

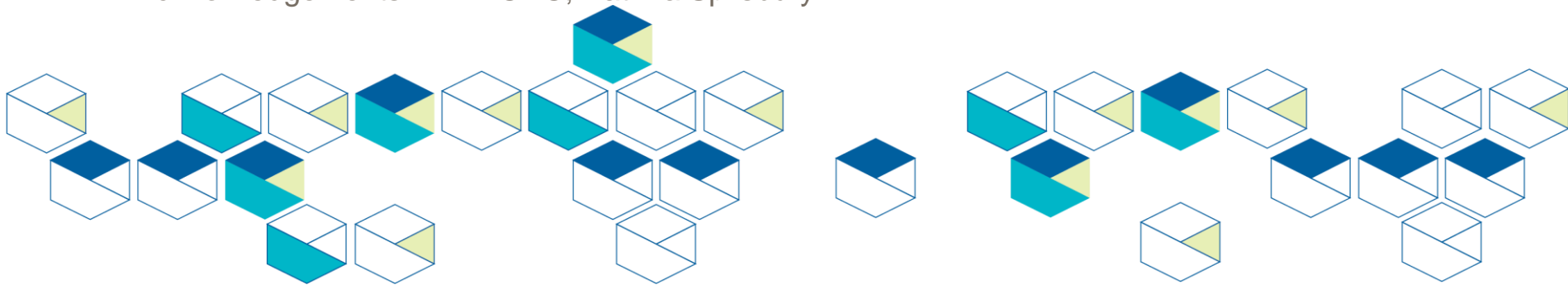


Government of **Western Australia**
South Metropolitan Health Service
Fiona Stanley Fremantle Hospitals Group

Post-burn healing: quantifying optimal compression

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Acknowledgements: WMI CRC; Katrina Spilsbury



I respectfully acknowledge the past and present traditional owners of this land on which we are meeting, the Turrbal, Yuggera, and Yugambeh people. I pay my respect to Elders past and present and to emerging community leaders.

I acknowledge that the Aboriginal population in Brisbane is diverse and includes Aboriginal people from many communities across Australia.

I also acknowledge the contributions of Aboriginal Australians and non-Aboriginal Australians to the health and well-being of all people in this country we all live in and share together –

Australia



Conflict of interest

- Smith & Nephew
 - No commercial interest or involvement in this study
 - Independent funding WMI CRC grant
 - Data collected by OT Research Assistant Inge Wong, employed by Fiona Wood Foundation
- No funding of compression garments (BSN, Second Skin, Jobskin)



Why this study?

- Lack of evidence to determine effectiveness of pressure garment therapy
- Lack of scientific justification for level of compression used
- Impact of graduation in compression
- Lack of evidence regarding interface pressure
- Failure to acknowledge differences based on body site, potential effect of movement



Potential benefit

Clinical decision-making in garment prescription

Cost-effective compression

Justification of required long-term compliance

A clinically-applicable measurement method

Aim: to provide high quality data on the intensity, duration and clinical impact of compression applied to burn injuries in the form of compression garments

Objectives:

1. Benchmarking of resting and movement associated changes in skin interface pressure by different garments
2. Investigate the influence of measured pressure levels at the skin interface on long term cellular changes in scar
3. Calculate relative health costs in pressure therapy regimes



Hypothesis

1. Compression of 15mmHg will be associated with inferior reduction in the cellular markers associated with scar
2. Compression of 25-30mmHg will be associated with lower mVSS at 6/12 than garments exerting 15mmHg
3. RTW garments fail earlier and are more variable in pressure



Protocol

- 30 patients with burn injuries on a limb that required a skin graft
- Two groups - RTW garments then Powernet
- Hydrophobic then Powernet (usual)
- Compression delivery assessed at time of fitting, then 6/52, 3/12, 6/12
- Cellular changes tracked through skin biopsies at 3 months and 6 months



Project Design

Prospective
Randomised
Single-centre
Blinded (patient)
Controlled

Inclusion	Exclusion
>18 yo	Pregnant/lactating
<15% TBSA	Facial/torso burn
Burn requiring surgery	Inability to provide consent
Burn on limb	Keloid scars

Control – custom garments (hydrophobic initially then powernet)

Intervention – ready to wear garments then custom powernet



Outcome measures

T1 <2/52 post surgery	T2 6/52 post burn	T3 3/12 post burn	T4 6/12 post burn
Pico-Press	Pico-Press	Pico-Press	Pico-Press
	mVSS	mVSS	mVSS
	POSAS	POSAS	POSAS
	BBSIP	BBSIP	BBSIP
	Photography	Photography	Photography



