Cubital Fossa Peripheral IV Catheters Are a High-Risk Source of *Staphylococcus aureus* Bacteraemia: A 10-Year Infection Control Audit

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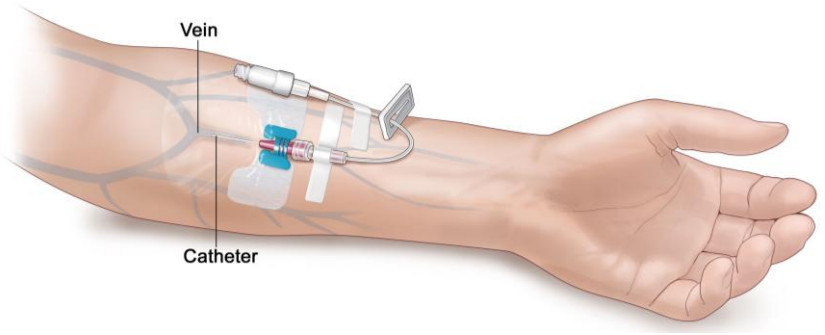

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NSW GOVERNMENT Health
Hunter New England Local Health District

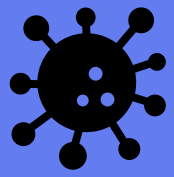
Hunter New England Local Health District

- 131,785 square km
- ~1 million residents
- 38 hospitals
- 1 Principal Referral Hospital (John Hunter)
- 3 Public Acute Group A Hospitals

Peripheral Intravenous Catheters

One of the most used medical devices worldwide (1)

Cannulation is still a medical procedure!

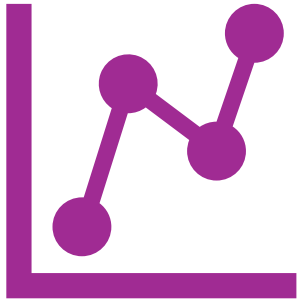


Can cause mechanical, vascular or infectious adverse effects (2)

SABSIs as a complication of PIVCs

- Systemic bloodstream infections have high mortality rates ~ 10-30% (3,4)
- *Staphylococcus aureus* - leading cause of PIVC associated bloodstream infections (5,6)
- PIVC infection complications are avoidable through optimal use of IPC bundles (7,8)
- In HNE, all HA-SABSIs require a London protocol
- Limited research conducted into the relationship between PIVC location and SABSIs (2, 6)

The Audit



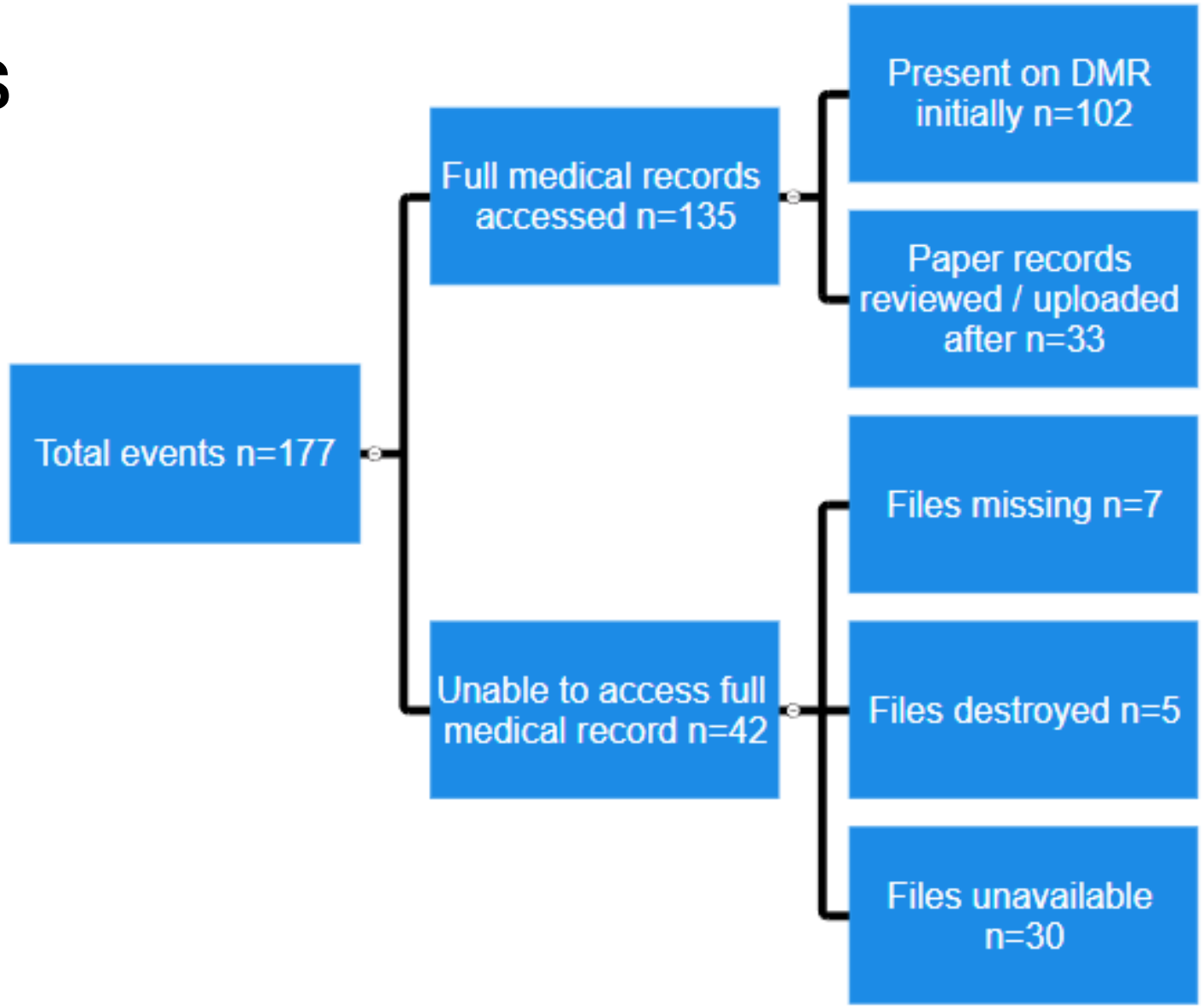
Retrospective audit to quantify the burden of PIVC-related SABSIs in HNELHD from 2015-2024

