

Making Dressings Stick!

Securement of jugular central venous catheter dressings with liquid adhesive reduces dressing change frequency: A multicentre randomised controlled trial

Marsh N, O'Brien C, Larsen EN, Alexandrou E, Ware RS, Pearse I, Coyer F, Patel MS, Royle RH, Rickard CM, Sosnowski K, Harris PNA, Laupland KB, Baurer MJ, Fraser JF, McManus C, Byrnes J, Corley A

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Disclosures

Related to this project

This study was supported by an investigator-initiated clinical research grant from Eloquest Healthcare who had no part in study design or conduct; data collection, management, analysis or interpretation; or presentation/publication preparation.

Nicole Marsh: Griffith University and the University of Queensland have received on my behalf speaker fees and investigator initiated grants from 3M, Biolife, Eloquest Healthcare, Cardinal Health, Medline and Walters Kluwer.

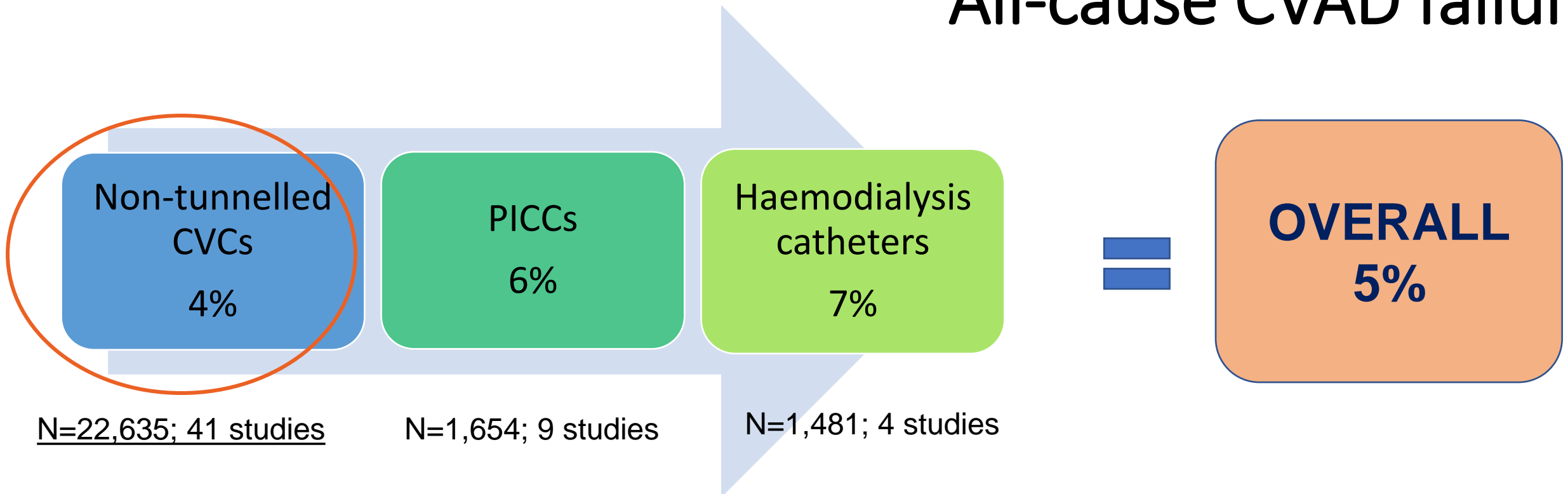
Central Venous Access Devices (CVADs)



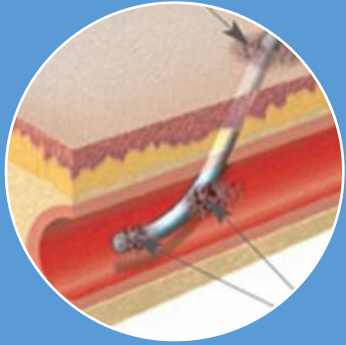
Complication and Failures of Central Vascular Access Device in Adult Critical Care Settings

