


Randomised controlled trials in PIVs

1. PIVs in acute care adults (Marsh et al, 2015)
2. PIVs inserted in emergency department (Budgen et al, 2016)
3. PIVs in acute care adults (unpublished) 

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1. PIV in acute care adults (Pilot RCT)

- 4 arm, non-blinded, single centre pilot RCT
- Primary outcome: **PIV failure**
- Compared:
 1. Tissue adhesive
 2. Standard transparent dressing
 3. Bordered transparent dressing
 4. Sutureless securement device

JVA

J Vasc Access 2015; 16 (3): 237-244
DOI: 10.5301/jva.5000348
ORIGINAL ARTICLE

Securement methods for peripheral venous catheters to prevent failure: a randomised controlled pilot trial

Nicole Marsh^{1,2}, Joan Webster^{1,3}, Julie Flynn^{1,4}, Gabor Mihala^{1,5}, Barbara Hewer¹, John Fraser^{1,6}, Claire M. Rickard^{1,7,8}

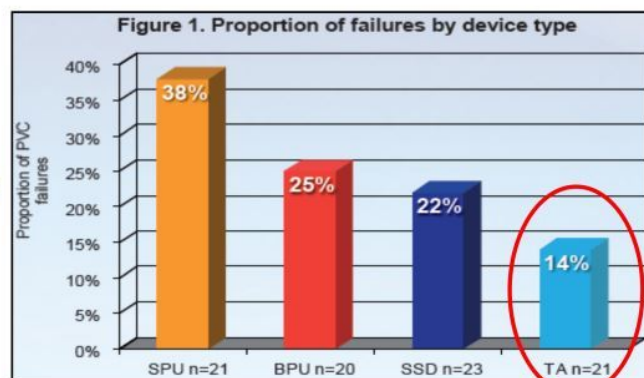
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1. PIV in acute care adults (Pilot RCT)

RESULTS

- n=85
- 5305 PIV hours
- 4 adverse skin events all in TA group
 - 1 skin tear
 - 2 rashes
 - 1 blister



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2. PIV inserted in emergency department

- 2 arm non-blinded RCT in metropolitan ED
- Primary outcome: **PIV failure** at 48 hours
- Compared:
 1. Tissue adhesive
 2. Bordered transparent dressing

THE PRACTICE OF EMERGENCY MEDICINE/ORIGINAL RESEARCH

Skin Glue Reduces the Failure Rate of Emergency Department-Inserted Peripheral Intravenous Catheters: A Randomized Controlled Trial

Simon Buggden, MBChB, FACEM¹; Karla Shean, RN; Mark Scott, MBBS, FACEM; Gabor Mihala, MEng(Mech), GradCert(Biostatistics); Sean Clark, MBBS, FACEM; Christopher Johnstone, MBChB, FACEM; John F. Fraser, MD, PhD; Claire M. Rickard, PhD, RN



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2. PIV inserted in emergency department

RESULTS

- n= 369
- No adverse skin reactions
- Occasional feeling of 'pulling' noted during removal

	Standard Care, No. (%)	Skin Glue, No. (%)	Difference (95% CI), %	
Primary outcome				10% absolute reduction
PVC failure	52 (27)	31 (17)	-10 (-18 to -2)	
Secondary outcomes				P=0.02
Infection	0	0	0	
Phlebitis	9 (5)	6 (3)	-1 (-5 to 3)	
Occlusion	20 (11)	15 (8)	-2 (-8 to 4)	
Dislodgement	26 (14)	13 (7)	-7 (-13 to 0)	

CI, Confidence interval.

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3. PIVs in acute care adults (large RCT)

- 2 site, 4 arm, single blinded definitive RCT
- Primary outcome: **PIV failure** (dislodgement, occlusion, phlebitis, and primary bloodstream or local infection)
- Compared:
 1. Tissue adhesive and standard transparent dressing
 2. Simple transparent dressing
 3. Bordered transparent dressing
 4. Sutureless securement device and standard transparent dressing

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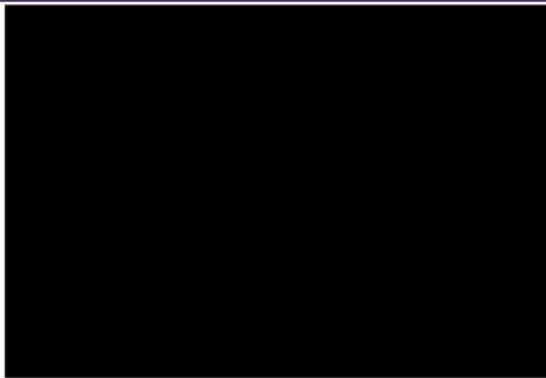
Randomised controlled trials in peripheral arterial catheters (ACs)