Aim: To determine the proportion of events attributable to placement in the ACF

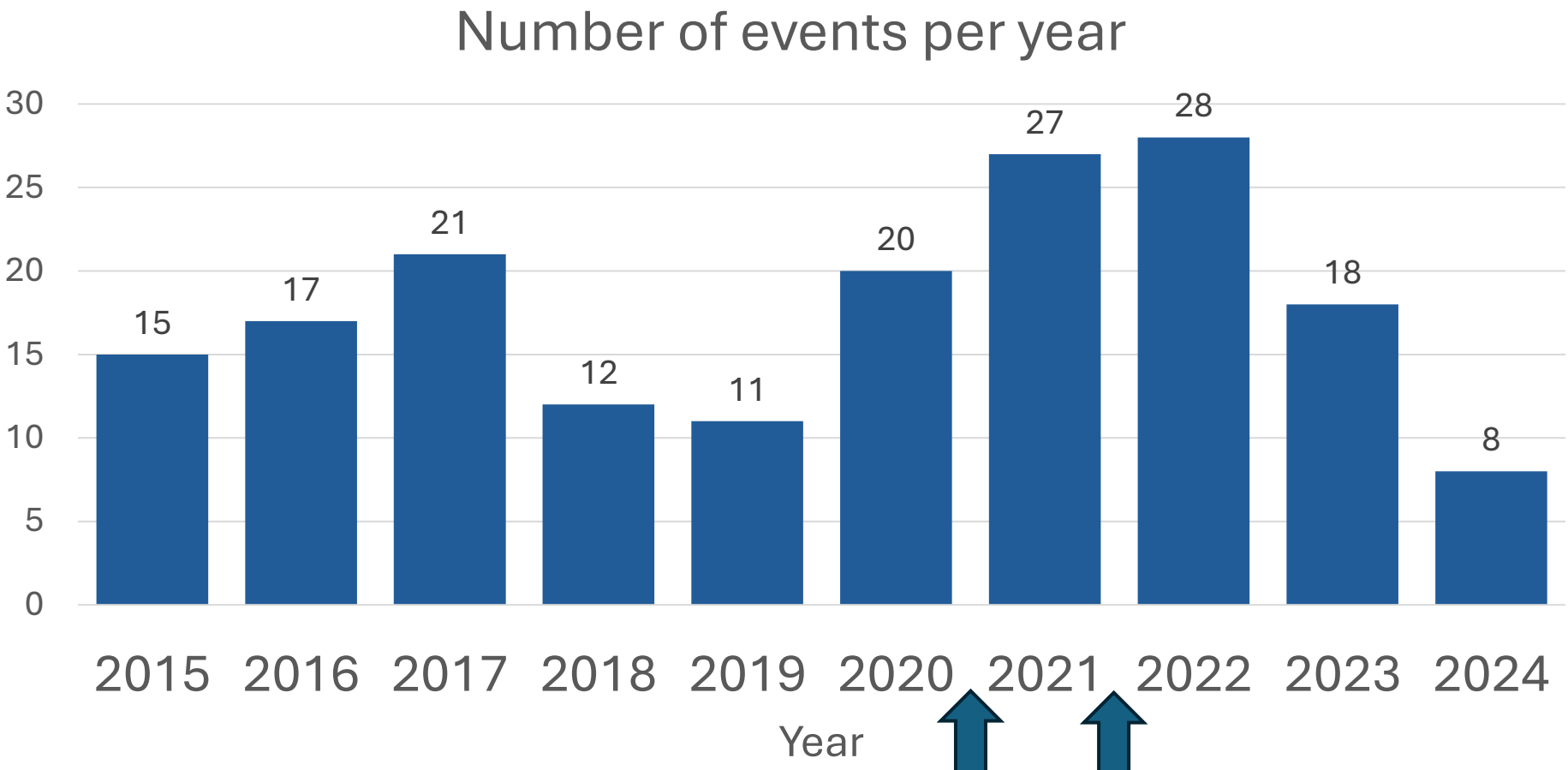
Method

1. PIVC-related SABSI events between January 2015 and December 2024 in HNELHD were identified via the ICNet (Infection Control Network) database.
2. Where available, Digital Medical Records (DMR) of all patients were reviewed
3. If unavailable, stored paper medical records were located and reviewed

Results


Total events n=177
Full medical records accessed n=135
Present on DMR initially n=102
Paper records reviewed / uploaded after n=33
Unable to access full medical record n=42
Files missing n=7
Files destroyed n=5
Files unavailable n=30

