

Choice of line

Peripheral vs. Central

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Goal of IV access

“Correct device, placed in the correct vein, at first attempt and maintained, complication free, until iv therapy is complete”

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Peripheral vs. Central

- Definition (GAVeCeLT)

Any catheter whose tip is positioned in the superior vena cava, or in the right atrium, or in the inferior vena cava can be defined as 'central' venous access. Any catheter whose tip is in any other venous area is classified as 'peripheral'.

Peripheral vs. Central

- Historically
 - PIV, Midline, PICC (CICC/Port etc.)
- Focus on PIV vs. PICC vs. Midline

“Patient needs IV access for...”

How do we choose a line?

Line Choice

- Usually mostly based on algorithms of which there are many!

INTRODUCTION

The evidence-based Vessel Health & Preservation (VHP) concept of vascular access management was introduced in the UK. The essence of VHP is timely, intentional, proactive patient intervention for vascular access device selection during the first 24 hours of entry into the healthcare process (and re-evaluation thereafter), followed by placement of a clinically appropriate device within 48 hours. Once placed, the focus shifts to daily maintenance and care of the device using the central line bundle and daily assessment to determine the health of patients' blood vessels as well as continued necessity of the device (Moreau, et al, 2012).

This practical framework has been developed to support practitioners to undertake vessel assessment and make decisions regarding suitable devices for vascular access and administration of medication or fluids. This is based on individual patient need and risk assessment. The framework is divided into relevant sections recognising the different stages of vascular assessment and therapy and is intended to be used either in its entirety or individual sections.

Preservation of vessels is required to minimise damage (thrombosis, stenosis and infection) and maintain the patency of the peripheral and central veins for as long as possible. This maintains good venous access for future treatments and minimises patient suffering. Further such actions have the potential to save significant staff and equipment costs to organisations providing vascular access and administration of medication or fluids.

This guidance relates to adult vascular access in acute or planned settings. It is not planned for use in emergency situations where other issues take priority and other routes of access may be appropriate e.g. introsseous infusions.

The content of the poster will be reviewed every two years and revisions taken in the light of new evidence.

Please forward feedback to VHP@ips.uk.net

GLOSSARY OF TERMS

CVC - Central venous catheter

IV - Intravenous route of access

Midline - Long venous catheter inserted into arm veins which does not extend centrally

PICC - Peripherally inserted central venous catheter

PN - Parenteral nutrition

TNAD - Total implanted vascular access device (port)

Tunnelled CVC - central venous catheter which is tunnelled away from exit site and has anchoring cuff (e.g. Hickman type catheter)

VAD - Vascular access device

VHP - Vessel health and preservation

VIP - Visual Infusion Phlebitis Score (Jackson, 1997)

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UK VESSEL HEALTH AND PRESERVATION

START HERE

FIRST CONSIDERATION

IS IV THERAPY REQUIRED?

NO

CONTINUE TREATMENT VIA ALTERNATIVE ROUTE¹

YES

SEE DECISION TOOL

HAVE ALTERNATIVE ROUTES BEEN CONSIDERED AND EXCLUDED?

RIGHT LINE DECISION TOOL

GENUINE NEED FOR IV THERAPY?

YES

NO

MUST therapy be administered centrally?
(See example drugs list)

Continue via alternative route:
Consider: Oral, sublingual, intralid, subcutaneous, nasal, transdermal, topical etc.

YES

NO

PERIPHERAL VEIN ASSESSMENT grade

PERIPHERAL VEIN ASSESSMENT					
	1 EXCELLENT	2 GOOD	3 FAIR	4 POOR	5 NONE IDENTIFIABLE
Outpatient / Long Term	<6 months Intermittent Therapy	<4 months Intermittent Therapy	Ok for 4-6 wks Intermittent Therapy	One of Cannulation	Not suitable for Cannulation
Inpatient / Acute	Less than 10 days therapy	Less than 10 days therapy	Less than 10 days therapy	One of Cannulation	Not suitable for Cannulation

If Peripheral Vein grade not compatible with intended treatment duration, consider other type of vascular device

DURATION OF ANTICIPATED THERAPY?

<10 days⁴

>10 days <4 weeks⁴

>4 weeks <6 months⁴

>6 months <1 year⁴

>1 year <2 years⁴

>2 years <3 years⁴

>3 years <4 years⁴

>4 years <5 years⁴

>5 years <6 years⁴

Non-tunnelled CVC / PICC or Midline⁵

PICC / Midline⁵

PICC / Tunnelled CVC or TNAD

Tunnelled CVC/TNAD

SECONDARY QUESTIONS WHICH MAY REFINE LINE CHOICE IN INDIVIDUAL PATIENTS:

Patient preference / Lifestyle issues / Body image.