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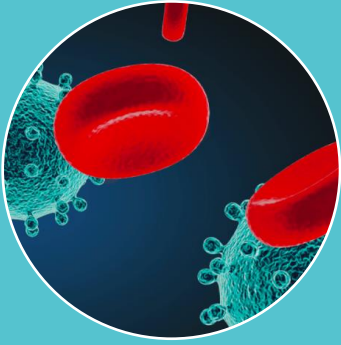
All-cause CVAD failure



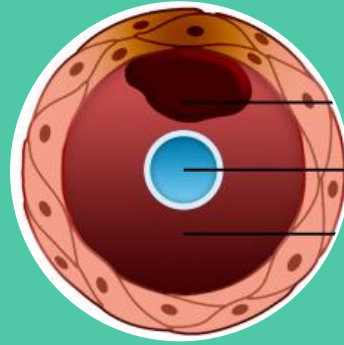
Non-tunnelled CVCs



CRBSI
4%



CLABSI
3%



Thrombosis
9%



Occlusion
8%



Migration
2%



Local infection
2%

Modes of failure

CRBSI = catheter related bloodstream infection
CLABSI = central line associated bloodstream infection



Could failure
be reduced
with better
dressing and
securement?



INTENSIVE CARE UNIT

- 21 beds
- Cardiothoracic ICU
- Many internal jugular (IJ) non-tunnelled CVCs



Absorbent Dressing + suture (AD)

Bordered Polyurethane Dressing + suture (BPU)



Sutureless Securement Device (SSD)

Tissue Adhesive (TA)



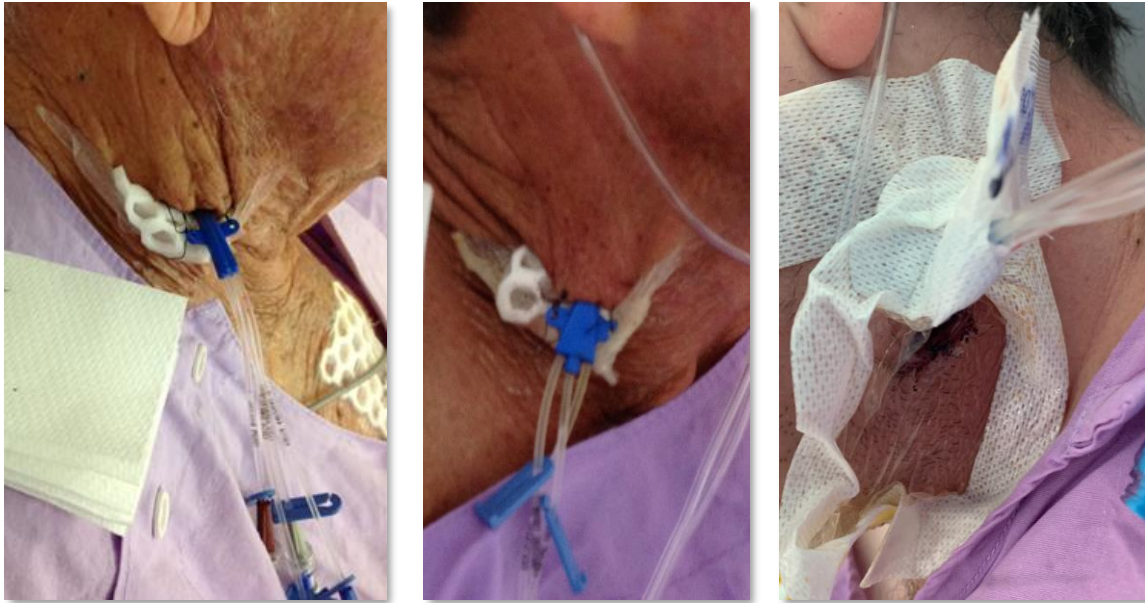
Study group	Group Size N=211	CVC failure n (%)	Dwell time (hrs)
BPU + suture (control)	55	2 (4)	69
AD + suture + SPU	56	1 (2)	68
TA + SPU	23	4 (17)	69
TA + suture + SPU	30	0 (0)	72
SSD + SPU	55	4 (7)	68