Results

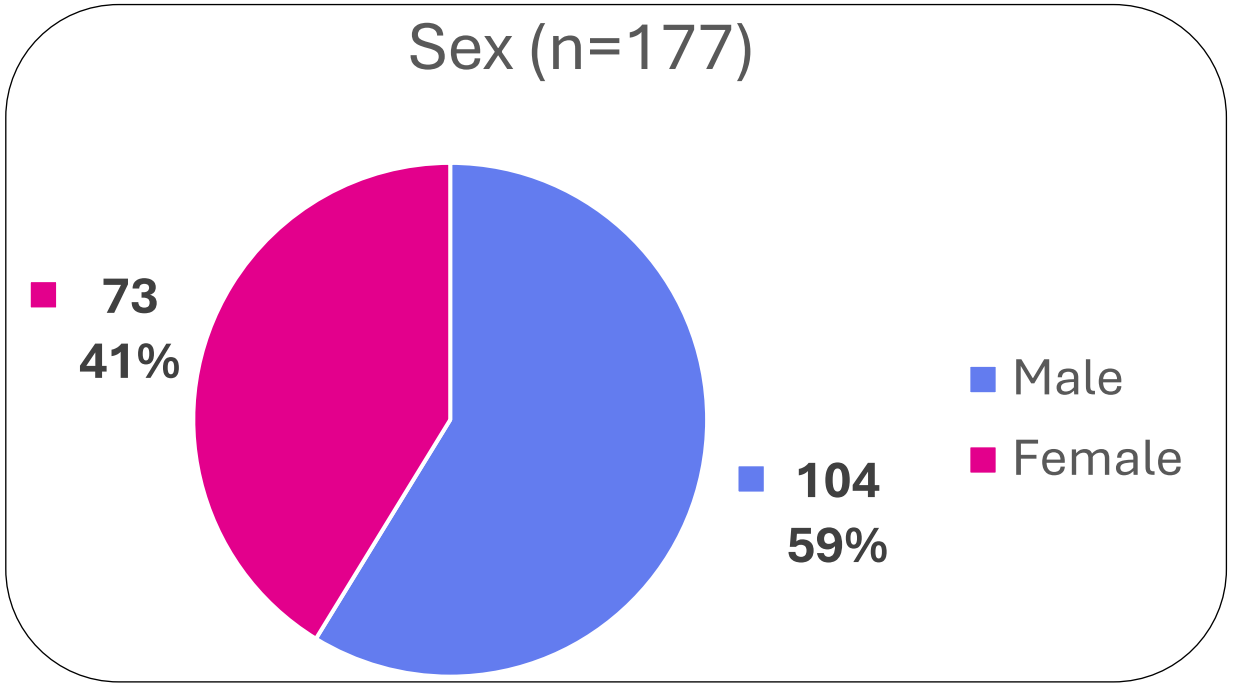


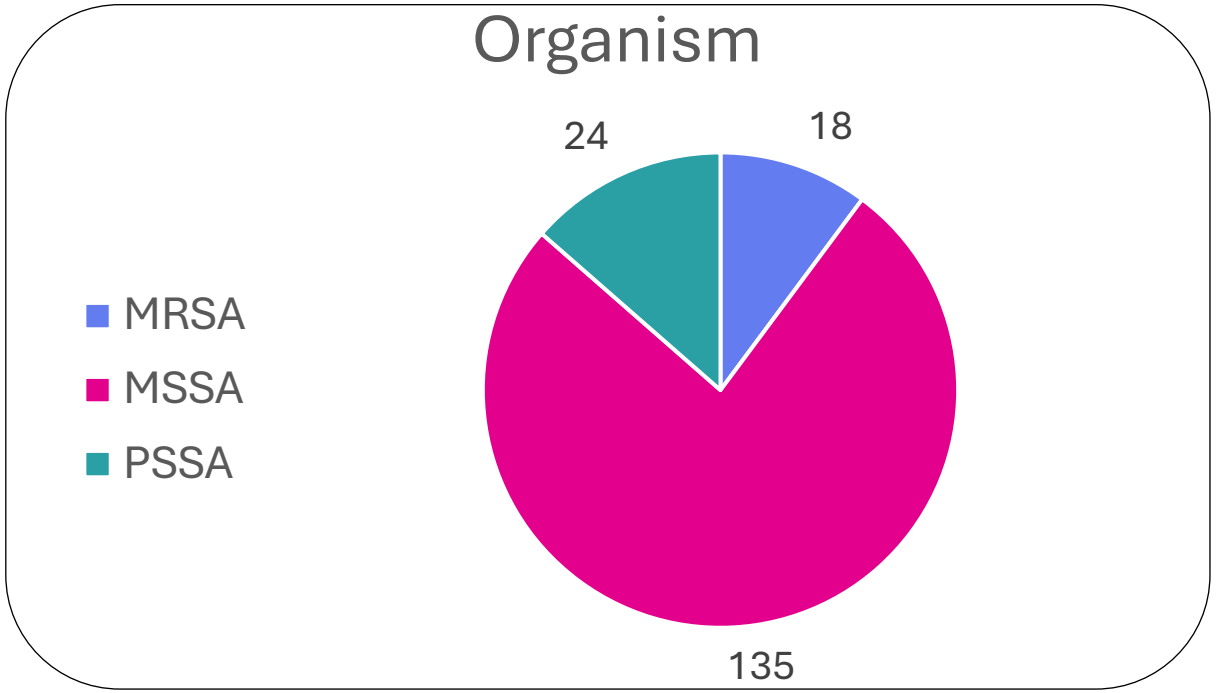
Requirement for routine removal at 24h / 72h removed