Known abnormalities of vascular anatomy which limit access site.

Therapy specific: eg intermittent vs continuous II health of patient, extreme duration of therapy (months-years), specific indications (eg bone marrow transplant).

Local availability of vascular competency.

Need for long term dialysis with: AV fistula, avoid vein damage from PICC or Axillary / Subclavian catheters.

Relevant PMH: coagulopathy, severe respiratory dysfunction and other contraindications to central access.

Patient factors: cognitive function.

VESSEL ASSESSMENT

PERIPHERAL VEIN ASSESSMENT			
GRADE	VEIN QUALITY	DEFINITION IF VEIN QUALITY	INSERTION MANAGEMENT ²
1	Excellent	4-5 palpable: easily visible veins suitable to cannulate	Cannula may be inserted by trained authorised health care practitioner
2	Good	2-3 palpable/visible veins suitable to cannulate	Cannula may be inserted by trained authorised health care practitioner
3	Fair	1-2 palpable/visible veins suitable to cannulate. (Veins may be small, scarred or difficult to find and require heat packs to aid vasodilation)	Cannula may be inserted by trained authorised health care practitioner but may require Infrared Viewer or Ultrasound
4	Poor	Veins not palpable/visible (requires ultra sound assistance or infrared viewer)	Cannula may be inserted by an experienced practitioner ³ in Cannulation, Use Infrared Viewer, Ultrasound, transillumination or other aids
5	None identifiable	No visible (heated eye or aid) or palpable veins.	Peripheral cannulation should not be performed

¹ The number of attempts for cannulation before escalation should be reflected in local policy

² To be determined locally

SUITABILITY OF DRUGS

Suitability of drugs for peripheral infusion is potentially complex and requires risk assessment for the individual drug and route of access with each treatment. In broad terms the safety of a drug infusion to prevent damage to the vessel will relate to factors like pH, osmolality, viscosity, volume of dilution, speed of infusion, the size and fragility of the peripheral vein. General guidance should be available locally in all clinical settings. Examples include Injectable Medicines Guide (Medusa) <http://medusa.wales.nhs.uk/Home.asp> (Login and registration required).

Guidelines suggest peripheral cannulae and midlines are unsuitable for the following:

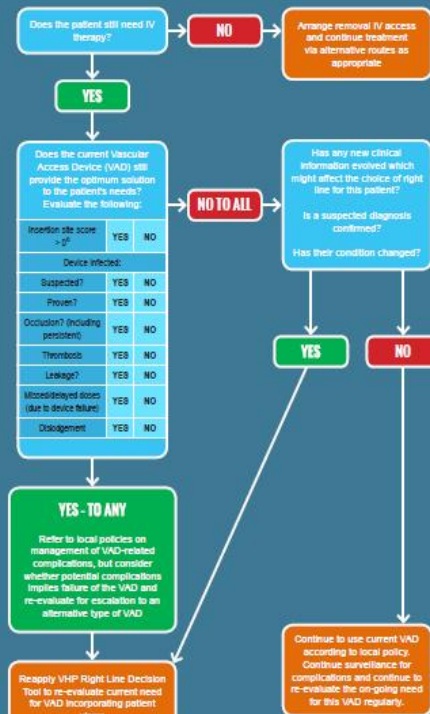
- Continuous vesicant chemotherapy
- Parenteral nutrition exceeding 10% dextrose and/or 5% protein
- Solutions and/or medications with pH less than 5 or greater than 9
- Solutions and/or medications with osmolality greater than 600mOsm/l

EXAMPLE OF A DRUGS LIST

DEFINITELY CENTRAL	CONSIDER CENTRAL
Amiodarone (except emergency in cardiac arrest)	Vancomycin (especially when more than just a few days)
Some cancer chemotherapy drugs	Labetalol
Dobutamine	Arginine
Dopamine	Caffeine
Epinephrine (adrenaline) (infusion (except bolus dose in cardiac arrest))	GTN
Norepinephrine (noradrenaline)	Co-trimoxazole
Poassium >40mmol/l	Darifenacin
PN (unless only for first 1-2 days of therapy)	Phenoxymethazine
Dopamine	Foscanet
Glucose >15%	Nitroglycerine
Timolol	Phenol
Sodium Bicarbonate 4.2% or 8.4%	Genciclovir
Sodium Chloride 1.8%	Pentamidine

RE-EVALUATION OF ACCESS DEVICE

Daily assessment is required to ensure the device is appropriate, preserving vessel health and comfort for the patient. The assessment should consider any complications and whether the device is still required. In addition, observation of the vascular access device insertion site should be performed each shift.



