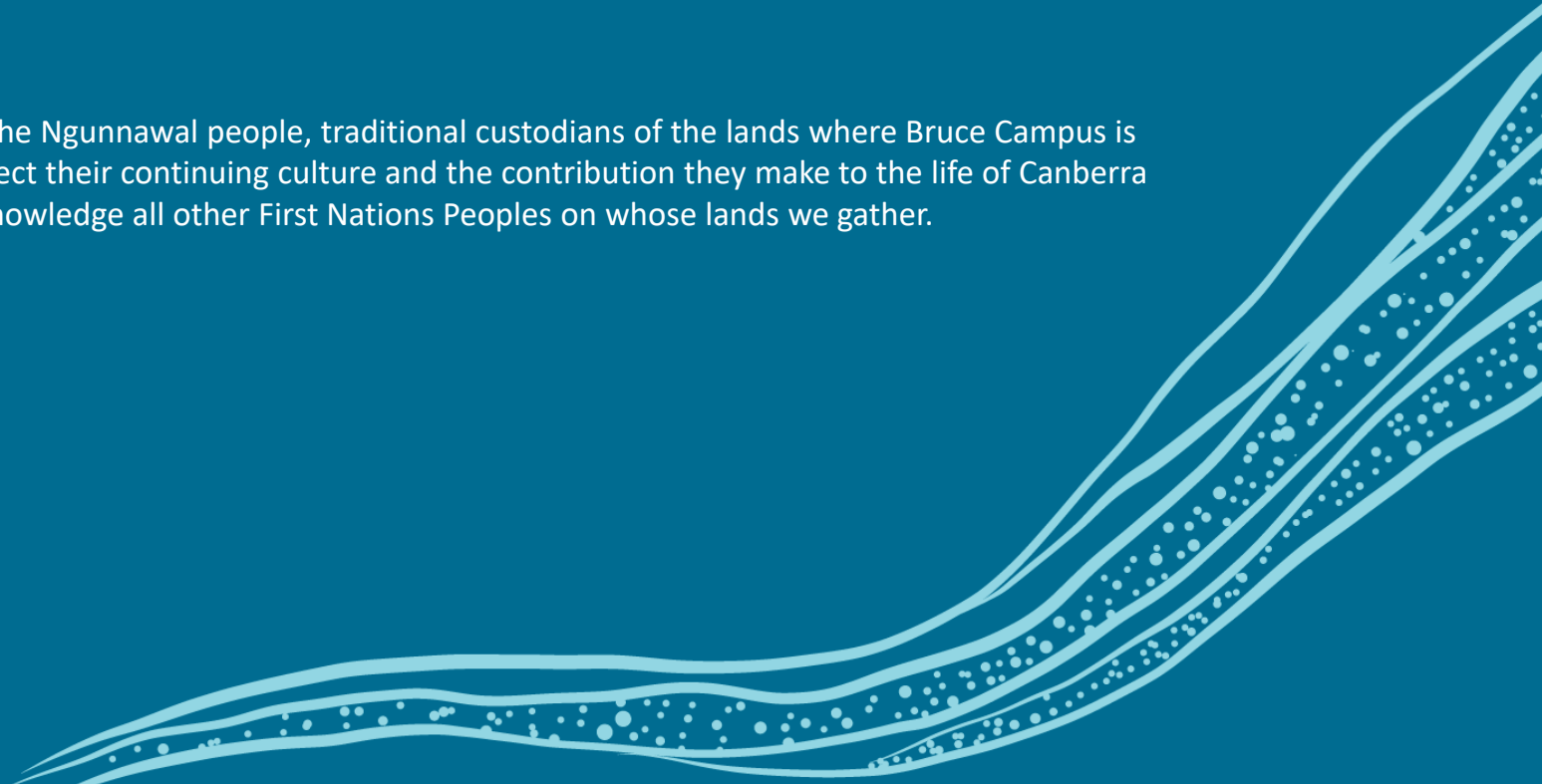
Katherine Rae





UNIVERSITY OF CANBERRA

The University of Canberra acknowledges the Ngunnawal people, traditional custodians of the lands where Bruce Campus is situated. We wish to acknowledge and respect their continuing culture and the contribution they make to the life of Canberra and the region. We also acknowledge all other First Nations Peoples on whose lands we gather.



Are all mattresses the same?