Requirement for routine removal at 24h / 72h reinstated

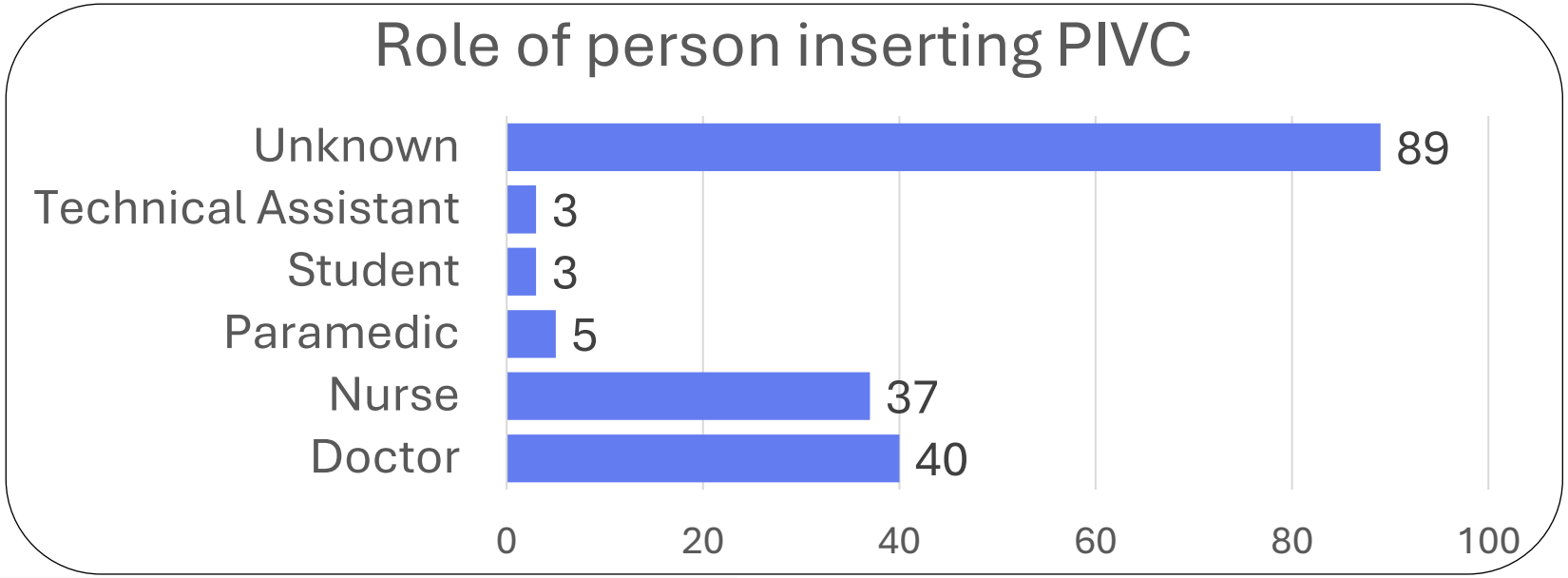
Results

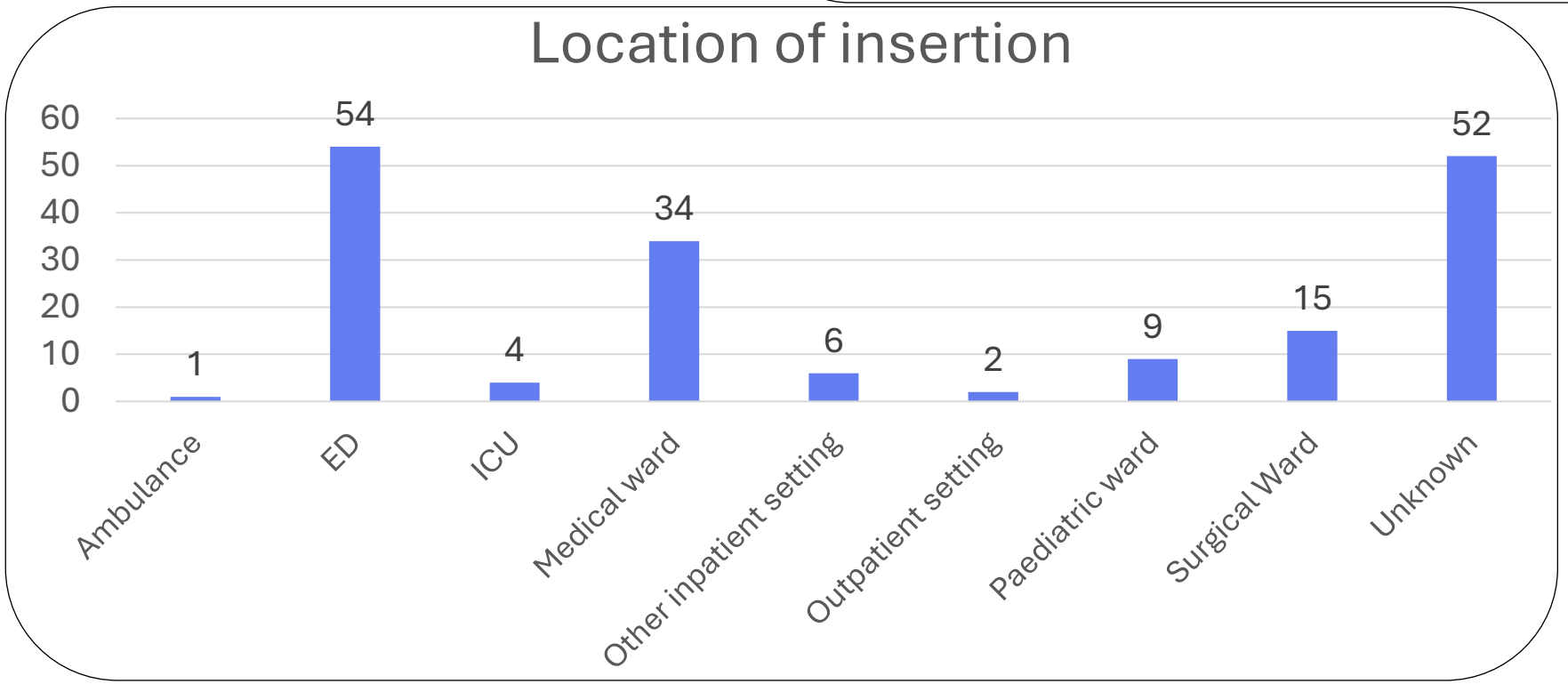
Age	
♂	♀
Average = 64.3 years (10 days – 95 years) Median = 69 years	Average = 66 years (5 days – 100 years) Median = 73 years