15 479 CVC hours

Dislodgement highest (17%) in TA + SPU group

Clinical challenges with:

LOCATION



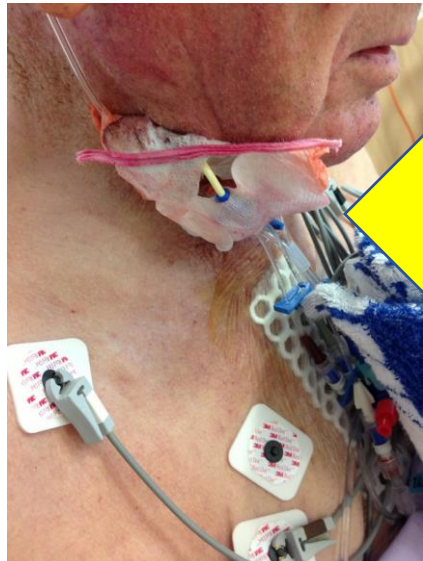
GLUE

- Lowest patient satisfaction + highest pain rating
- Cohort were coagulopathic and diaphoretic
- Weight from multiple infusions overcame glue strength
- Removal from male beard growth was painful despite adhesive remover wipes





Past research had focused on improving securement at insertion site



How do we stop the dressing edges lifting?



Pistacia lentiscus, found only on Greek Island of Chios



Medical Liquid Adhesive (MLA)

- Non-water soluble gum mastic
- Applied to the skin following antiseptics but before dressing application
- Allow to dry for 20-30 seconds
- Mastisol, Eloquest Healthcare

Study design

Multi-centre, two-arm, parallel group, RCT recruiting at 4 adult hospitals

STUDY PROTOCOL

Open Access

Securing jugular central venous access devices with dressings fixed to a liquid adhesive in an intensive care unit population: a randomised controlled trial

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Inclusion criteria

- ✓ ≥ 18 years
- ✓ Patient expected to require IJ CVC ≥ 72 hours
- ✓ Requiring ≥ 24 hours treatment in ICU
- ✓ Within 12 hours of IJ CVC insertion

Exclusion criteria

- ✗ Emergency CVC insertion (standard ANTT not able to be adhered to)
- ✗ Bloodstream infection in 24 hours prior to CVC insertion
- ✗ Pre-existing concurrent CVAD expected to dwell for >24 hours
- ✗ Patient receiving end-of-life care
- ✗ Previous study enrolment

Standard Care: Bordered Polyurethane Dressing +/- CHG with suture



Intervention: Mastisol (MLA) and Standard Care (MLA applied after skin decontamination but before dressing application)

OR



Outcomes

Primary

Premature IJ CVC dressing failure

- Replacement of the initial CVC dressing due to the dressing lifting at the edges prior to routine dressing change at 7 days