Comparing pressure mattresses for wound healing in the community

Background

Overview of the contemporary aetiology of pressure injuries and the literature

Pragmatic Research

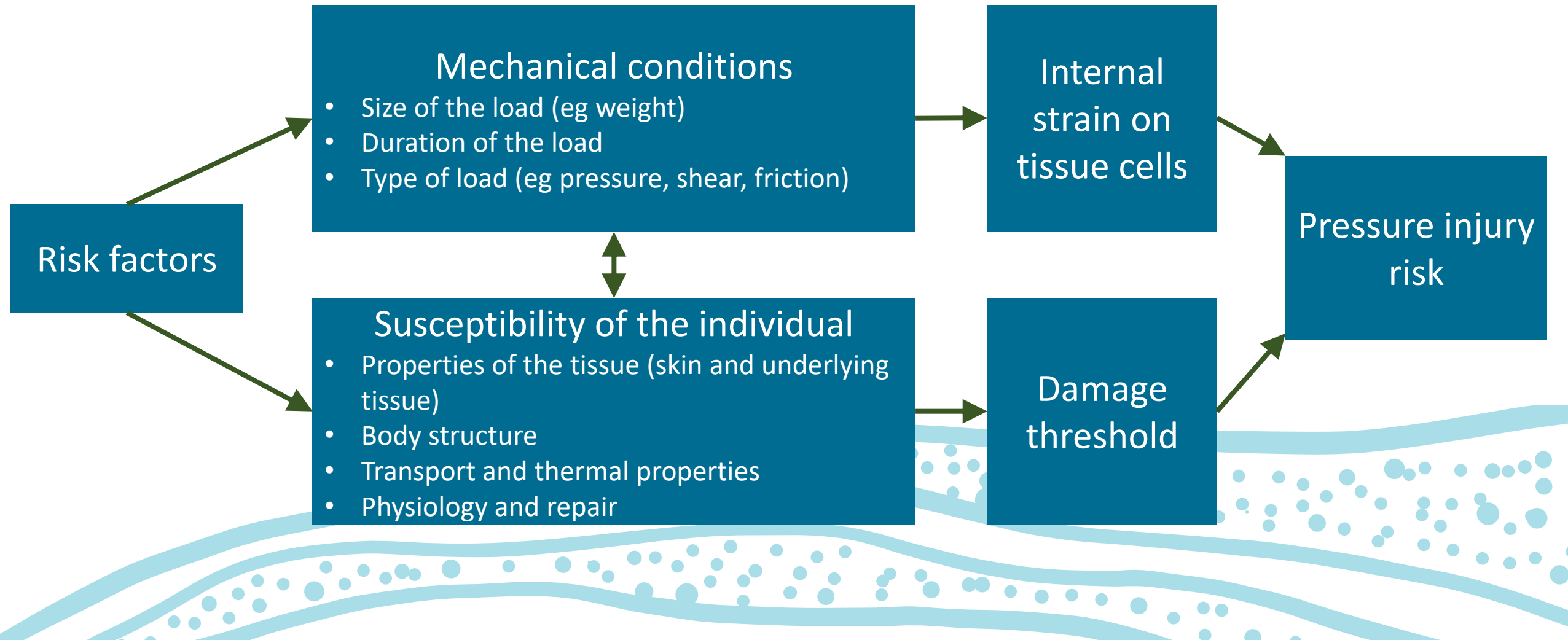
Details of the research in a community setting comparing different mattresses

Clinical Implications

What this means for prescribers of pressure mattresses

Aetiology of pressure injuries

European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel & Pan Pacific Pressure Injury Alliance. (2019). *Prevention and treatment of pressure ulcers/injuries: Clinical practice guideline. The International Guideline*. E. Haesler (Ed.). EPUAP/NPIAP/PPPIA.