Progress to date

Completed recruitment August 2018 - 30 patients

- 26 x lower limbs (now 15)

- 4 x upper limbs (now 1)

Final data set anticipated February 2019

Now 16 patients – DNA, co-morbidities, telehealth

Outcomes to date

Objective 1: Investigate the influence of measured pressure levels at the skin interface on long term cellular changes in scar

- Hypothesis 1 - Compression of 15mmHg will be associated with inferior reduction in the cellular markers associated with scar
- Hypothesis 2 - Compression of 25-30mmHg will be associated with lower mVSS at 6/12 than garments exerting 15mmHg

No results to date. No histological analysis of skin biopsies until all samples collected

Outcomes to date

Objective 2: Benchmarking of resting and movement associated changes in skin interface pressure by different garments

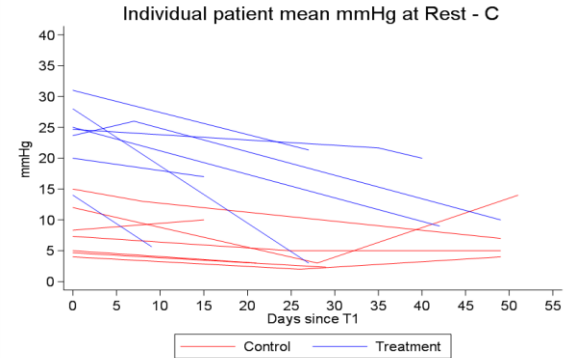
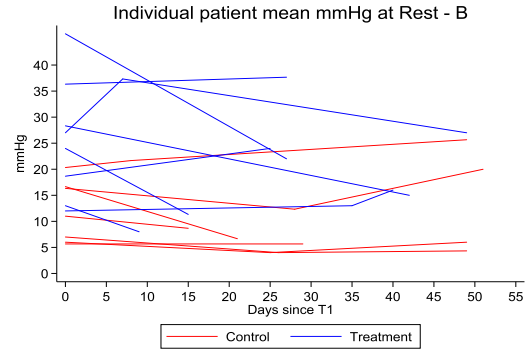
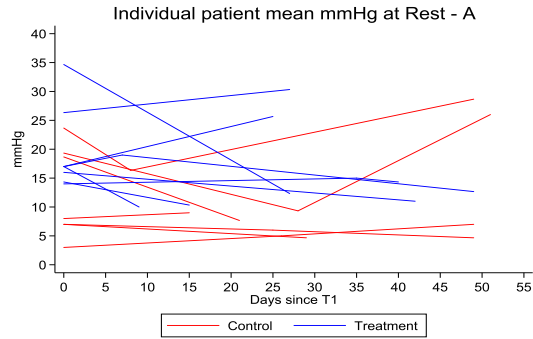
- Hypothesis 3 - RTW garments fail earlier and are more variable in pressure

