

First do no harm...
Researching Outcomes in
Vascular Access

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Our Service



- John Hunter Hospital / Royal Newcastle Centre / Newcastle Children's Hospital/Rankin Park Rehabilitation Unit
~ 850 – 900 beds
- Immunology & Infectious Diseases Unit
 - Infusion Lounge (1991 – all hosp 2006)
 - Out & About IV Therapy Program (1995)
 - Adult and paediatric
 - IVI Team (1997)
 - Peripheral cannula and PICC insertion

A microscopic view of blood cells, including red blood cells and white blood cells, set against a dark blue background. The red blood cells are prominent, appearing as biconcave discs in various shades of red and purple. The white blood cells are smaller and more irregular in shape, appearing in lighter shades of blue and green. The overall scene is illuminated from the left, creating a sense of depth and highlighting the texture of the cells.

IV therapy & risk

- Highly educated workforce
- IV therapy commonplace
- Central venous catheters demystified
- Better knowledge about how to avoid infection
- Clear guidelines and policies
- Should we be concerned?



Things we have seen

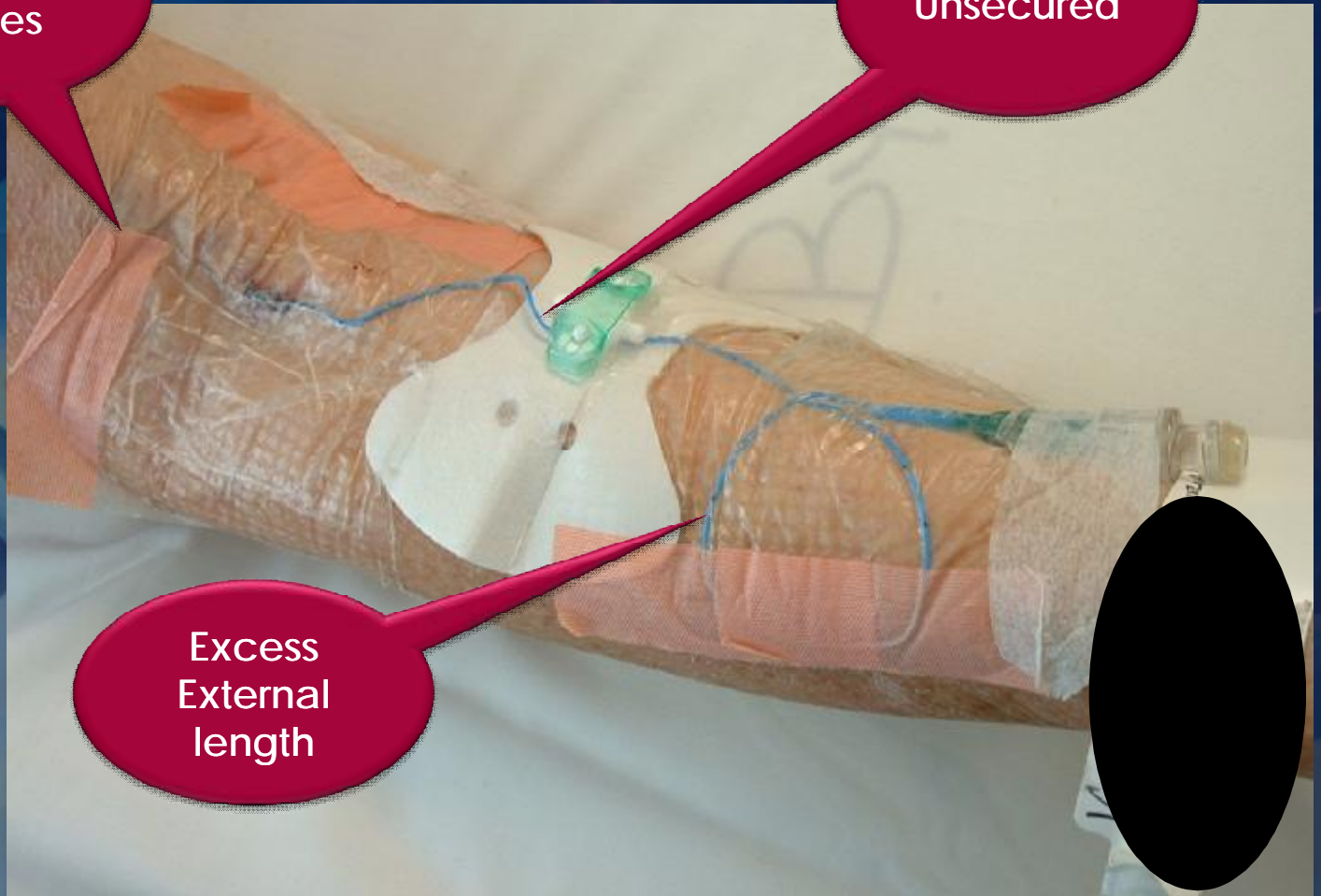
Referrals to Out & About come from all public and private hospitals in a 200km radius

When we see examples of PICC care that illustrate a point we take a photo...