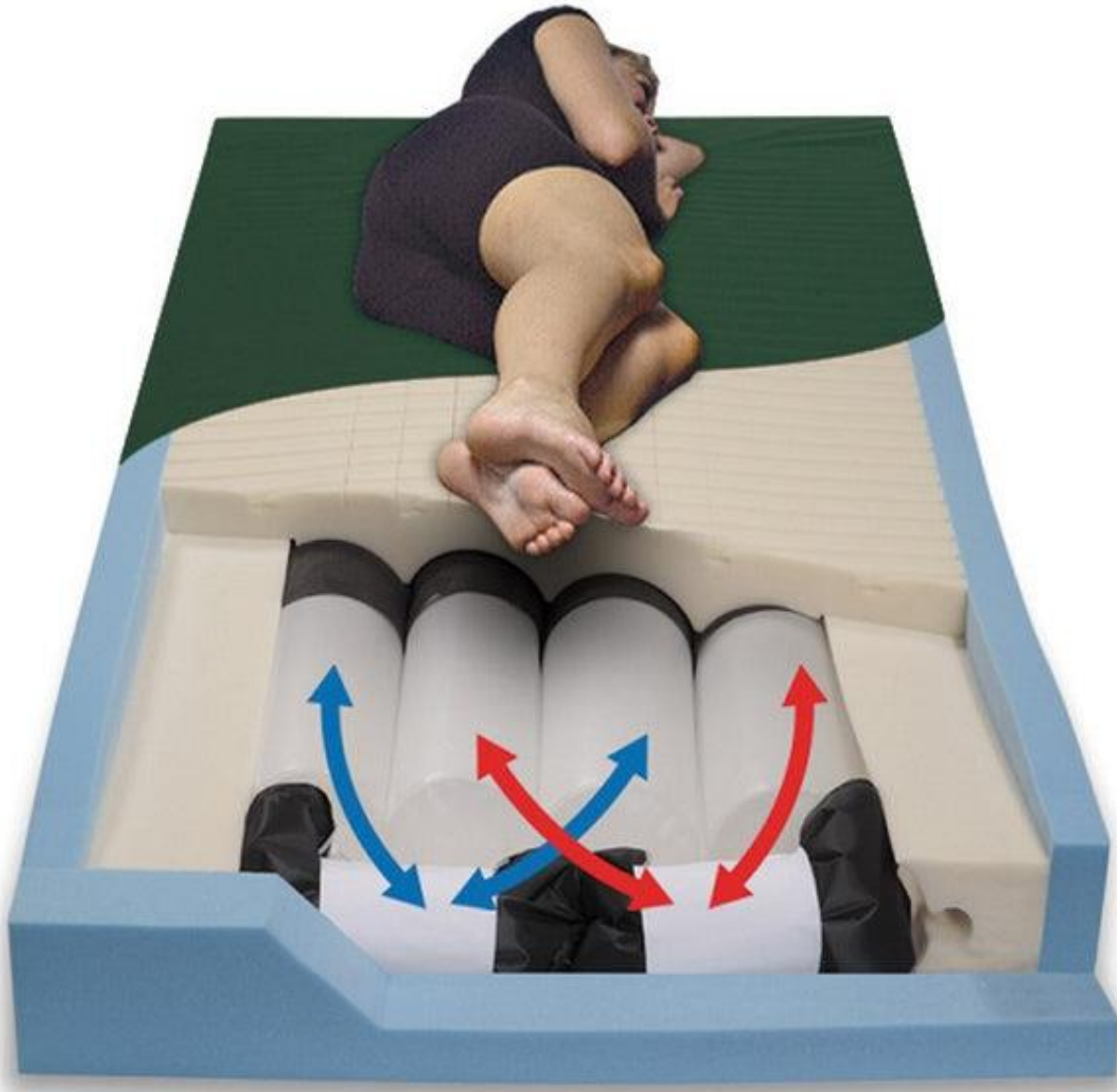
Active mattresses

Temporary offloading

Allows blood flow into the tissues for increased oxygenation and thus improved healing



(Auralis Plus Bariatric alternating pressure mattress, n.d.)



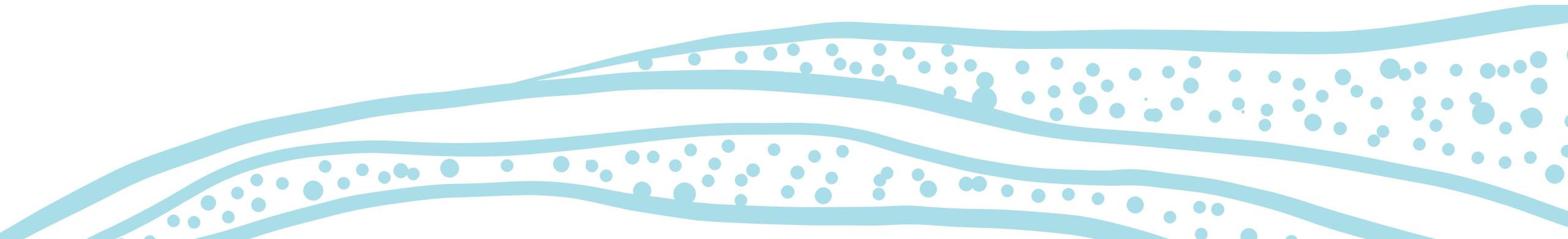
Reactive mattresses

Immersion and envelopment

By spreading the pressure over a larger area, more of the body is supported and thus peak pressures are reduced, particularly at bonier areas

“What is the comparative effectiveness of active (alternating) and reactive (static) mattresses?”

- Two components to ‘effectiveness’
 - Wound healing
 - Client satisfaction
- Secondary aim – to track effectiveness of implementation of pressure injury prevention strategies



Methodology

Who?

People aged 50+
with an existing
pressure injury

- Stage 2
- Unstageable
- SDTI

What?

Different types of
pressure mattress
- alternating
(active)
- static (reactive)
Excluding hybrid
mattresses

Cushion for when
sitting out of bed

Where
?

Based in the
home setting
People living in
their own
homes and
sleeping on
their own beds

When?

On the allocated
mattress until:
- one week after
pressure injury
has healed
- eight weeks

How?

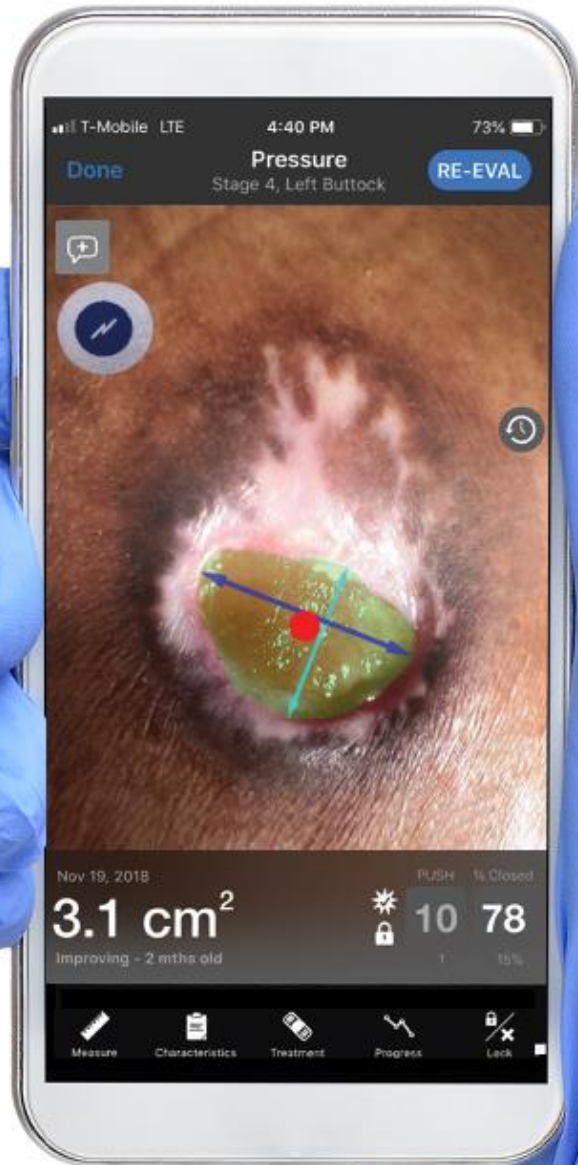
- Randomised
pragmatic RCT
- Survey looking
at subjective
aspects of the
mattress

What do we mean by pragmatic research?