1. ACs in adult ICU (Edwards et al, 2014)
2. ACs inserted in adult operating theatre and maintained in ICU (Reynolds et al, 2015)

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TA application to AC



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1. ACs in adult cardiac and general ICU

- 4 arm, single centre, unblinded **pilot RCT**
- Primary outcome: **AC failure** (complete dislodgement, occlusion, pain or any infection)

• Compared:

1. Tissue adhesive
2. Bordered polyurethane dressing
3. Sutureless securement device
4. Standard polyurethane dressing

 Crit Care Resusc 2014; 16: 175-183

A pilot trial of bordered polyurethane dressings, tissue adhesive and sutureless devices compared with standard polyurethane dressings for securing short-term arterial catheters

Melannie Edwards, Claire M Rickard, Ivan Rapchuk, Amanda Corley, Nicole Marsh, Amy J Spooner, Gabor Mhala and John F Fraser

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1. ACs in adult cardiac and general ICU

Results

- n=195
- 7147 AC hours
- Patient and staff satisfaction high in all groups
- Anecdotally, TA degraded over ~ 3 days

	SPU n=47	BPU+ SPU n=43	SSD + SPU n=49	TA + SPU n=56
AC failure	10 (21%)	2 (5%) *	8 (16%)	6 (11%)
Adverse skin events	0	0	1	2
Dressing costs	\$3.48	\$5.07*	\$10.90*	\$17.70*

SPU - Standard polyurethane dressing; BPU - Bordered polyurethane dressing; SSD - Sutureless securement device; TA - Tissue adhesive
* p<0.05 when compared with control (SPU)

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2. ACs in adult OT and general ICU

- 4 arm, single centre, unblinded **pilot RCT**
- Primary outcome: **AC failure** (complete dislodgement, occlusion, phlebitis or any infection)
- Compared:
 1. Tissue adhesive
 2. Bordered polyurethane dressing
 3. Sutureless securement device
 4. Standard polyurethane dressing



Contents lists available at ScienceDirect
Australian Critical Care
Journal homepage: www.elsevier.com/locate/aucc

Research paper
Novel technologies can provide effective dressing and securement for peripheral arterial catheters: A pilot randomised controlled trial in the operating theatre and the intensive care unit

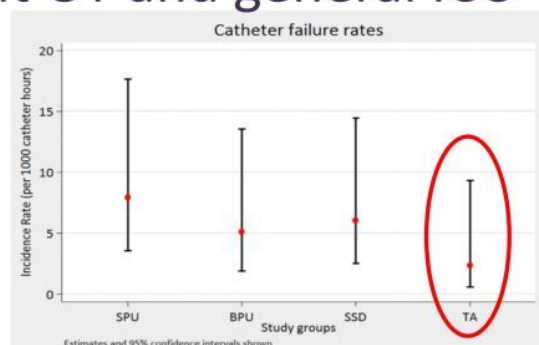
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2. ACs in adult OT and general ICU

Results

- n=195
- 7147 AC hours
- 14% reduction in failure with TA when compared with control (SPU)
- Patient satisfaction highest in TA group





SPU - Standard polyurethane dressing; BPU - Bordered polyurethane dressing; SSD - Sutureless securement device; TA - Tissue adhesive

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Randomised controlled trials in CVADs

1. PICCs in acute care adults (unpublished) 
2. PICCs in paediatrics (Kleidon et al, 2017)
3. Jugular non-tunnelled CVAD in adult post-cardiac surgery patients (Rickard et al, 2016) 
4. Non-tunnelled CVAD in paediatric ICU (unpublished)
5. Tunnelled CVAD in paediatrics (Ullman et al, 2017)

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Application of TA to PICC



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1. PICCs in acute care adults

- 4 arm, single centre, single blinded **pilot** RCT
- Primary outcome: PICC failure (infection, dislodgement, occlusion, and/or catheter fracture)
- Compared:
 1. Standard polyurethane dressing + Sutureless securement device + CHG disc
 2. Polyurethane with Absorbent Lattice pad dressing + CHG disc
 3. Combination Securement-Dressing (Sorbaview™) + CHG disc
 4. Tissue Adhesive + Standard polyurethane dressing

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1. PICCs in acute care adults



Results

- n=121
- 1132 PICC days
- PAL group – ceased recruitment due to safety concerns
- High incidence of adverse skin events in all groups