Multiple
Opsites

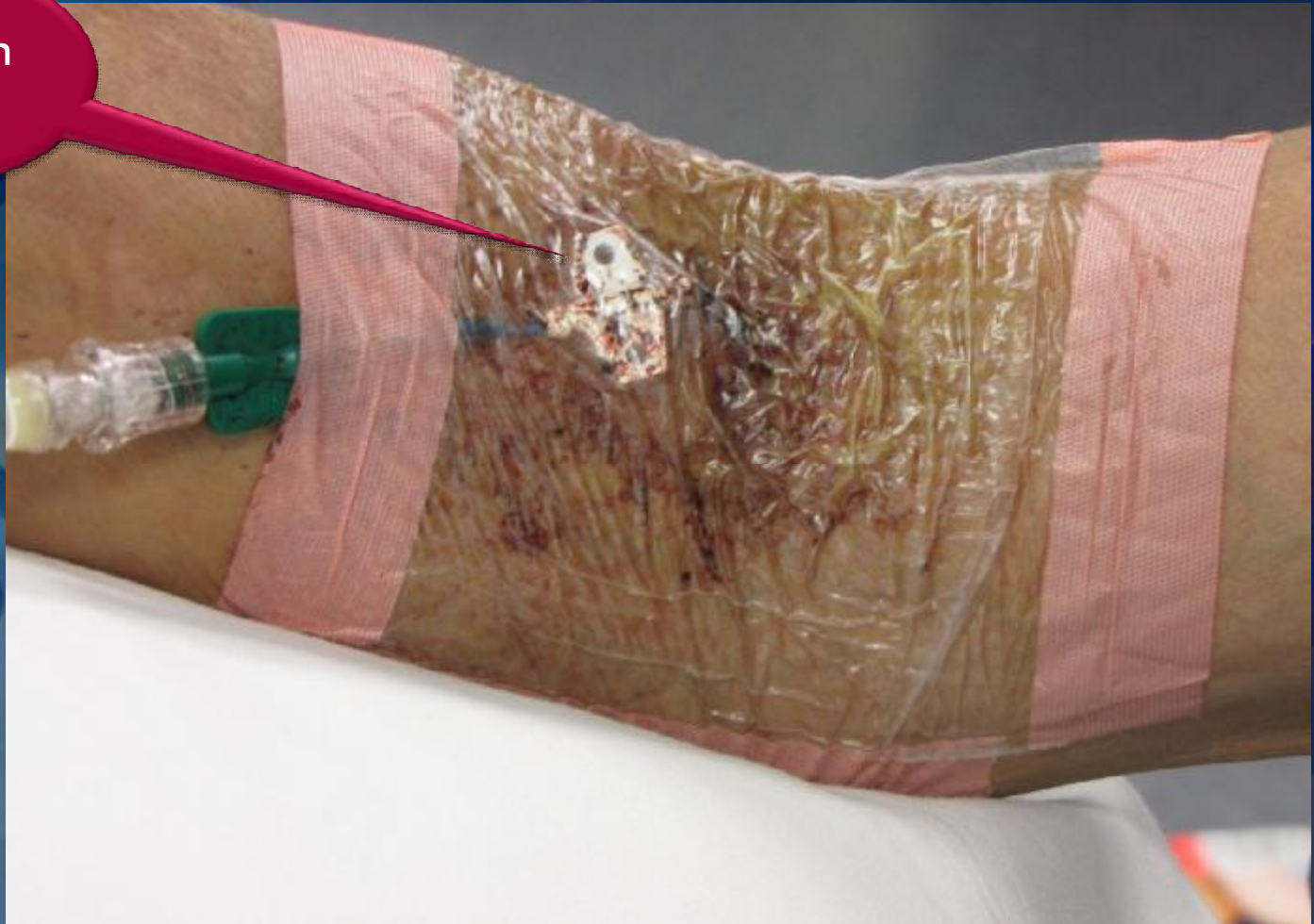
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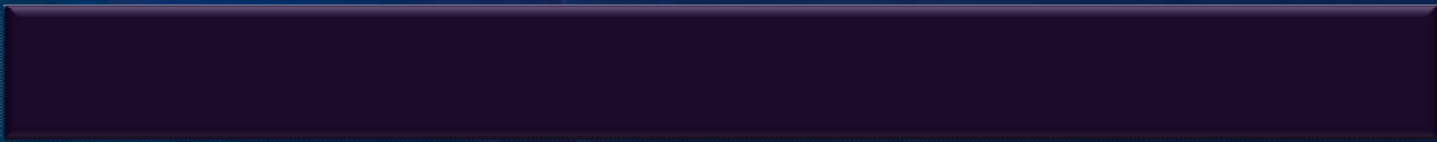