Secondary

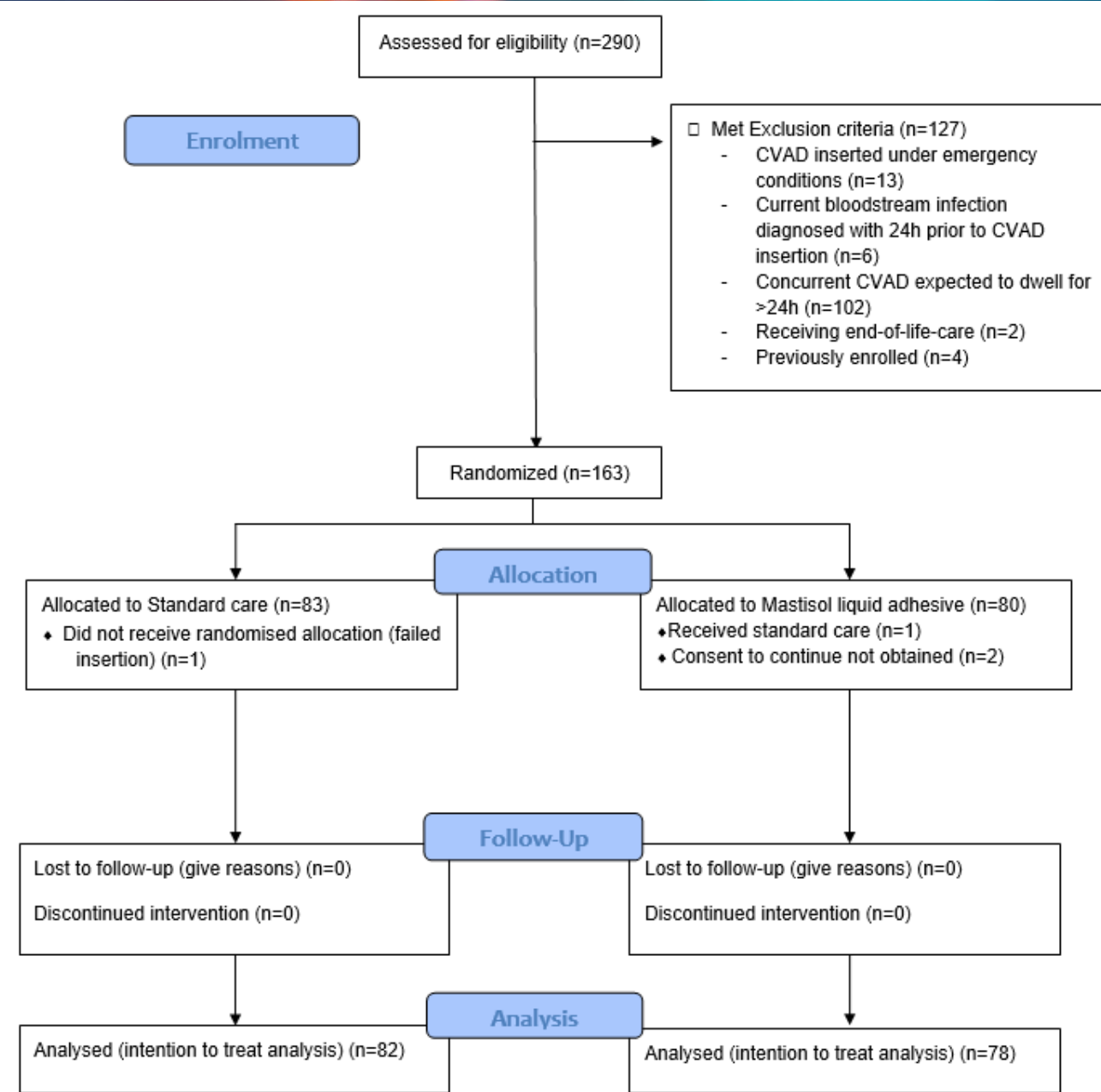
- Time to first dressing change
- Number of dressing changes for CVC dwell
- All-cause CVC failure
- Medical adhesive related skin injury
- Staff and Patient satisfaction
- Colonisation at insertion site (sub-study)



Recruitment

- Between September 2021 and February 2023
- 290 patients screened
 - 127 met exclusion criteria
- 163 randomised
 - 3 excluded
- 160 included in final analysis
 - Control 82
 - Intervention 78

Location of enrolment	MLA	Standard
The Prince Charles Hospital	29 (37%)	31 (38%)
Liverpool Hospital	37 (47%)	38 (46%)
Logan Hospital	4 (5%)	6 (7%)
The Royal Brisbane and Women's Hospital	8 (10%)	7 (9%)