⁴ Use local insertion site score - eg VIP Score for peripheral cannula

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IOS Infection Prevention Society

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Figure 3. Venous access device recommendations for infusion of peripherally compatible infusate.

Device Type	Proposed Duration of Infusion			
	≤5 d	6–14 d	15–30 d	≥31 d
Peripheral IV catheter	No preference between peripheral IV and US-guided peripheral IV catheters for use ≤5 d			
US-guided peripheral IV catheter	US-guided peripheral IV catheter preferred to peripheral IV catheter if proposed duration is 6–14 d			
Nontunneled/acute central venous catheter	Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d			
Midline catheter	Midline catheter preferred to PICC if proposed duration is ≤14 d			
PICC		PICC preferred to midline catheter if proposed duration of infusion is ≥15 d		
Tunneled catheter				PICC preferred to tunneled catheter and ports for infusion 15–30 d
Port				

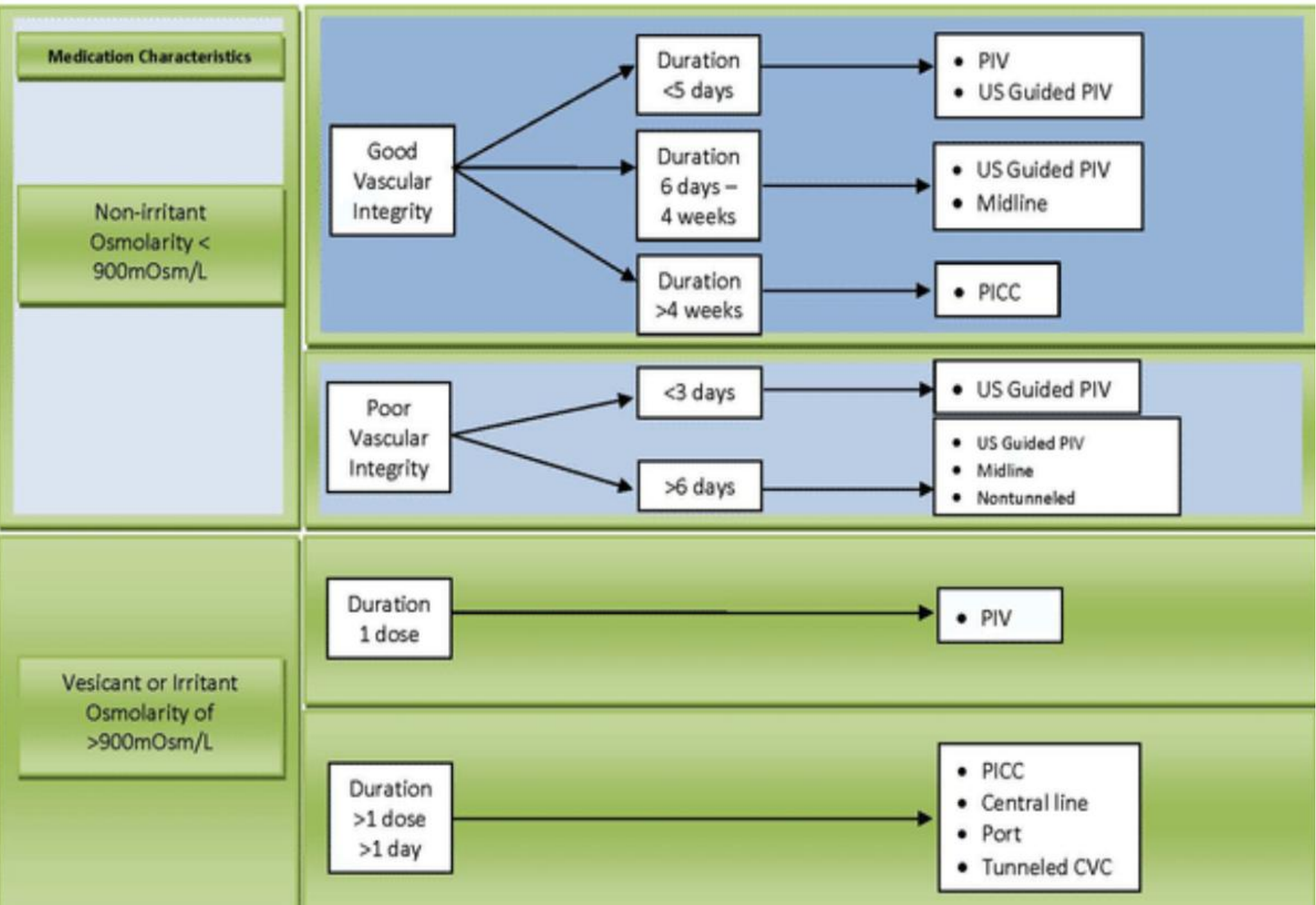
Appropriate

Neutral

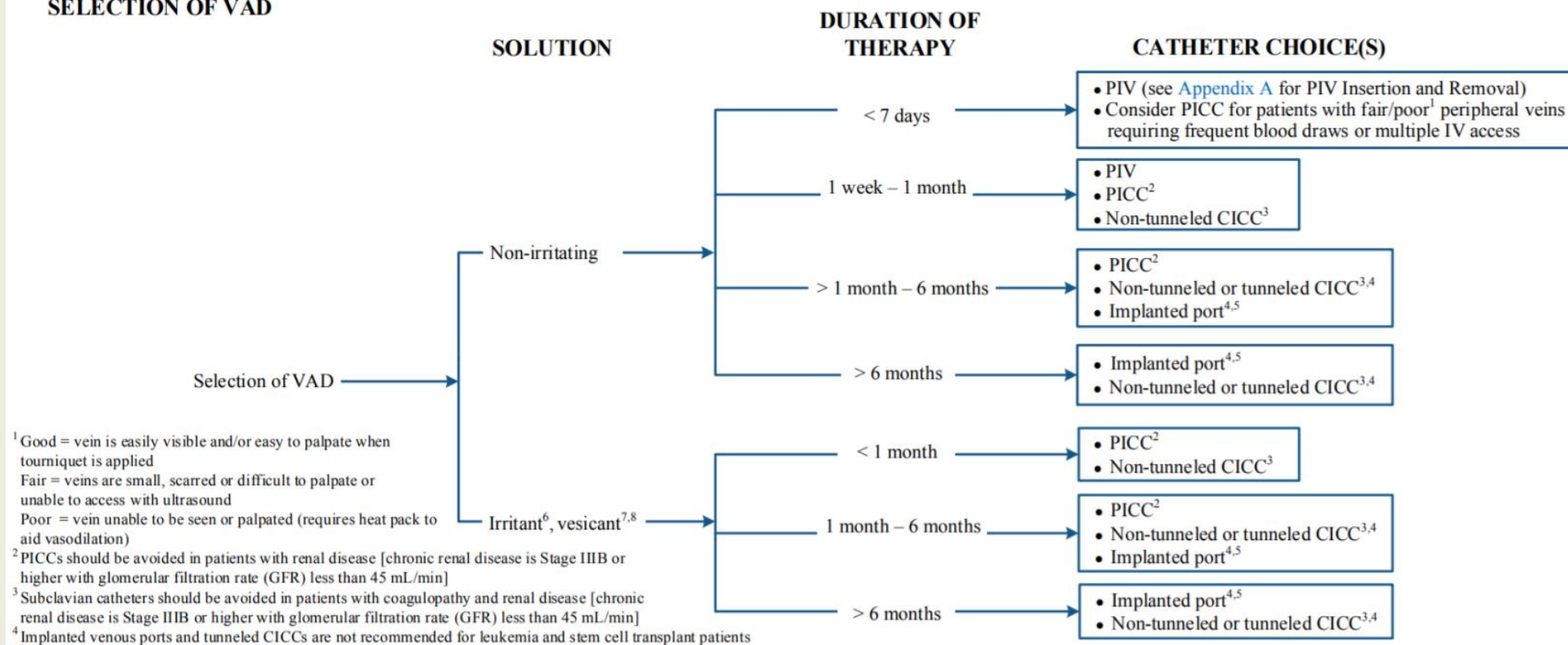
Inappropriate

Disagreement

Vascular Access Device Selection Algorithm



SELECTION OF VAD



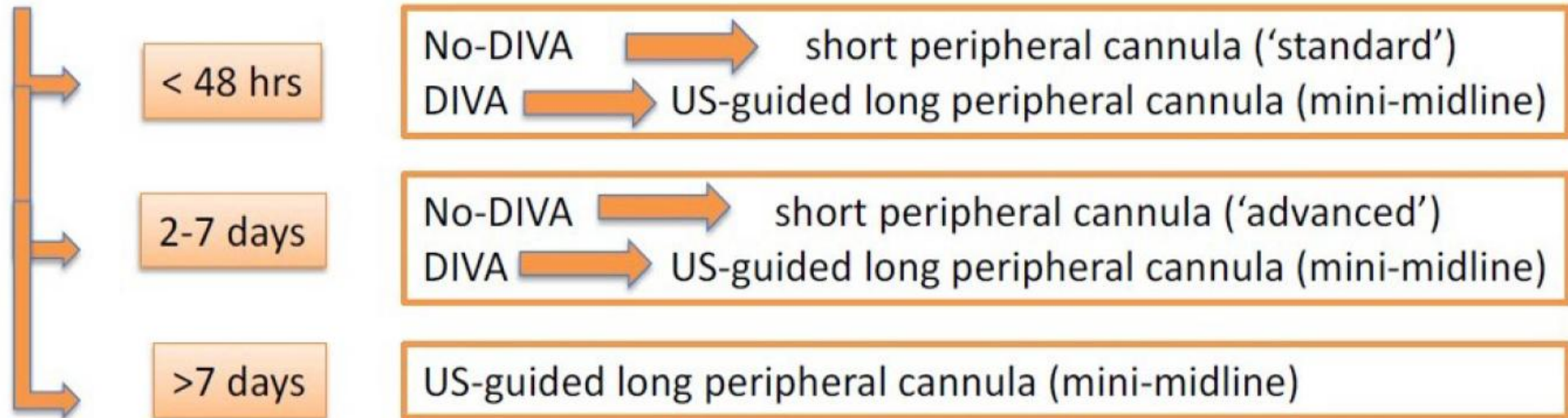


- DAV-EXP is an expert system developed by GAVeCeLT to present an algorithm for choosing the most suitable venous access device (DAV) in a simple and clear way.
