Peripheral extracorporeal membrane oxygenation (ECMO) cannula dressing and securement practices across Australia and New Zealand

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Critical Care RESEARCH GROUP

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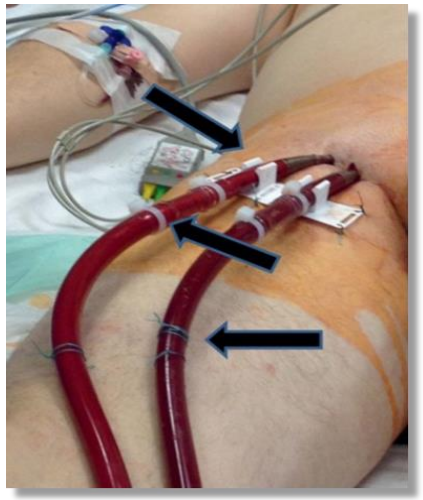
ECMO

- Advanced mechanical circulatory support for refractory cardiac and/or respiratory failure
- First successful use in humans in early 1970's
- H1N1 influenza pandemic of 2009 increased usage globally

The success of ECMO therapy is reliant on properly placed cannulae and them staying there

Dislodgement



lposition/ dislodgement
s a patient safety risk 3

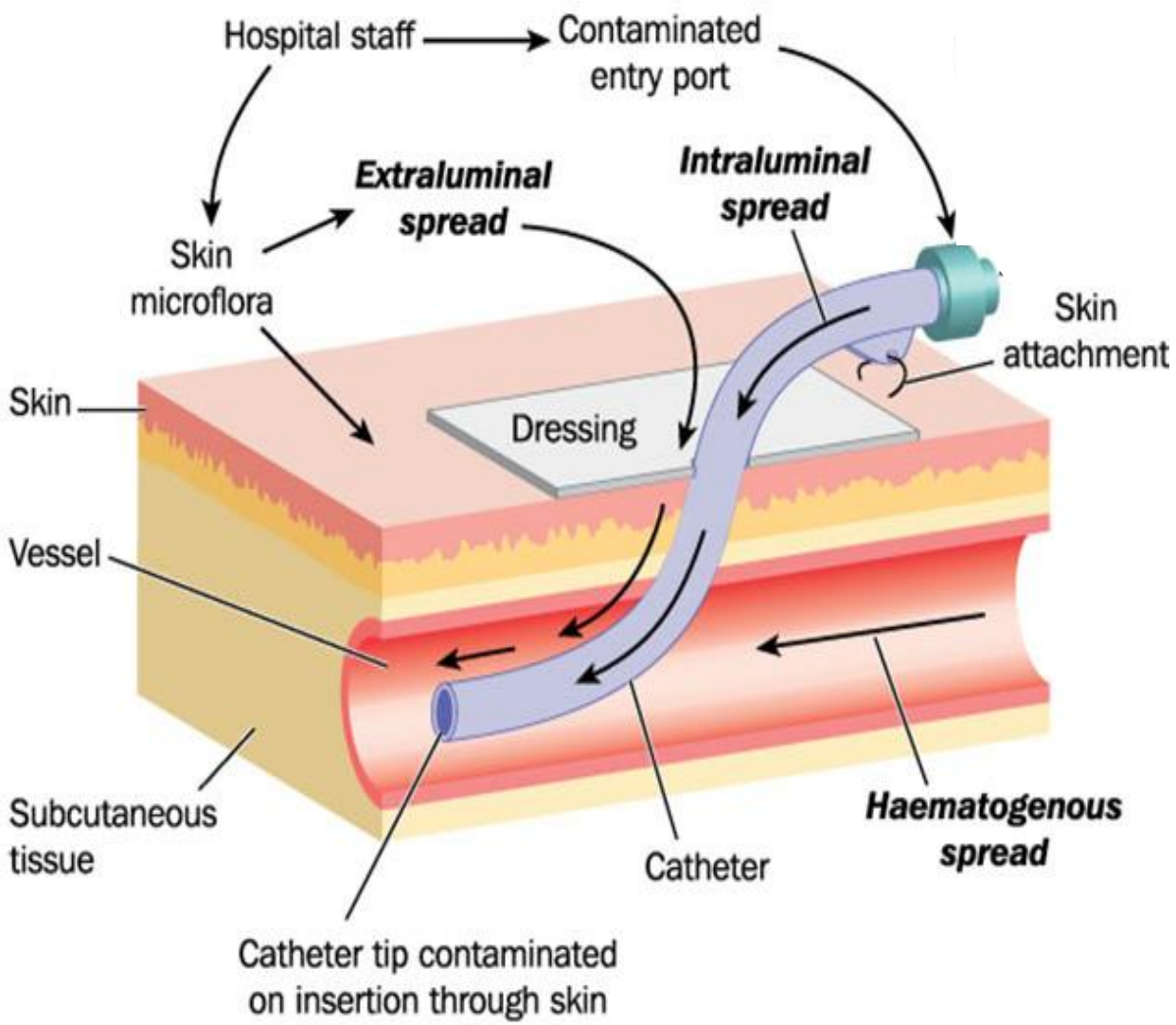
Global practice survey

dentified a dislodgement event
leading to an adverse outcome

Over a quarter directly
tributable to ineffective securement

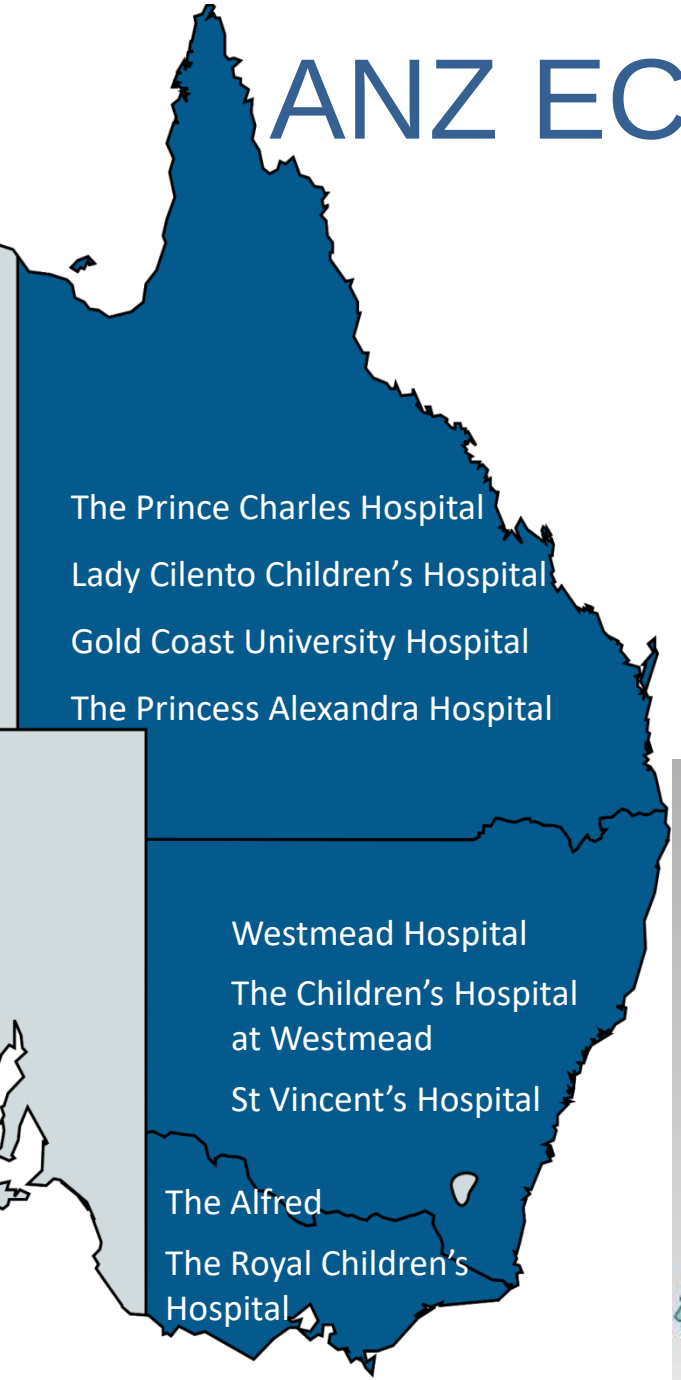
Reason given for dislodgement	Frequency N=71 (n, %)
Inadequate/ineffective securement	**20 (28)**
During cannula insertion/manipulation	10 (14)
Patient removed cannula	9 (13)
During turning or bathing patient	8 (11)
During transport of patient	3 (4.2)
Cannula material failure	2 (2.8)
During ambulation	1 (1.4)
No reason given	18 (25)