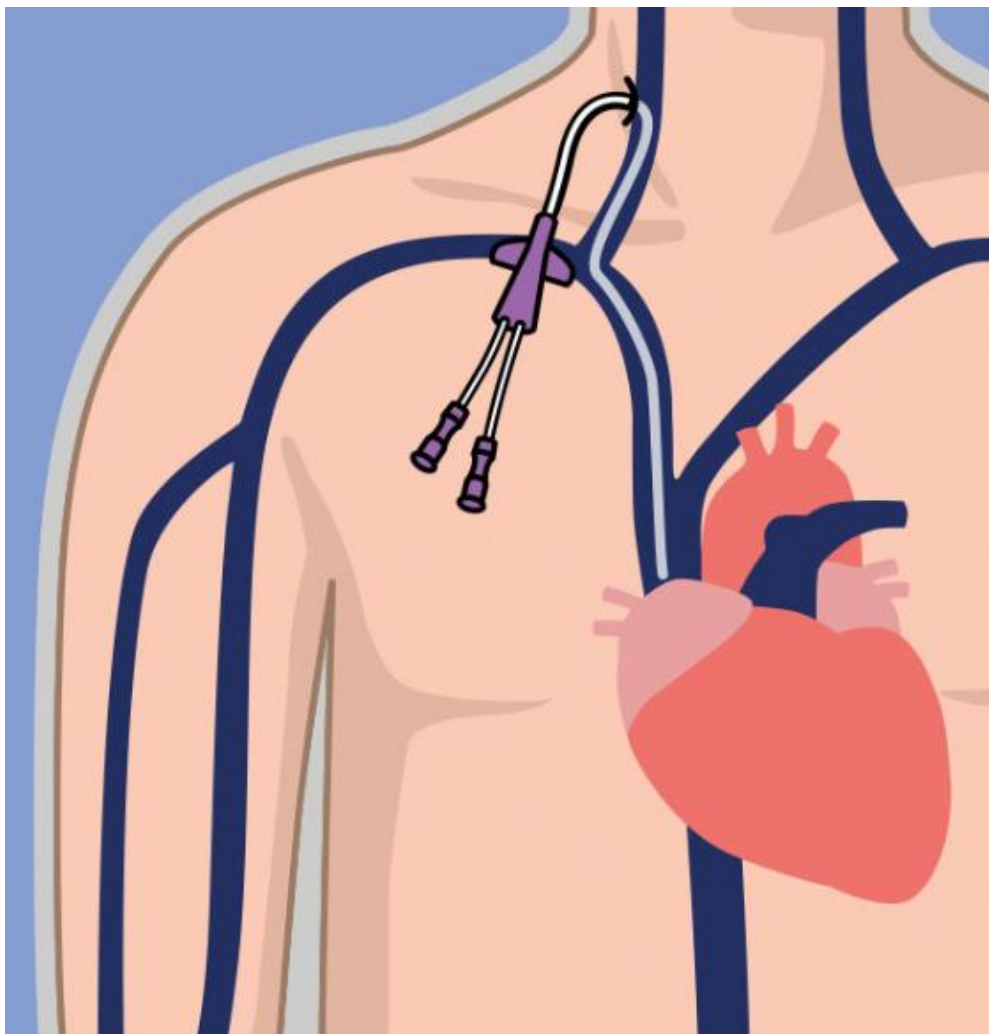


Patient Characteristics



Characteristic	MLA (n =78)	Standard (n=82)
Age, range	62 (50-70)	65 (52-70)
Gender, female	28 (36%)	30 (37%)
ICU admission type		
Planned	33 (42%)	37 (45%)
Emergent	43 (55%)	39 (48%)
Inter-hospital transfer	2 (3%)	6 (7%)
APACHE II Score	16.5 (13-21)	17 (13-23)
≥3 co-morbidities	38 (49%)	36 (44%)
BMI overweight /obese	58 (74%)	59 (72%)

Device Characteristics



Characteristic	MLA (n=78) n (%)	Standard Care (n=82) n (%)
Inserted by		
ICU/Anaesthetic registrar	64 (82%)	63 (77%)
Anaesthetic consultant	9 (12%)	11 (13%)
Insertion department		
ICU	49 (63%)	47 (57%)
Operating theatre	25 (32%)	30 (37%)
Insertion site/site, right	59 (76%)	73 (89%)
First time insertion success	69 (88%)	66 (80%)
Technology assisted		
Ultrasound	66 (85%)	67 (82%)
X-ray confirmation	54 (69%)	58 (70%)
Central venous catheter lumens		
3	6 (8%)	6 (7%)
4	68 (87%)	74 (90%)
5	4 (5%)	2 (2%)
Antimicrobial catheter	55 (71%)	53 (65%)
Additional dressings/securements	11 (14%)	19 (23%)
Suture at insertion site	65 (83%)	68 (83%)