	Sample Size n=121	Failure Rate (%)	Incident rate/1000 cath days	Skin events* (%)
Standard polyurethane + Sutureless securement + CHG disc	39	4 (10%)	9	12 (30%)
Integrated Securement-Dressing + CHG disc	42	3 (7%)	9	10 (23%)
Tissue Adhesive + Standard polyurethane	35	3 (8%)	10	13 (36%)
Polyurethane absorbent lattice dressing + CHG	5	1 (20%)	17	1 (20%)

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* any of rash, blister, itchiness, skin tear and bruising at device removal



1. PICCs in acute care adults



Lessons learned from this trial

- Positive feedback by clinicians regarding **TA to control haemostasis** (but not formally tested)
- TA easily removed from skin but **built up++ on PICC**, threatening skin injury
- Manual **removal of TA from PICCs risked dislodgement**, and was time consuming
- TA has **potential benefits at insertion**, its use for repeated dressings during PICC dwell was not feasible



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2. PICCs in paediatrics

- 3 arm, single centre RCT
- Primary outcome: PICC failure (cessation of function prior to completion of therapy)
- Compared:
 1. Bordered polyurethane dressing + sutureless securement device
 2. Integrated securement dressing
 3. Tissue adhesive + bordered polyurethane dressing

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2. PICCs in paediatric ICU

Results

- n=95
- Low overall failure rate (5%)
- Cost of TA higher but fewer dressing changes

	BPU + SSD n=32	ISD n=31	TA + BPU n=32
PICC failure	2 (6%)	2 (6%)	1 (3%)
Incident rate/1000 catheter days	8	8	3
Adverse skin events*	5 (16%)	3 (10%)	10 (31%)
Parental satisfaction (0-10)	7.6	9.7	8.5

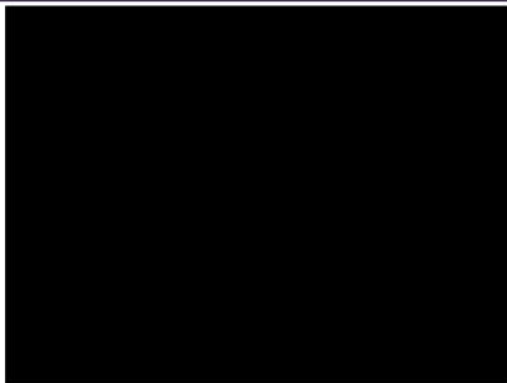
*Itchiness, rash, skin tear, blister or bruising at any time during study

2. PICCs in paediatric ICU

Lessons learned from this trial

- **Excessive application** of TA on insertion may lead to **skin tears**
- **Less is more** → 2 drops at insertion site and 2 drops to securement wings
- TA was removed easily from skin but difficult to remove from PICC resulting in **residual build up** → maybe not a long-term securement option
- TA **could be useful as an adjunct to other dressings**, to provide immediate haemostasis, reduce post-operative bleeding, and the need for early dressing change



TA application to jugular CVL



3. Jugular non-tunnelled CVAD in adult cardiac ICU

- 4 arm single centre **pilot RCT**
- Primary outcome: CVAD failure
- Compared:
 1. Bordered polyurethane + suture (control)
 2. Absorbent dressing + suture
 3. Sutureless securement device x 2 + standard polyurethane dressing
 4. #1 Tissue adhesive + standard polyurethane dressing
#2 Tissue adhesive + standard polyurethane dressing + suture

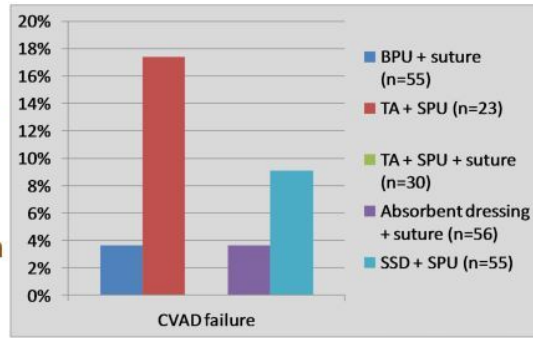


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3. Non-tunnelled jugular CVAD in adult cardiac ICU

Results

- n=221
- 15 479 CVAD hours
- TA without a suture in jugular CVADs was unsafe
- TA - Less patient and staff satisfaction, and more pain on removal



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3. Non-tunnelled jugular CVAD in adult cardiac ICU

Lessons learned from this trial

- Factors likely to be associated with TA failure:
 - Diaphoretic coagulopathic post-cardiac surgical patients
 - CVAD position (internal jugular vein)
 - Early mobilisation
 - ‘Drag’ from multiple infusions
 - Beard regrowth in males



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4. Non-tunnelled CVAD in paediatric ICU