Based on REAL PRACTICE:

- Tracking differences rather than controlling for them
- Involving members of the multi-disciplinary treatment team
- Keeping the interventions as close to what happens in practice as possible





Outcome Measures

Primary Outcome Measure:

- Time to complete healing
- Rate of healing (for wounds that did not heal)

Secondary Outcome Measures:

- Pain Scale (with functional descriptions)
- Subjective measures (Likert scale) including comfort, ease of use, time spent in bed

(Hand holding phone with wound photo, 2019)



What we found...

Based on preliminary data analysis:

- Trends are showing there is no clinical difference between the mattress types for wound healing or prevention
- Education made a difference to use of pressure injury prevention strategies in daily life
- Client preference plays a large part in mattress success

WELL...NOW WHAT?



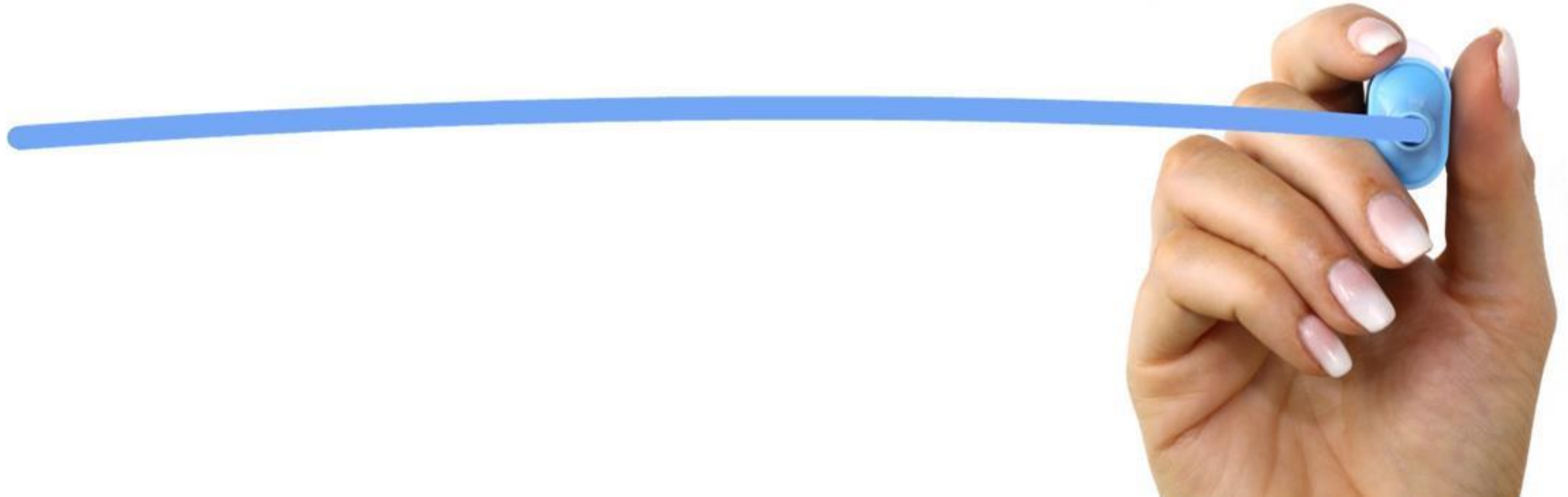
What does this mean for prescribers?

- Primary consideration should be given to the needs and preferences of the individual with regards to mattress choice eg
 - What type of pressure relief do they need
 - How well can they move around in bed (would need to consider a surface to maximise independence)
 - Do they have any challenges regarding moisture (would need to consider a surface with good breathability and air flow eg LAL)
- Trend towards the key role education plays in the increase of pressure injury prevention strategies

Image References:

- [*Auralis Plus Bariatric alternating pressure mattress*]. (n.d.). [photograph]. AlperMedikal. <https://alplermedikal.com/uploads/arjo-auralis-plus-havali-yatak-2.jpg>
- [*Hand holding phone with wound photo*]. 2019. [photograph]. Medline. https://www.medline.com/strategies/skin-health/digital-wound-photography/?_requestid=893729
- [*Man lying on PressureGuard CFT mattress*]. (2022). [diagram] SpanAmerica. http://www.spanamerica.com/myimages/header_cft_11.jpg
- BethanyM. (2019). *Now what – Finding Nemo*. Imgflip.com. <https://imgflip.com/i/3sukmt>