Excess
External
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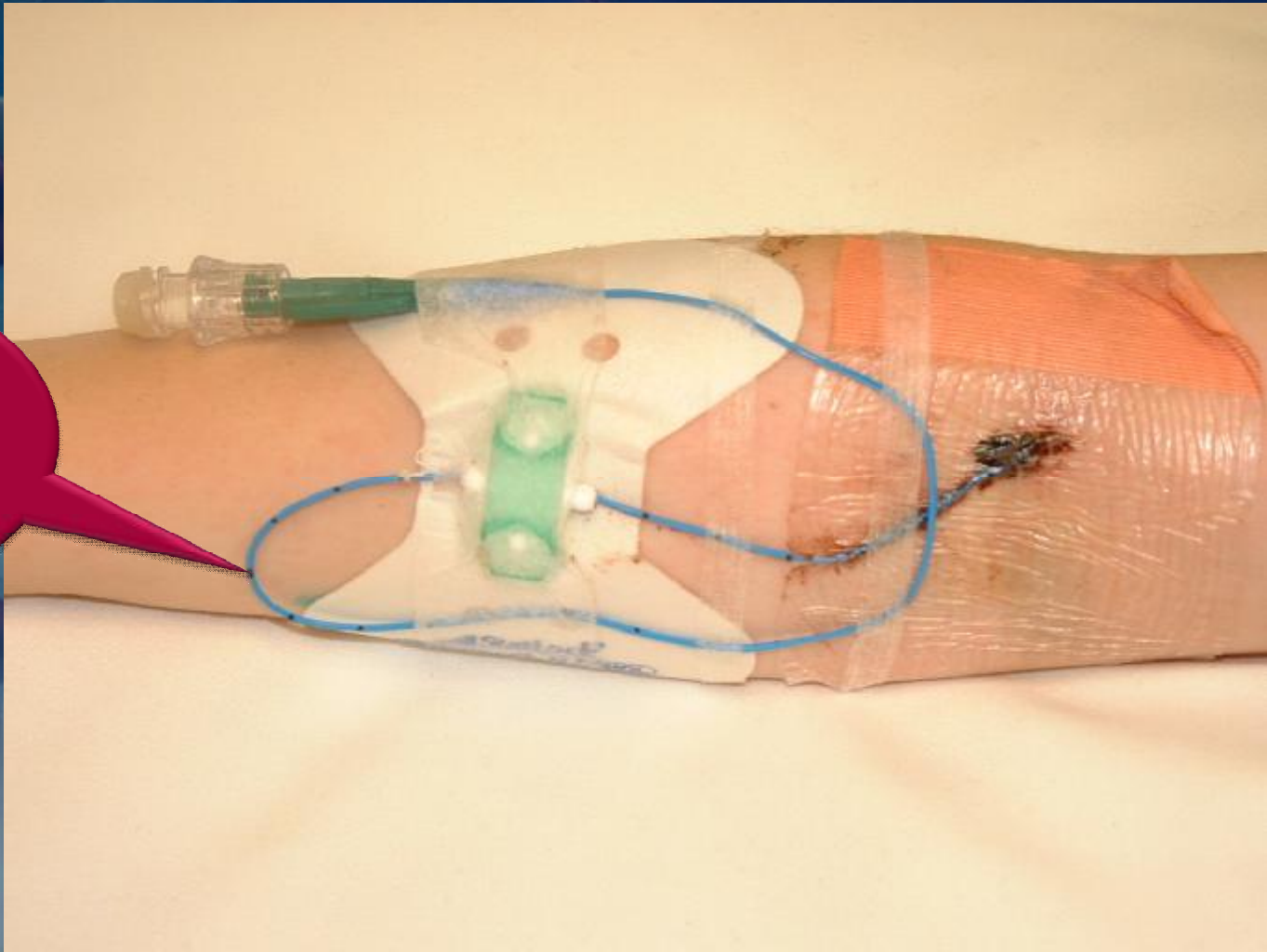
St Elsewheres a number of days post insertion