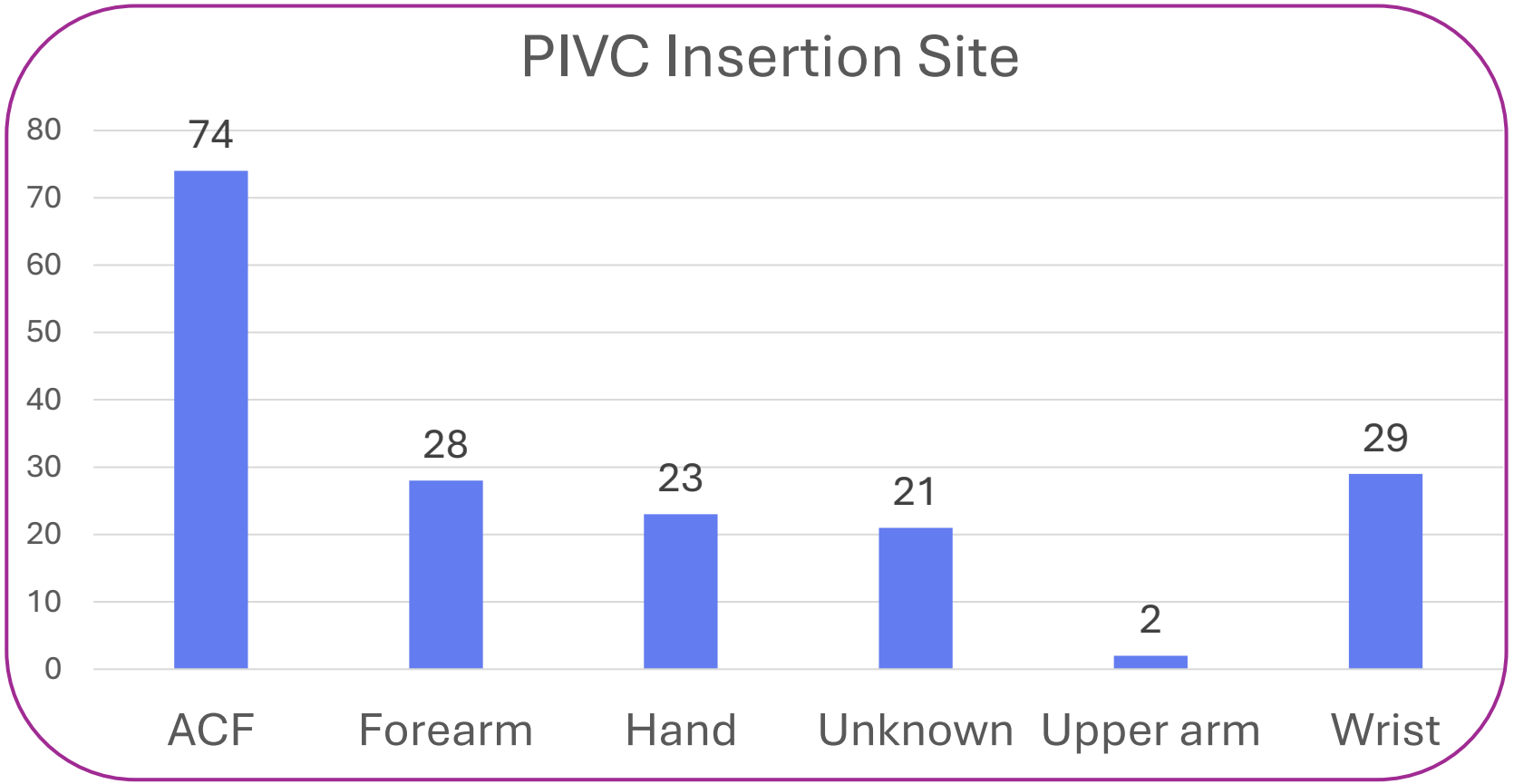


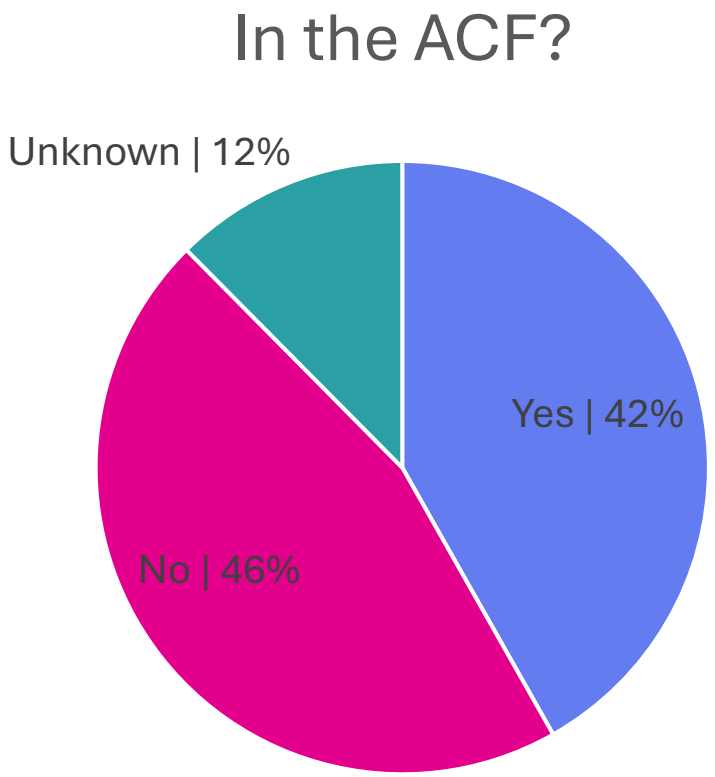
Results


Role of person inserting PIVC
Unknown
Technical Assistant
Student
Paramedic
Nurse
Doctor
89
3
3
5
37
40
0
20
40
60
80
100


Location of insertion
60
50
40
30
20
10
0
1
54
4
34
6
2
9
15
52
Ambulance
ED
ICU
Medical ward
Other inpatient setting
Outpatient setting
Paediatric ward
Surgical Ward
Unknown