QUESTIONS



Queensland Health

Using pressure cushions on recliners

Gavin Brealey



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My story

- Post- and sub-acute
- Cushions used on recliners



The pilot study



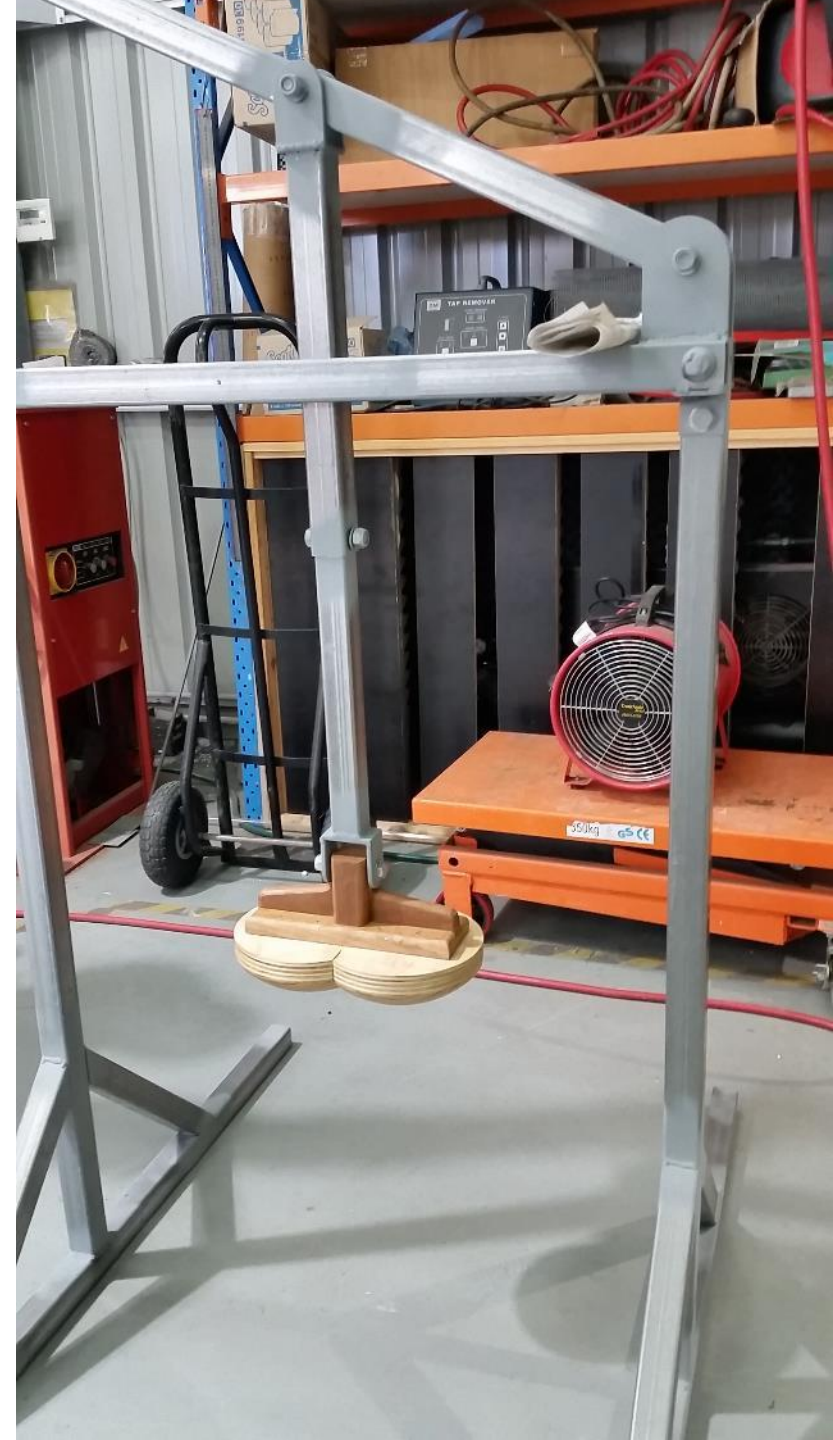
Armchair	mmHg	Better ↑ ↓ Worse	Firm Chair	mmHg
	>125/>175			
Single Cell Air	0.3%/0%		Multi-Cell Air	2.1%/0%
Dry Gel(1)	0.1%/0%		Single Cell Air	3.5%/0%
Foam	.7%/.1%		Foam	2.9%/0.9%
Gel (2)	1.7%/0%		Dry Gel	6.6%/3.2%
Multi-Cell Air	4.1%/0.1%		Gel Foam	10.1%/2.5%
No Cushion	2%/0.3%		Gel	4.7%/11.1%
Gel Foam	3.1%/0.5%		No Cushion	4.3%/12.7%



Masters research journey

INITIAL QUESTION:

Is it possible to create a model that will predict which PRC will significantly reduce maximal interface pressure (IP) on a client's own armchair using simple, readily available data collection tools?



First study

Research question: For adults over 65 years of age, is it possible to predict which pressure redistribution cushion (PRC) will provide interface pressure (IP) reduction on an armchair as compared to the armchair itself without a PRC?



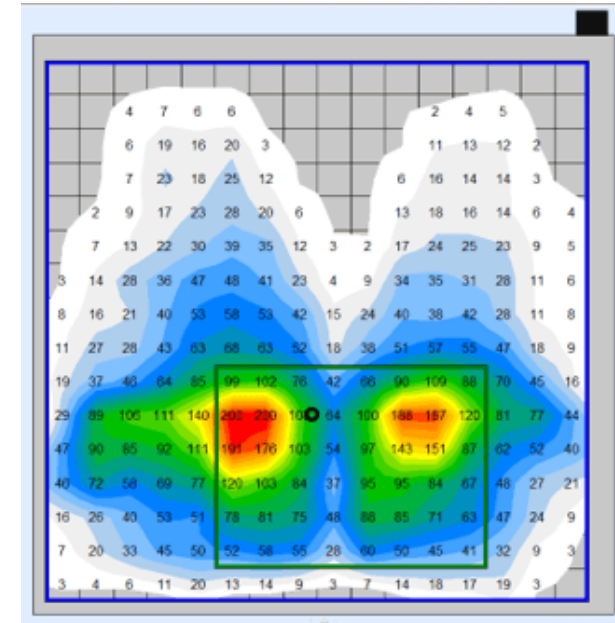
Method: overview

- Quasi-experimental study
- Human sample: Adults of 65 years of age, volunteer sampling
- Chair sample: 3 chairs from op shops.
- Intervention conditions:
 1. No cushion
 2. ROHO Quadtro
 3. Repose
 4. Jay Easy
 5. Equagel General
 6. Action Gel