Not much help!





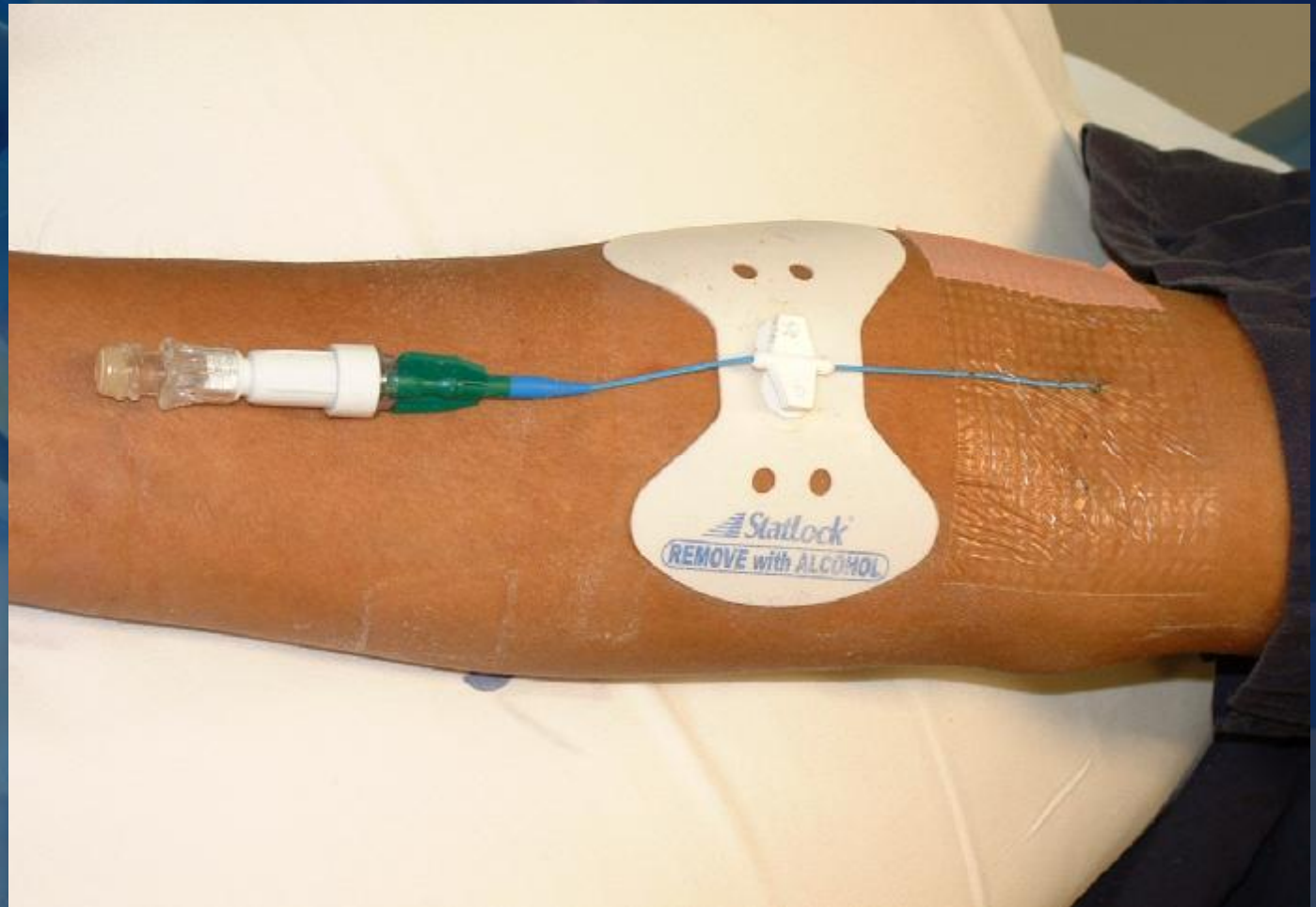
The long
and
winding
road



This PICC is
not getting
away!



Neat double-bunger!