NOT OFF THE PRESS

- 3 arm, single centre **pilot RCT**
- Primary outcome: CVAD failure
- Compared:
 1. Bordered polyurethane dressing + sutures + CHG disc (control)
 2. Tissue adhesive + control
 3. Integrated dressing securement + sutures + CHG disc

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4. Non-tunnelled CVAD in paediatric ICU

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Results

- n=180
- Similar levels of acceptability for each group
- TA most difficult to apply

	BPU+suture +CHG (control) n=54	ISD+suture +CHG n=56	TA + control n=59
CVAD failure	3 (6%)	1 (2%)	6 (10%)
Non-routine dressing change	28%	13%	10%

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5. Tunnelled CVAD in paediatrics

- 4 arm, 2 centre **pilot RCT**
- Primary outcome: CVAD failure
- Compared:
 1. Bordered polyurethane dressing + suture
 2. Sutureless securement device + suture + bordered polyurethane dressing
 3. Tissue adhesive (at exit wound and under catheter bifurcation) + bordered polyurethane dressing
 4. Integrated securement-dressing + suture

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5. Tunnelled CVAD in paediatric ICU

Results

- n=48
- High staff approval on application
- High parental satisfaction on removal but not staff satisfaction

	ISD+suture n=12	SSD+suture +BPU n=13	BPU+suture (control) n=11	TA+BPU n=12
CVAD failure	2 (17%)	1 (8%)	0	0
Adverse skin event*	2 (17%)	1 (8%)	2 (18%)	0

*rash, blister, itchiness

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Non-randomised reports in CVADs

Practice review of >30 CVCs (Wilkinson et al, 2007)

- Application less time-consuming than sutures & line securement a 'complete success'

Practice review in 20 non-tunnelled CVCs (Lawrence & Hacking, 2014)

- Application process easier than sutures
- But 3 CVC accidental removals; 6 CVCs ineffectively secured → **TA NOT ADOPTED**

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Non-randomised reports in CVADs

Cohort study of CVADs in adult patients (Scoppettuolo et al 2013)

- In 45 PICCs, 11 dialysis catheters and 9 CVCs, no bleeding at 1 or 24 hrs post-insertion
- No adverse events/No damage to polyurethane catheters detected

Cohort study of CVADs in adult & paediatrics (Pittiruti 2016)

- 348 PICCs; 165 CVCs; 114 tunnelled PICCs & CVCs; 802 ports & PICC ports
- 100% effective in haemostasis; in PICCs, in preventing extra-luminal bacterial contamination; and, in paediatric CVCs, achieved a tenfold reduction in CLABSI

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Non-randomised reports in CVADs

Cohort study of CVADs (and midlines) in adult patients (Ariotti 2016)

- >200 patients had TA applied to insertion site immediately after insertion, then compression bandage applied
- No need for dressing change within 24 hrs of catheter insertion
- Economic savings for hospital; and reduced discomfort for patient

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Take home message for TA use in CVADs

PICCs	<ul style="list-style-type: none"> • TA reduced failure rates • Build-up of TA over repeated applications was problematic
CVADs	<ul style="list-style-type: none"> • In non tunnelled CVADs, TA ± suture may be effective in preventing failure → more evidence required • In tunnelled CVADs, TA appears to be effective in reducing CVAD failure and providing haemostasis
Adverse events	<ul style="list-style-type: none"> • Adverse skin events need to be investigated further • Patient/device factors need to be considered

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Clinical practice guidelines

Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2016

Naomi P. O'Grady, M.D.,
Patchen Dellinger, M.D.,
A. Lipsett, M.D.,
Pearson, M.D.,
M.D.,
Sanjay Saint, M.D.

or Intravenous Catheter
Panel Using the

Access 2011; 12(4): 292-305
10.5310/JVA.2011.2736

VeCeLT* consensus
plantable venous access

Infusion Nursing Standards of Practice

'Use of cyanoacrylate products ("super glue") to prevent oozing or discharge from the exit site or to secure catheters was rated as neutral by the panelists, who noted **lack of substantial evidence or experience** to support this recommendation'

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Challenge for manufacturers

- To supply TA in a form suitable for VAD securement
 - Smaller volume at a lower price point
 - More suitable applicators for VAD securement
 - VAD manufacturers could provide vials prepacked with insertion pack

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Where to now?

- More large RCTs investigating TA use in all VADs are necessary, particularly:
 - PIV securement in paediatrics
 - PICC securement in all populations
 - Tunnelled and non-tunnelled CVADs in all populations
 - Testing of haemostatic and antimicrobial properties
- Adverse skin events associated with TA need to be explored further



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