Infection



- Nosocomial infection in ECMO has a reported prevalence of up to 64% (Schmidt 2012)
- ECMO cannula-related infection:
  - Affects 7 to 18% of patients (Davies JAMA 2009; Austin CCR 2017; Allou ASAIO 2018; Thomas AnnIC 2017)
  - Incidence b/w 7.1 & 17.2 episodes/1000 ECMO days (Schmidt CID 2012; Allou ASAIO 2018)
- Difficult to diagnose

ANZ ECMO Infection Point Prevalence study



- 12 month prospective, observational point prevalence study
- 11 Adult and Paediatric ECMO centres across Australia and New Zealand
- Data collected for every patient receiving ECMO during 12 pre-determined data collection weeks
- Data collection will be finalised by December 2018

Sample characteristics

	Adults (n = 80)	Paediatrics (n = 21)
Age	45 years (±6)	Range 3 days - 14 years
Sex	Male 63%	Male 43%
Average Severity of Illness Score	APACHE II 18.2	PIM3 -1.32
RASS score	-3.5 (mod-deep sedation)	-3 (mod sedation)
ECMO Mode	VA (51.2%) VV (45%) VA + Impella (1.3%) V-PA (1.3%) VV+A (1.3%)	VA (57.1%) VV (38.1%) V-PA (4.8%)
Days on ECMO to study day	6.7 days	4.8 days

Cannulae characteristics

	Adults (n = 80)	Paediatrics (n = 21)
Total Cannulae	192	39
Peripheral Cannulae	183 (95%)	25 (64%)
Cannula size	21F	17F
Most frequent insertion site/Configuration	•Femoro – Femoral 70% •Femoro – Jugular 23%	•Femoro-Jugular 33% •Jugular 25% •Femoro-Femoral, Carotid-Jugular, 17% each

Dressing practices

	Adults (n = 80)	Paediatrics (n = 21)
Dressing type at insertion site		
Transparent semi-permeable	**84%**	**50%**
Transparent, CHG-impregnated	**10%**	**20%**
CHG-impregnated disk + transparent dressing	**4%**	**0**
Other (Ioban Incise drape; hydrocellular foam)	**0%**	**20%, 10%**
Days in situ (on study day)		
< 1 day	**24%**	**14%**
1-3 days	**32%**	**55%**
4-5 days	**16%**	**16%**
> 5 days	**22%**	**32%**
Adherence to hospital dressing guidelines	**93%**	**83%**

Securement practices

	Adults (n = 80)	Paediatrics (n = 21)
At insertion site		
Sutures	**50%**	**95%**
Along circuit tubing		
Sutures	**37%**	**64%**
Commercial sutureless device	**49%**	**9%**
Adhesive bandage	**29%**	**27%**
Clip/fix to bed or other object	**11%**	**45%**
Points of securement		
1 point	**12%**	**50%**
2 points	**64%**	**27%**
>2 points	**23%**	**23%**
Nil	**1%**	**0**
Adherence to hospital securement guidelines	**83%**	**83%**

Transport and mobility practices

	Adults (n = 80)	Paediatrics (n = 21)
Transport out of ICU		
Interhospital transfer	27%	0
Interdepartment transfer	43%	42%
Mobility practices		
Tilt table	2.5%	0
Standing	1.2%	8%
Hoist	0	0

What now?