Method: outcomes

- Boditrak pressure mapping device
- Each person had 3 sits on each cushion / no cushion on each chair, IP measures taken at 1:00, 1:30 and 3:00mins



Pressure injury prevention method	Outcome measure
Immersion (spread the pressure)	Median pressure of activated cells Interquartile range of activated cells
Offload (reduce high pressures)	Number of cells of 75/125mmHg

Method: data analysis

- Data cleaning (e.g., wallet in a pocket)
- Tests for normality to determine statistics to use
- Non-parametric tests (Freidman's) to compare performance across cushions / chairs
- Boxplots to visually demonstrate patterns
- Square root transformations (to enable linear regression modelling)
- Linear regression (to analyse all variable while controlling for others such as age or gender)

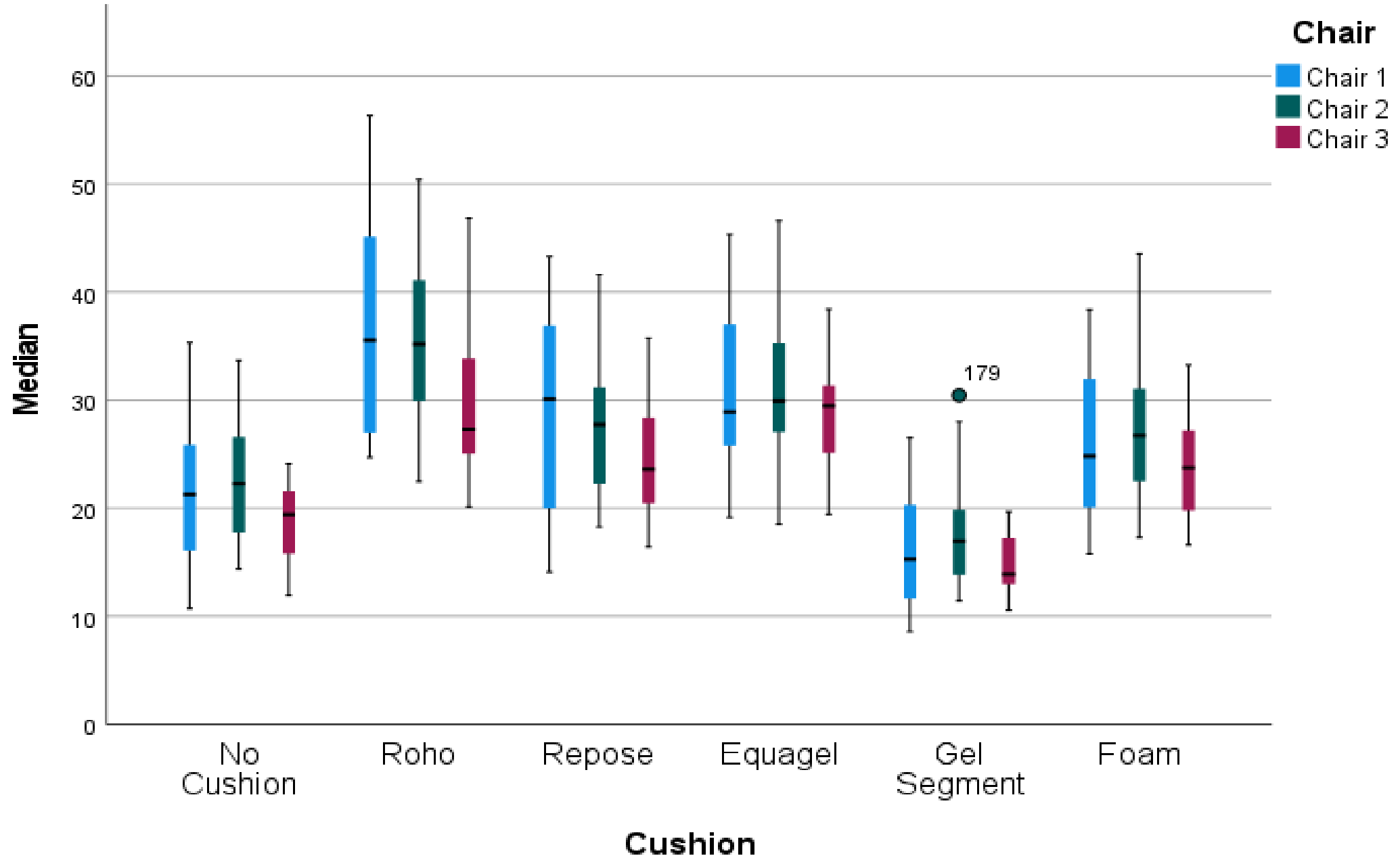


Results

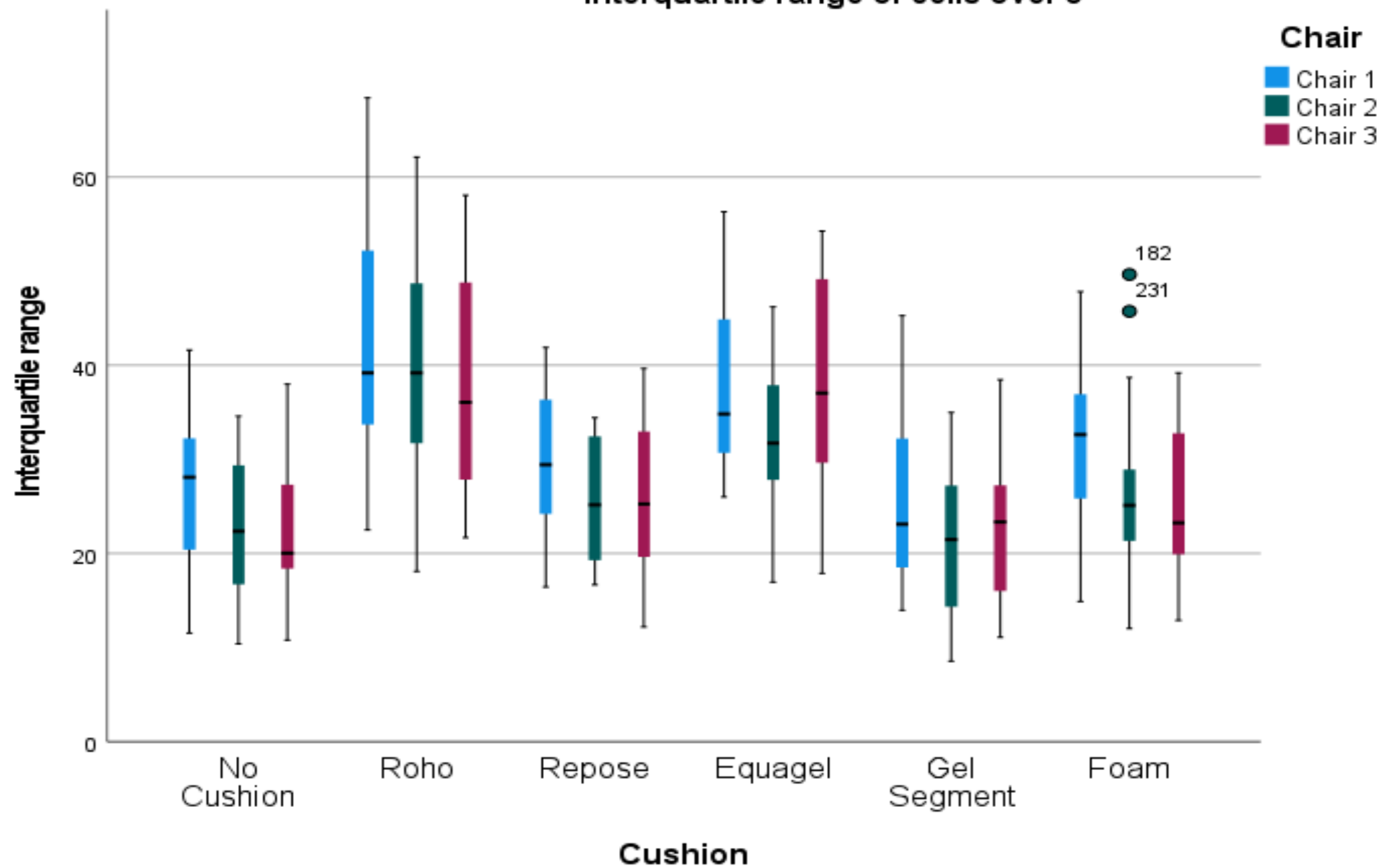
- 10 participants, median age 77.5 years, 50/50% male/female
- No significant difference between 1:00/1:30/2:00 mins
- No significant difference between 3 sites on same chair/cushion



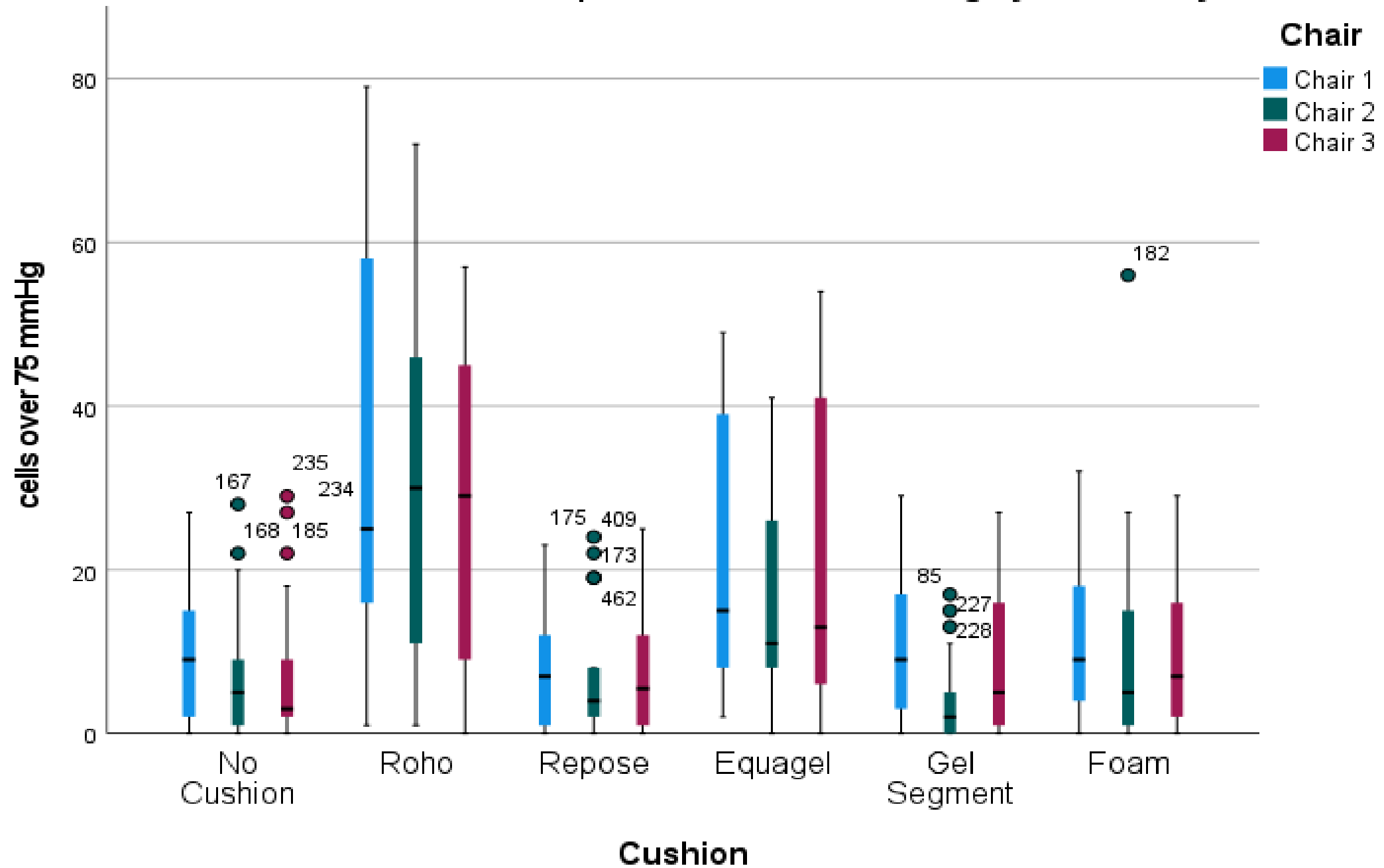
Clustered Boxplot of Median if X is greater than 0 by Cushion by Chair