Grotty double-bunger

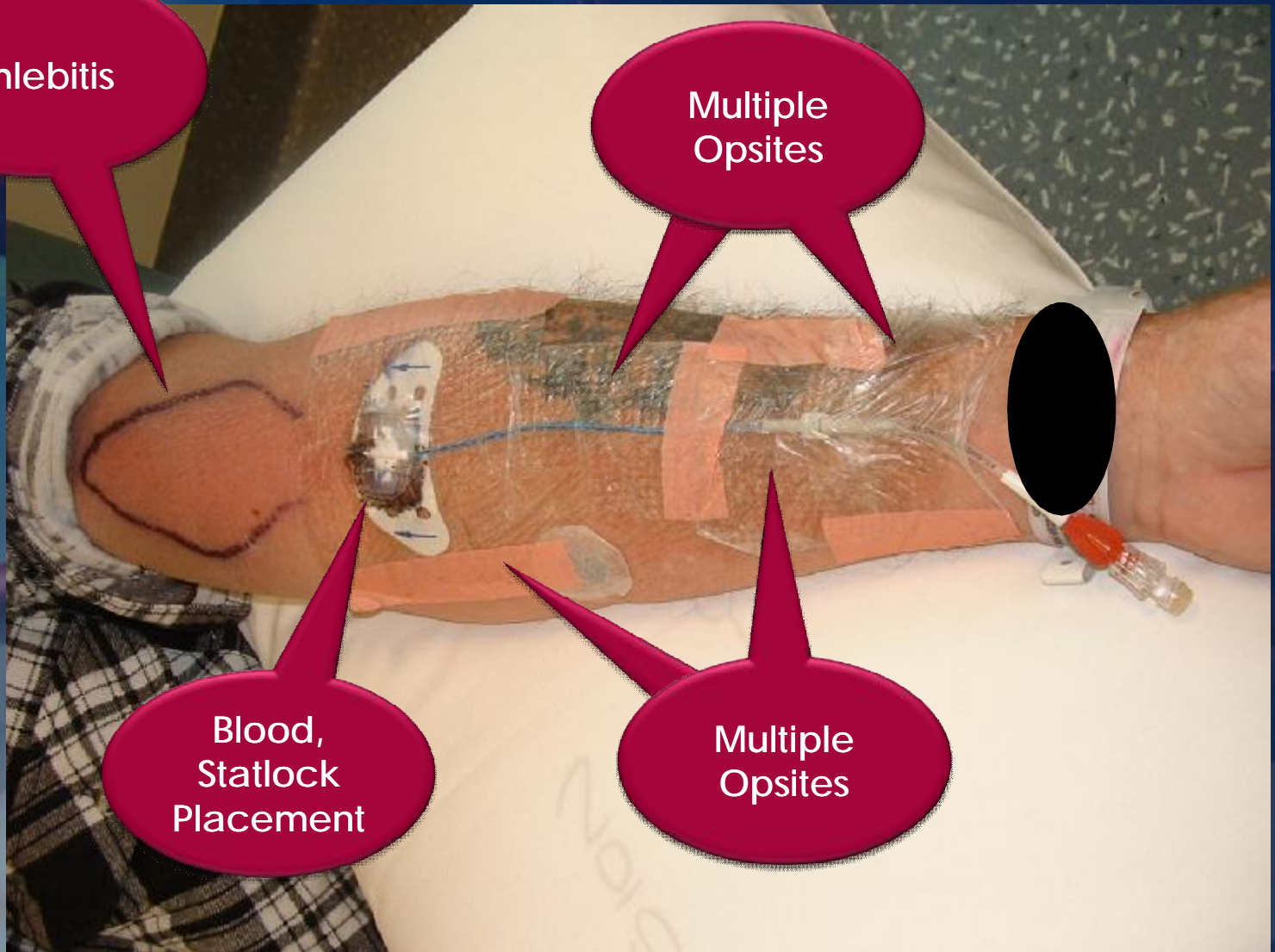


Phlebitis

Multiple
Opsites

Blood,
Statlock
Placement

Multiple
Opsites



Evidence

- Many questions remain unanswered in IV therapy
- Research focuses on infection prevention
- Little focus on other morbidity
- Limited post marketing follow-up

- Two databases
 - Out & About Home IV Therapy
 - 4,000 patients, >93,000 patient days
 - Nurse Inserted PICC database
 - 4600 successfully inserted PICC lines
 - > 92,000 catheter days

A microscopic view of blood cells, including red blood cells and white blood cells, set against a dark blue background. The red blood cells are prominent, showing their characteristic biconcave disc shape. The white blood cells are larger and more varied in shape, some appearing as large, pale spheres. The overall scene is illuminated from the left, creating a sense of depth and highlighting the textures of the cells.

Research project 1

**Do nurses
do it better?**

Can carers care?

- Data presented at WOCOVA
- Home IV therapy (HIVT) program
- A comparison of nurse versus patient / carer administered HIVT
- Central venous catheters: PICCs, tunnelled lines (Hickmans/Broviac), Implantable Ports, Short term subclavian / IJ CVC
- Suitable patients / carers have option of self-administering HIVT
- Some complex regimens (up to 3 abs) or by different modes (continuous, bolus, intermittent)

	Patient / Carer	HCW
Admissions	1305	2205
Program days	29561	49747
Mean days	22.4	22.3
Mean age (range)	38yrs (3wks-89yrs)	57yrs (3mths- 96yrs)
Adults	34%	66%
Gender (%)	Male: 57.5%	Male: 63.8%

Complication (events)	Hazard Ratio HCW Managed lines	Rate per 1000 patient days	
		PTC group	HCW group
Phlebitis (92)	1.99 (1.23-3.2)	0.8	1.4
Blockage (96)	1.02 (0.68 – 1.55)	1.3	1.2
Thrombosis (28)	2.88 (1.09-7.58)	0.2	0.5
Accidental removal (25)	4.6 (1.37-15.48)	0.1	0.5
Suspected line infection (17)	0.96 (0.36-2.55)	0.25	0.2
Definite line infection (11)	0.14 (0.03-0.63)	0.3	0.04
Exit site inflammation (79)	0.96 (0.61-1.52)	1.1	0.99

Other indicators compared

- The HCW group were more likely to **call** the on-call nurse after hours IRR 1.2 (95% C.I., 0.96-1.49) and nearly twice as likely to require an after hours **call-out** to fix problems IRR 1.79 (95% C.I., 1.2 – 2.8).
- There was no significant difference in rates of **early discharge** and **readmissions** due to a complication, between the two groups

Conclusion

- **HIVT for serious infections can be safely administered by patients and their carers, with most complication rates equivalent or better than HCW administered care**
- **The advantages of PTC provision of HIVT are that it involves the patient actively in their own care, provides them with more flexibility and saves the cost of HCW time.**
- **This option can be offered to a large proportion of HIVT patients. In 2010-11, over 50% of our HIVT patients are self-caring.**
- **These results reflect a high standard of selection and training provided by an experienced team.**
- **May also be due to a heightened sense of responsibility when caring for one's own catheter.**