Interface pressure – level of compression

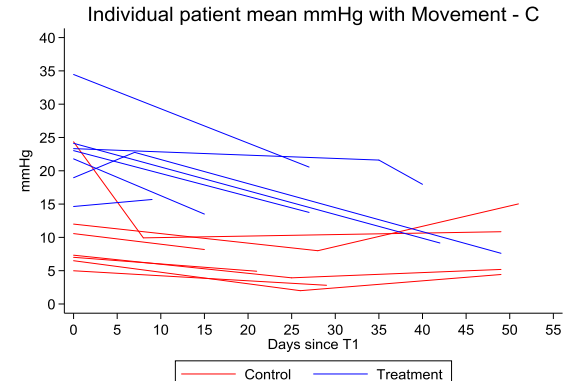
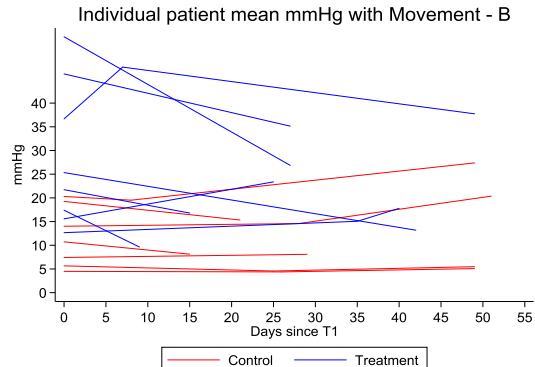
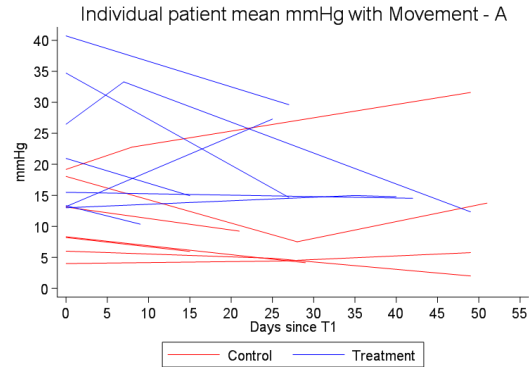
	Control group N=9		Treatment group N=13		p-value
	Mean	SD	Mean	SD	
PicoPress readings at T1 (mmHg)					
All sites					
A rest mean	11.1	7.4	19.2	6.2	0.012
A Movement Min	9.4	5.7	19.1	9.7	0.016
A Movement Max	12.4	7.3	27.4	20.2	0.048
Median from A movement	10.1	5.7	20.9	9.6	0.013
Mean from A movement	10.2	6.0	21.0	10.2	0.017
B rest mean	11.4	5.6	23.1	10.4	0.006
B Movement Min	10.6	6.3	23.7	13.5	0.014
B Movement Max	15.0	8.5	32.2	17.5	0.014
Median from B movement	12.0	5.9	26.7	14.6	0.024
Mean from B movement	11.0	6.2	27.4	14.9	0.010
C rest mean	8.5	4.0	23.1	6.1	<0.001
C Movement Min	7.8	4.8	20.4	6.3	<0.001
C Movement Max	12.0	9.3	28.1	11.2	0.003
Median from C movement	9.9	5.6	22.7	5.6	<0.001
Mean from C movement	9.8	6.4	23.4	5.4	<0.001

	Control group N=9		Treatment group N=13		p-value
	Mean	SD	Mean	SD	
PicoPress readings at T2 (mmHg)					
All sites					
A rest mean	8.3	4.0	16.7	7.7	0.022
A Movement Min	7.0	6.1	17.5	8.8	0.020
A Movement Max	13.1	13.9	22.9	8.6	0.122
Median from A movement	8.4	6.6	20.0	8.6	0.013
Mean from A movement	8.4	6.6	20.0	8.7	0.013
B rest mean	9.0	6.3	21.0	11.4	0.028
B Movement Min	8.6	5.3	19.6	9.5	0.017
B Movement Max	15.9	10.0	27.3	13.7	0.093
Median from B movement	10.4	5.9	23.8	14.7	0.043
Mean from B movement	10.7	5.8	23.5	12.8	0.030
C rest mean	5.5	4.3	14.8	8.9	0.028
C Movement Min	4.7	2.9	14.9	3.8	<0.001
C Movement Max	6.7	3.1	20.9	7.3	0.001
Median from C movement	5.7	3.0	16.1	4.9	<0.001
Mean from C movement	5.7	3.0	16.7	5.0	<0.001

Interface pressure at rest



Interface pressure with movement



Interface pressure – relative difference

At rest mean	Location A			Location B			Location C		
	Δ	95%CI	p-value	Δ	95%CI	p-value	Δ	95%CI	p-value
Time									
1	ref	-	-	ref	-	-	ref	-	-
2	-3.2	-6.4 - -0.0	0.051	-3.2	-6.6-0.1	0.059	-6.0	-9.4 - -2.6	0.001
3	0.9	-3.6-5.6	0.680	0.5	5.4 4.3	0.828	-5.0	-9.4 - -0.3	0.037
Group									
Control	ref	-	-	ref	-	-	ref	-	-
Treat	8.6	4.6-12.7	<0.001	13.4	8.9-17.9	<0.001	12.0	8.5-15.5	<0.001
Site of injury									
Lower leg	ref	-	-	ref	-	-	ref	-	-
Foot	7.2	2.7-11.7	0.002	11.0	6.0-16.0	<0.001	2.5	-1.3-6.2	0.195
Arm	4.7	-1.6-11.0	0.145	0.1	-7.0-7.1	0.984	-7.0	-13.8- -0.2	0.043
Upper leg	-2.6	-10.0-4.8	0.489	-3.8	-12-4.5	0.365	-0.9	-7.7- -5.9	0.798

Where to from here?

- Provoked more questions than elicited answers
- Integration of T3
- Comparison between textiles; textile analysis
- Histochemical analysis of skin biopsies
- Correlation with interface pressures
- ?integration of compression measurement into clinical practice



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