Results



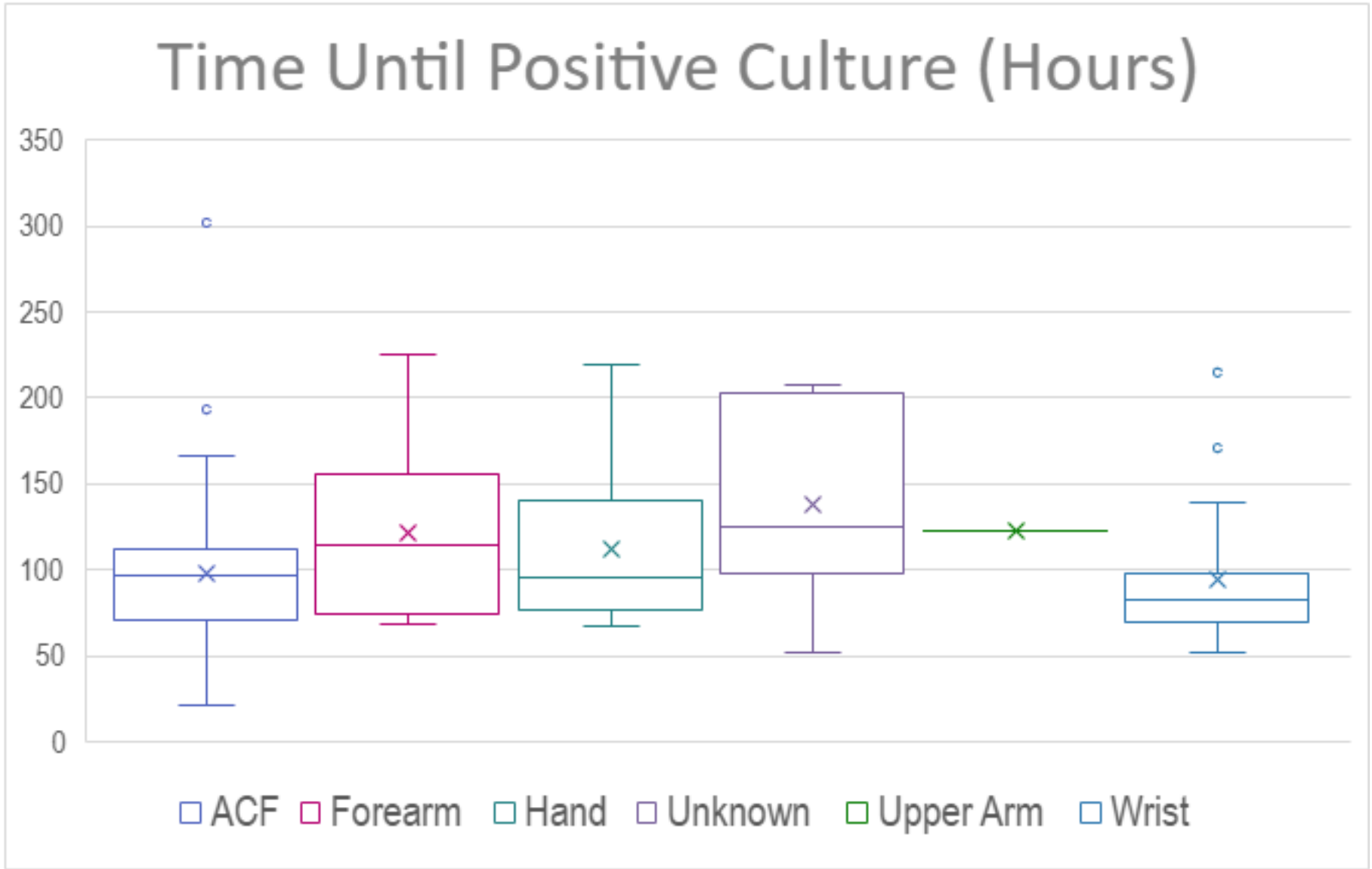


Of the PIVCs where the insertion site was known, ACFs contributed to 47% (74/156)