Interquartile range of cells over 0



Clustered Boxplot of cells over 75 mmHg by Cushion by Chair



Outcomes: For Linear Regression		
Dependent Variable	Median X > 0	Interquartile range if X > 0
Model Summary	R=0.791, R Square=0.626	R=0.719, R Square=0.517
ANOVA significance	<0.001	<0.001
Co-efficients (Significance)	<0.001	<0.001
Roho	13.227	11.998
Repose	5.814	
Equagel	9.654	8.416
Gel	- 4.425	- 4.577
Foam	5.018	
No Cushion		- 3.319 (Significance 0.002)
Chair 1		4.103
Chair 2		
Chair 3	- 3.433	
Gender	2.518	3.527
Age	0.434	0.584
BMI	0.398	0.541

Armchair & cushion performance

- Chair 1 performed worse
- Chair 3 performed better
- Impact of pressure cushions was similar for all chairs

Better



Worse

GEL
RESPONSE
NO CUSHION
FOAM
EQUAGEL
ROHO



Findings

Findings	Findings
Confirming the existing literature	<ul style="list-style-type: none">• IP pressure risk increases with age and BMI• PRCs perform differently on recliners versus hard surfaces
Contradicting the existing literature	<ul style="list-style-type: none">• Males had higher IP pressure (Waterlow scale puts females at higher risk)
Adding to the existing literature	<ul style="list-style-type: none">• Effectiveness of PRCs on recliners differs between older people (this study) and younger people (pilot study)
Nuancing the existing literature	



Take home messages from this and previous studies

1. Multi-cell air (e.g., ROHO) and structured gel-foam hybrids tend to perform on recliners.
2. Depending on the population and risks, single-cell air (e.g., Repose) and viscous gel (e.g., Action gel) may improve interface pressure on recliners.
3. Foam has mixed effects.
4. Sometimes not adding a pressure cushion is best.

Brealey, G., James, E., & Hay, K. (2017). Pressure cushions in a home environment: How effective are they at reducing interface pressure and does the chair surface count? A pilot study. *Wound Practice & Research*, 25(4), 180-187.

Slayton, S., Morris, P., & Brinkley, J. (2017). Pressure mapping of a standard hospital recliner and select cushions with healthy adults. *Journal of Wound, Ostomy & Continence Nursing*, 44(3), 228-235.

PRACTICE ALERT

Using pressure cushions on recliners

Recliners vs wheelchairs
Pressure mapping shows that pressure cushions work differently on recliners vs hard surfaces on which they are usually tested

 **Stop**
Multi-cell air cushions (e.g., ROHO) and structured gel-foam hybrid cushions on recliners can make pressures worse

Think
Single-cell air (e.g., Repose), viscous gel (e.g., Action gel) and simple foam are sometimes effective



Consider
Sometimes not adding a pressure cushion is best



Learn
Learn more with MASS Clinical Education workshops, webinars and remote hands-on learning programs

health.qld.gov.au/mass/education

1. Brealey, G., James, E., & Hay, K. (2017). Pressure cushions in a home environment: How effective are they at reducing interface pressures and does the chair surface count? A pilot study. *Wound Practice & Research*, 25(4), 180-187.
2. Slayton, S., Morris, P., & Brinkley, J. (2017). Pressure mapping of a standard hospital recliner and select cushions with healthy adults. *Journal of Wound, Ostomy & Continence Nursing*, 44(3), 228-235.

Next steps

- Test whether we can find a buttocks analogue that replicates the pressure cushion performance pattern for older adults
- If we can, test a wider range of cushions and chairs and identify chair/cushion interaction effects



Pilot rig testing: Kate Garton, Kieran Broome 2020



Making a ballistic gel mould, 2022



Upcoming MASS Education

Anytime: Pressure Cushion Hands-on Learning Program

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[Expression of interest](#)

[Online learning materials](#)

13th Oct: [Cultural considerations regarding AT provision](#)

10th Nov: [Bathing & toileting aids](#)

30th Nov: [Meeting the AT needs of bariatric clients](#)



Feedback form



Complete the feedback form to receive a certificate of attendance

[Link to feedback form](#)



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