Optimal ECMO cannula dressing & securement to reduce dislodgement and infection

Preliminary in vitro work

Transparent dressing

Tissue adhesive

Bull et al. Intensive Care Medicine Experimental (2018) 6:6
https://doi.org/10.1186/s40635-018-0171-8

Intensive Care Medicine
Experimental

RESEARCH Open Access

Extracorporeal membrane oxygenation line-associated complications: in vitro testing of cyanoacrylate tissue adhesive and securement devices to prevent infection and dislodgement

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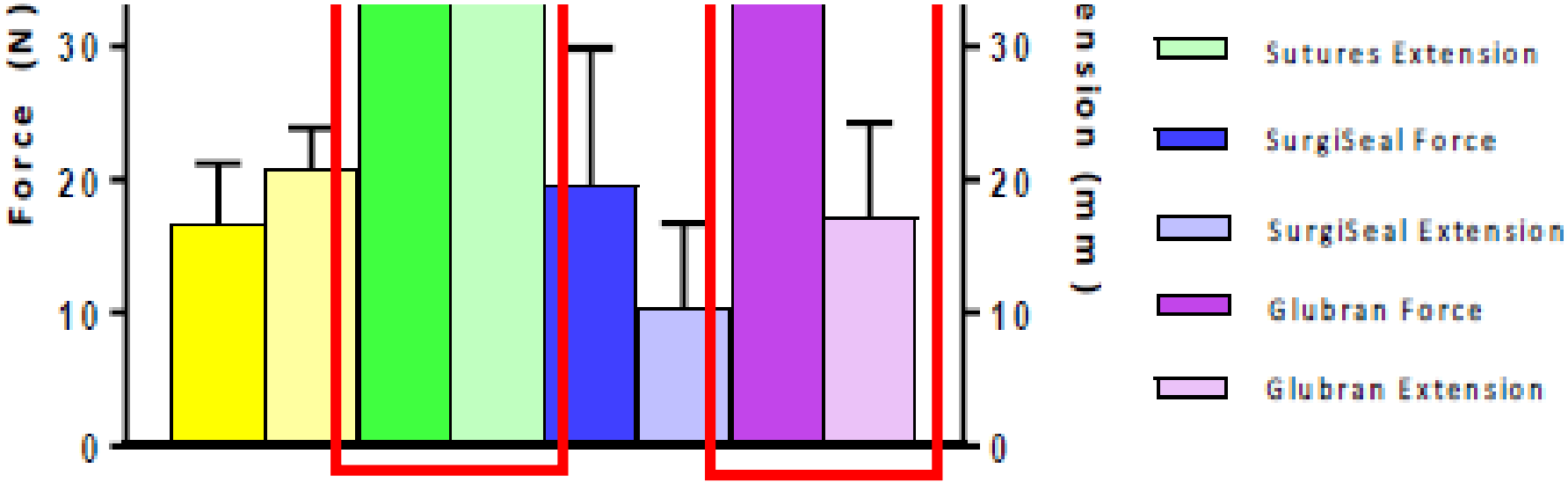

Randomised controlled trial

3 × 2 Factorial Design **<u>Primary outcomes</u>:** **1. Dislodgement/malposition** **2. Infection**	**Securement (Control): SSD** Sutureless securement device	**Securement: SSD + S + TA** Sutureless securement device + Sutures + Tissue Adhesive
Dressing (Control): SPU Standard Polyurethane Dressing	SSD + SPU	SSD + S + TA + SPU
Dressing: CHG Chlorhexidine Gel-Pad Dressing	SSD + CHG	SSD + S + TA + CHG
Dressing: TA + SPU Tissue Adhesive + Standard Polyurethane Dressing	SSD + TA + SPU	SSD + S + TA + CD + SPU

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