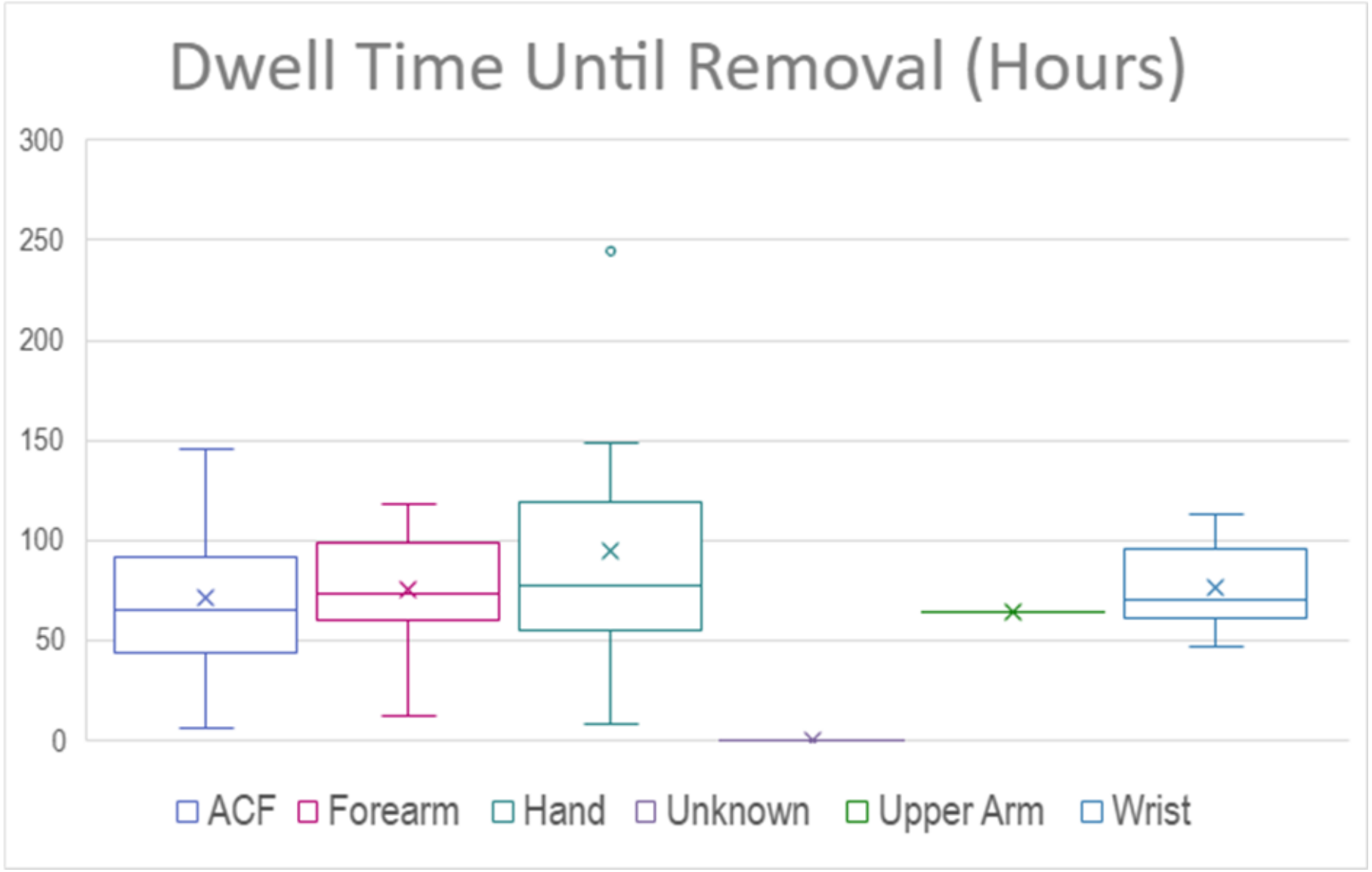
Results

All - Cause Mortality		
30 days	19.2%	34 deaths
90 days	24.2%	43 deaths

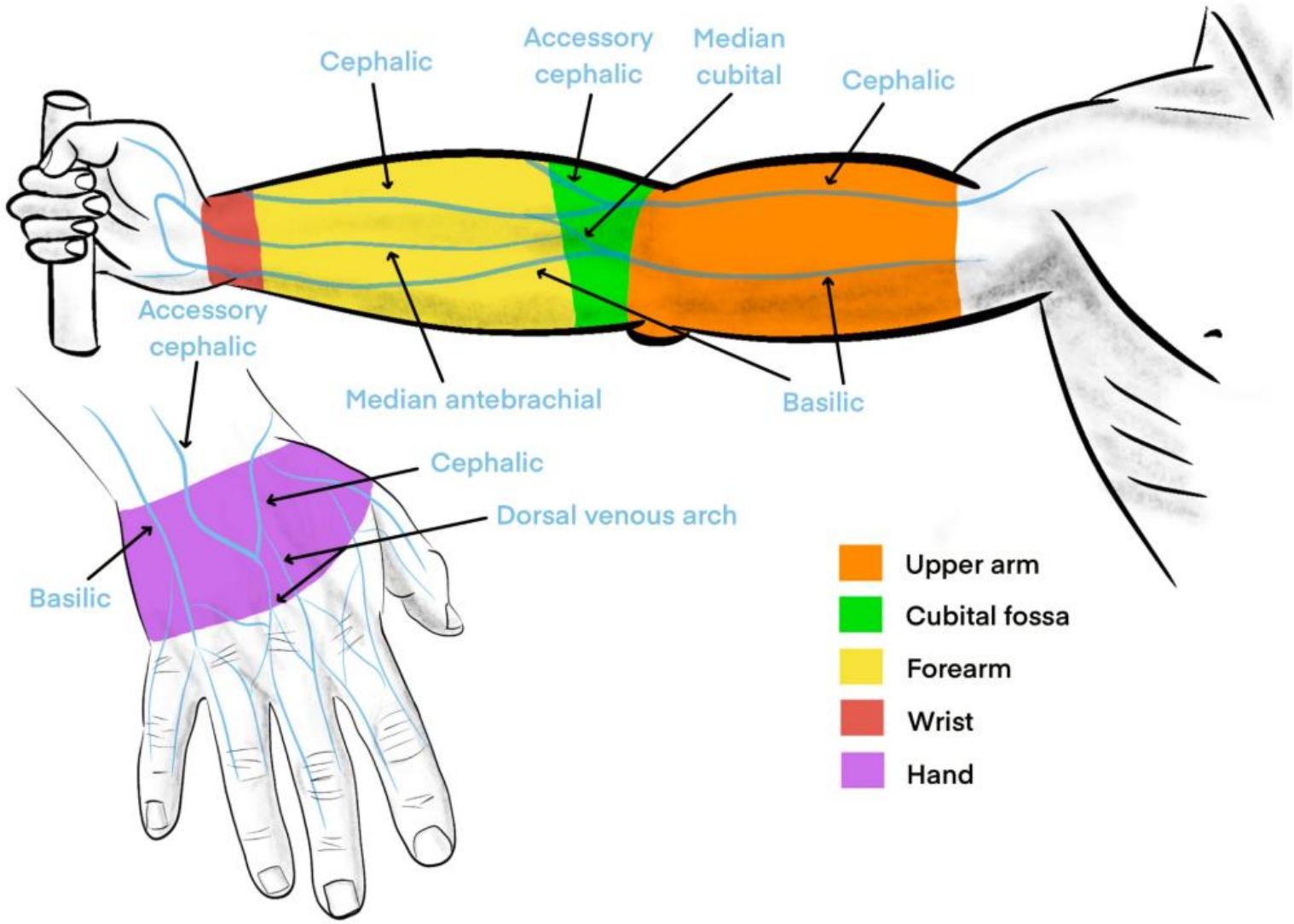
Results


Time Until Positive Culture (Hours)
350
300
250
200
150
100
50
0
ACF
Forearm
Hand
Unknown
Upper Arm
Wrist

Results


Dwell Time Until Removal (Hours)
300
250
200
150
100
50
0
ACF
Forearm
Hand
Unknown
Upper Arm
Wrist

PIVC Locations (2)



Limitations

- Paper charts and notes difficult to interrogate
- Procedure of insertion and removal often poorly documented
- Unable to calculate infection rate as total PIVCs inserted unknown

Future Direction

- Ideal to replicate in an EMR
- Ongoing implementation of HNE PIVC improvement bundle
  - Extension sets
  - Blood control cannulas
  - USS guided cannulation education, credentialling and governance
  - Increased use of midline and PICCs for DIVA patients
- Multidisciplinary Quality Improvement Projects

HNELHD Peripheral IV & Subcutaneous Cannula Care Plan

Use IV-wise tool to guide consent discussion with patient BEFORE insertion and provide "Looking after your cannula" patient information sheet.