Research project 2

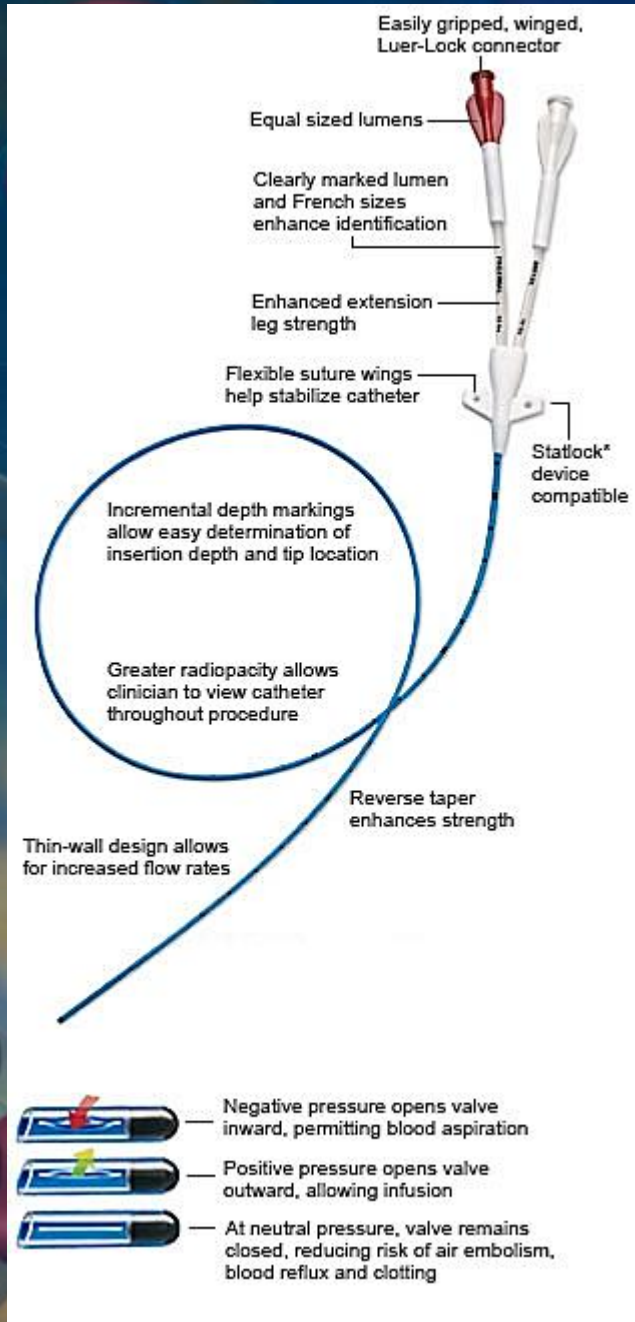


**Which PICC
to pick?**

Why is PICC choice an issue?

- Many PICCs on market, different features and cost
- Compared outcome of valved versus non-valved PICCs to determine if the additional cost resulted in improved line survival
- Methods: Database, insertion and removal details compared
- Results (1997-2011):
 - 4963 successful insertions, 97137 days
 - 650 Non-valved, 4313 Valved
 - 4467 3fr gauge, 708 4fr gauge

Valved PICC lines



Valved PICCs – potentially less blockage

Used as the majority PICC inserted by the IVI team since 1997

Staff comfortable with technique

More costly than non-valved PICCs \$175 each

Prone to damage, requiring repairs, out of hours call outs

Blade to cut skin

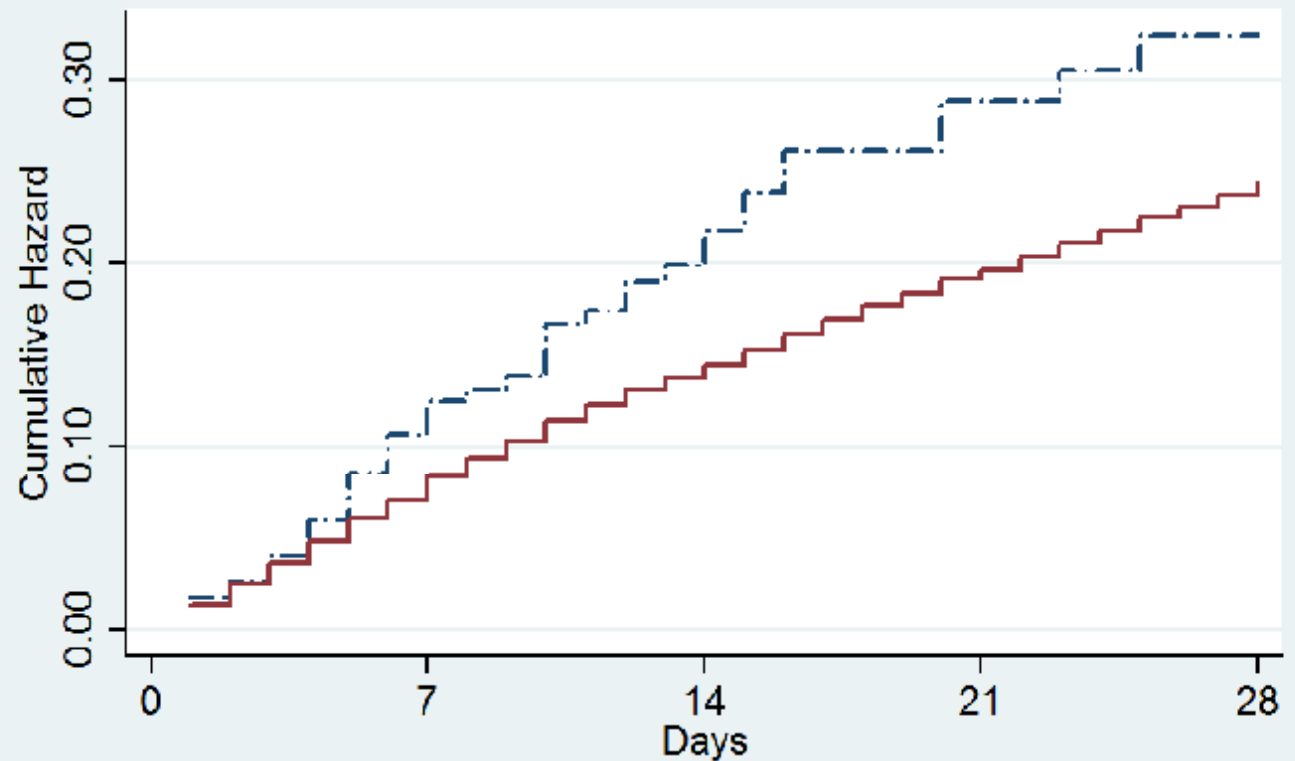
Non-valved PICCs



- Cost \$113.50
- Commenced inserting Feb '11
- Pros:
 - Open ended, can be rewired if needed
 - Stiffer material, less prone to damage
 - Not supposed to develop a 'memory' but this has been observed in lines
 - Direct insertion, cutting not required