<i>Primary outcome</i>	MLA (n = 78)	Standard Care (n = 82)	MLA vs. Standard Care	
	n (%) or Median (IQR)	n (%) or Median (IQR)	Effect estimate (95% CI)	P-value
First dressing failure n=63 (39%)	22 (28%)	41 (50%)	RD -22% (-37% to -7%)	0.005
Secondary outcomes				
Time to first dressing failure due to lifting, hrs	58.5 (29.6 to 81.2)	23.8 (12.3 to 61.1)	MedD 43.32 hrs (16.4 to 70.3)	0.002
Total dressings	64	124	IRR 0.74 (0.55 to 0.99)	0.041

Significantly less CVC dressing failure in the MLA group



<i>Secondary outcomes</i>	MLA n (%)	Standard Care n (%)
All-cause CVC failure Per 1000 catheter days (95% CI)	4 (5%) 9.5 (3.6 to 25.2)	4 (5%) 7.4 (2.8 to 19.6)
Infectious complications		
Local infection Per 1000 catheter days (95% CI)	2 (3%) 4.7 (1.2 to 18.9)	0 (0%) 0
Mechanical complications		
Blockage/occlusion	1 (1%)	2 (2%)
Dislodgement	3 (3%)	2 (2%)
Medical adhesive-related skin injury	1 (1%)	2 (2%)
Staff satisfaction, median (IQR)	9.5 (8-10)	8 (6-10)
Patient satisfaction, median (IQR)	8 (7-10)	8 (7.5-9)



Microbiology sub-study

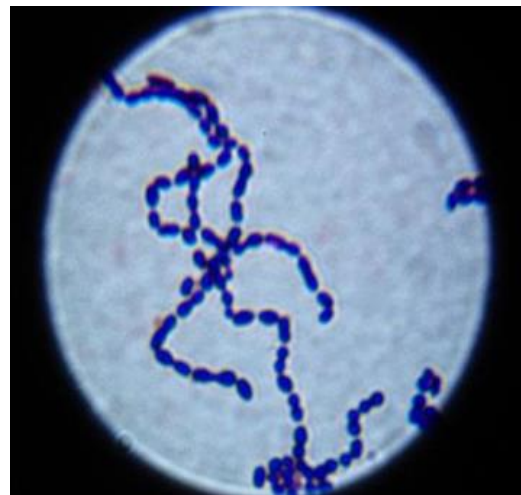
Convenience sample of skin swabs (10 per group)

Growth observed in 12/20 (60%)

8/10 (80%) Standard care

4/10 (40%) MLA

Swabs had a range of 1-9 colony types per patient



Microorganism	Standard care(N=10)			MLA (N=10)		
	≤ 14 CFU	15-99 CFU	100+ CFU	≤ 14 CFU	15-99 CFU	100+ CFU
Any organism	3/10	1/10	4/10	1/10	2/10	1/10
Coagulase Negative Staphylococci						
<i>Staphylococcus hominis</i>	2					1
<i>Staphylococcus capitis</i>	1	1	1	1		
<i>Staphylococcus epidermidis</i>	2		4	2	1	
<i>Staphylococcus cohnii urealyticus</i>	1			1		
Other Common Commensals						
<i>Streptococcus sanguinis</i>						1
<i>Micrococcus luteus</i>	1	2		1	2	
<i>Dermacoccus barathri</i>		1				
<i>Bacillus cereus</i> group	1			1		
<i>Bacillus altitudinis/pumilus</i>		1		1		
<i>Brevibacillus sp.</i>	1					
<i>Lysinibacillus fusiformis</i>	1					

conclusion

MLA is significantly associated with decreased IJ CVC dressing failure and longer dressing dwell

Clinicians should consider using MLA when applying CVC dressings in ICU



Additional RCTs to determine the impact of MLA on catheter associated infection and all-cause failure rates

Testing MLA in other device types, settings and patient cohorts



Thank you

Questions?

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