Replace cubital fossa and ambulance inserted cannulas within 24 hours (except paediatric patients).
Monitor patient's temperature whilst cannula in situ. Report temperature of >38°C - **Consider Sepsis**.
Consider PICC (or other CVAD) if anticipated duration of IV therapy >7 days.

Scrub the hub with 70% alcohol for 15 seconds every time you access. Allow to dry.

Cannula insertion record

☐ **Consent Obtained**
Insertion: Date & Time
___/___/___ & ___:___
____ gauge #attempts: _____
☐PIVC ☐ S/C
Site: L R _____
Reason: _____
By: _____
Designation: _____
☐ U/S used ☐ Lines labelled

An initial below confirms that the dressing is intact, there is no erythema, tenderness, pain or swelling and the PIVC is patent.

	AM	PM	ND	AM	PM	ND	AM	PM	ND	AM	PM	ND	**Device to be removed as soon as no longer required or within 72hrs** (except paediatric patients)
Date													
Time													
Initial													

Removal: Date: ___/___/___ Time: ____:____ By: _____
Reason: ☐ Not required/Due ☐Dislodged ☐Tissued/Leaking ☐ Haematoma ☐Blocked ☐Phlebitis/Pain Other: _____
☐ Suspected infection: ☐ Site swabbed ☐ IMS+ Number: _____
***Site checked* 24 hours post removal (Inpatients only):** ☐ Yes, by: _____ Clinical concern: ☐ No ☐ Yes & escalated

Cannula insertion record

☐ **Consent Obtained**
Insertion: Date & Time
___/___/___ & ___:___
____ gauge #attempts: _____
☐ PIVC ☐ S/C
Site: L R _____
Reason: _____
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Date													
Time													
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Removal: Date: ___/___/___ Time: ____:____ By: _____ **Device to be removed within 72hrs**
Reason: ☐ Not required/Due ☐Dislodged ☐Tissued/Leaking ☐ Haematoma ☐Blocked ☐Phlebitis/Pain Other: _____
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References

1. Morgan, R., Callander, E., Cullen, L., Walker, K., Bumpstead, S., Hawkins, T., Kuhn, L., & Egerton-Warburton, D. (2022). From little things, big things grow: An exploratory analysis of the national cost of peripheral intravenous catheter insertion in Australian adult emergency care. Emergency medicine Australasia : EMA, 34(6), 877–883. https://doi.org/10.1111/1742-6723.14009

2. Drugeon, B., Marjanovic, N., Boisson, M., Buetti, N., Mimoz, O., & Guenezan, J. (2024). Insertion site and risk of peripheral intravenous catheter colonization and/or local infection: a post hoc analysis of the CLEAN 3 study including more than 800 catheters. Antimicrobial resistance and infection control, 13(1), 57. https://doi.org/10.1186/s13756-024-01414-4

3. Bai, A. D., Lo, C. K. L., Komorowski, A. S., Suresh, M., Guo, K., Garg, A., Tandon, P., Senecal, J., Del Corpo, O., Stefanova, I., Fogarty, C., Butler-Laporte, G., McDonald, E. G., Cheng, M. P., Morris, A. M., Loeb, M., & Lee, T. C. (2022). Staphylococcus aureus bacteraemia mortality: a systematic review and meta-analysis. Clinical microbiology and infection : the official publication of the European Society of Clinical Microbiology and Infectious Diseases, 28(8), 1076–1084. https://doi.org/10.1016/j.cmi.2022.03.015

4. Kwiecinski, J. M., & Horswill, A. R. (2020). Staphylococcus aureus bloodstream infections: pathogenesis and regulatory mechanisms. Current opinion in microbiology, 53, 51–60. https://doi.org/10.1016/j.mib.2020.02.005

5. Drugeon, B., Guenezan, J., Pichon, M., Devos, A., Fouassin, X., Neveu, A., Boinot, L., Pratt, V., & Mimoz, O. (2023). Incidence, complications, and costs of peripheral venous catheter-related bacteraemia: a retrospective, single-centre study. The Journal of hospital infection, 135, 67–73. https://doi.org/10.1016/j.jhin.2023.02.012

6. Blauw, M., Foxman, B., Wu, J., Rey, J., Kothari, N., & Malani, A. N. (2019). Risk Factors and Outcomes Associated With Hospital-Onset Peripheral Intravenous Catheter-Associated Staphylococcus aureus Bacteremia. Open forum infectious diseases, 6(4), ofz111. https://doi.org/10.1093/ofid/ofz111

7. Tan, K. T., Benedict, S. L. H., Gani, Y. M., & Chidambaran, S. K. (2022). A quality improvement project: Reducing bloodstream infection by improving adherence to the care bundle of peripheral vascular catheters at the COVID-19 treatment centre. The Medical journal of Malaysia, 77(5), 590–596.

8. Lladó Maura, Y., Berga Figuerola, M. L., Rodríguez Moreno, M. J., Lluch Garvi, V., Soler Felsner, E. E., Rodríguez-Rodríguez, A., Almendral, A., Limón, E., & Fusté, E. (2023). Care bundle for the prevention of peripheral venous catheter blood stream infections at a secondary care university hospital: Implementation and results. Infection, disease & health, 28(3), 159–167. https://doi.org/10.1016/j.idh.2023.02.001

9. Zingg, W., Barton, A., Bitmead, J., Eggimann, P., Pujol, M., Simon, A., & Tatzel, J. (2023). Best practice in the use of peripheral venous catheters: A scoping review and expert consensus. Infection prevention in practice, 5(2), 100271. https://doi.org/10.1016/j.infpip.2023.100271

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