Risk of premature removal

Valved vs. Non-valved PICCs



Number at risk

Non-valved 229

168

106

69

46

Valved 4119

3310

2402

1790

1231

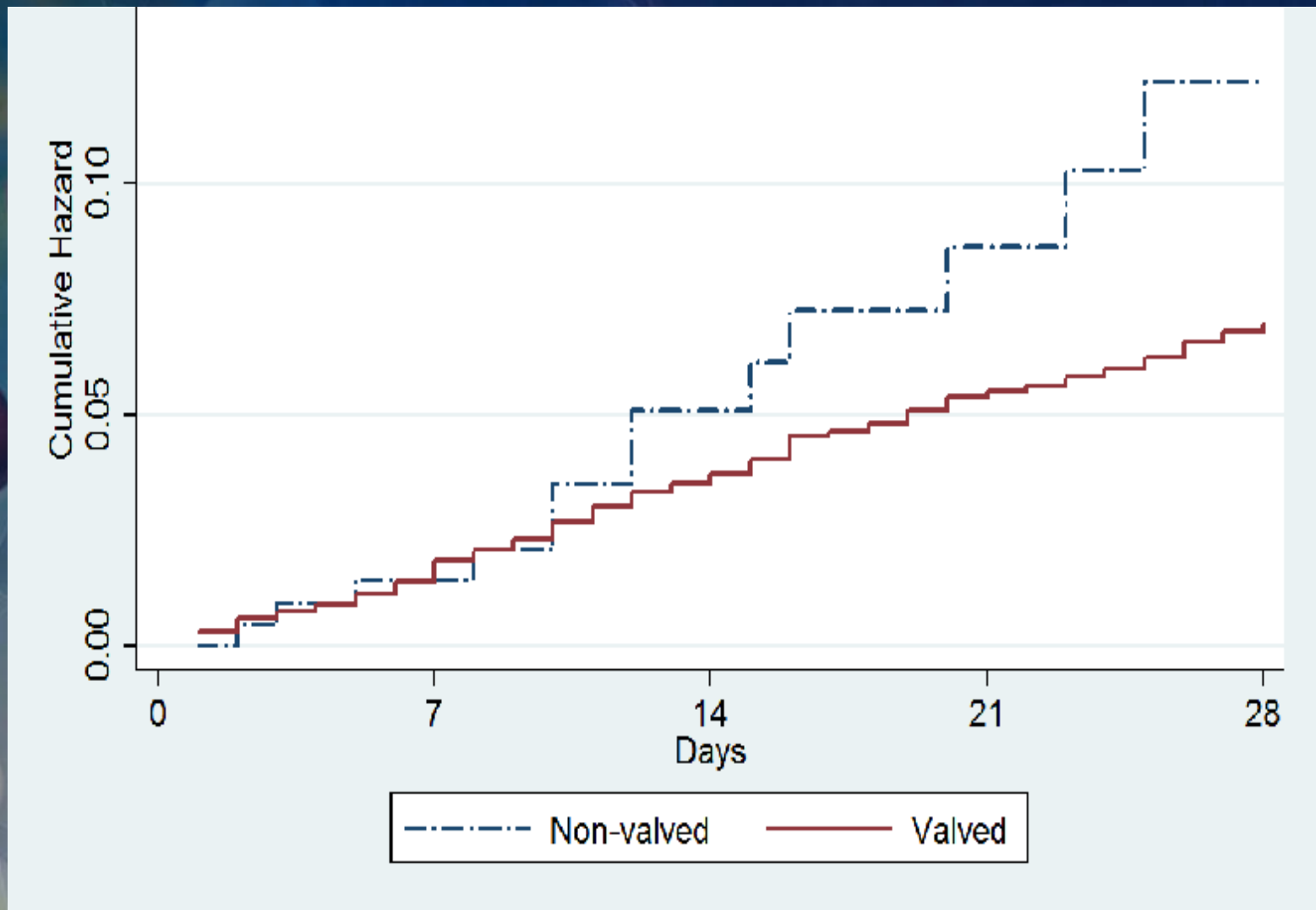
--- Non-valved — Valved

Complication rates

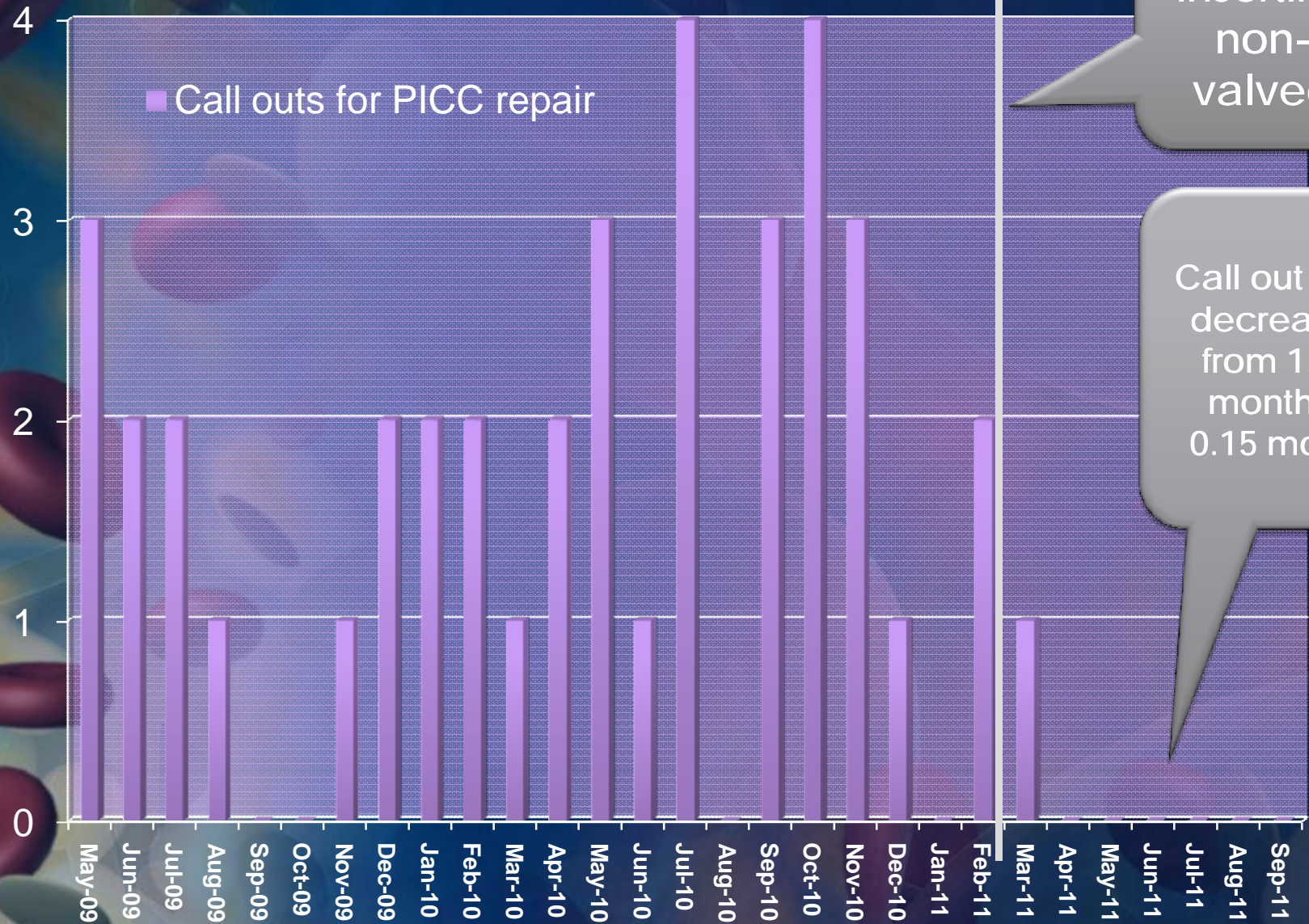
- 40% greater relative risk of failed insertion attempt with the non-valved PICCs ($p < 0.009$)

Complication	Hazard Ratio Valved PICCs	Hazard Ratio 4fr Gauge
Blockage	0.54 (95% CI 0.29-0.99)*	0.89 (95% CI 0.77-1.04)
Damage	3.27 (95% CI 0.42-25.7)	0.55 (95% CI 0.24-1.3)
Thrombosis	0.67 (95% CI 0.17-2.7)	3.3 (95% CI 1.24-8.9)*
Definite Infection	0.39 (95% CI 0.06-2.4)	1.9 (95% CI 0.25-7.6)
Suspected infection	0.5 (95% CI 0.19-1.3)	1.08 (95% CI 0.53-2.2)

Removal due to blockage



Impact on on-call



Started inserting non-valved

Call out Rate decreased from 1.7 / month to 0.15 month

Cost differential

- Between two PICCs, valved is \$61.50 dearer
- If non-valved replaced all valved
 - PICC cost saving of up to \$60,000 p.a.
 - Saving call out costs over \$5000 p.a.
 - Undetermined
 - Additional cost of blockage

A microscopic view of blood cells, including red blood cells and white blood cells, is visible in the background of the slide. The cells are rendered in a semi-transparent, 3D style against a dark blue background.

Conclusion

- Pros and cons for both valved and non-valved
 - Less blockage but more PICCs removed from damage in valved PICCs
 - Larger gauge PICCs have a higher incidence of thrombosis
- Inserters want choice
- We will continue to collect data which should show more definitive answers with larger numbers

Research is ongoing

Things
changing
all of the
time!

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