- DAV-EXP è un sistema esperto messo a punto dal GAVeCeLT per presentare in forma semplice e chiara un algoritmo per la scelta del dispositivo per accesso venoso (DAV) più appropriato per la singola situazione clinica.

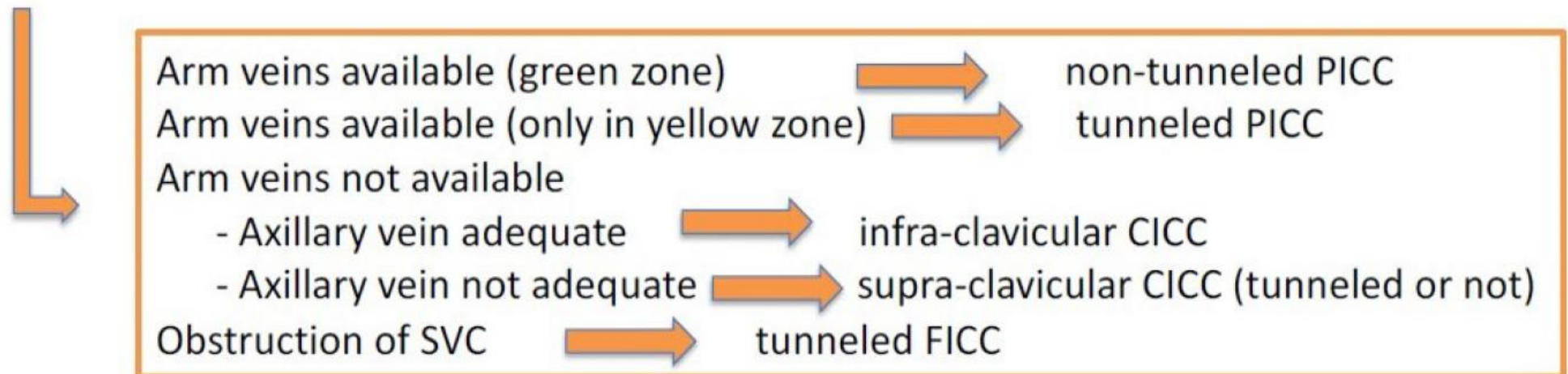
Adult patient- Elective

Intra-hospital use

Peripheral access is appropriate



Central access is required



Adult patient - Elective

Extra-hospital use

<4-6 months



Peripheral access is appropriate



< 3-4 weeks: mini-midline
> 3-4 weeks: midline

Central access is required



Arm veins available: non-cuffed PICC, tunneled or not
Arm veins not available: non-cuffed, tunneled CICC
SVC obstruction: non-cuffed, tunneled FICC

>4-6 months



Frequent use

Arm veins available : PICC (tunneled-cuffed or tunneled + SAS)
Arm veins not available: CICC (tunneled-cuffed or tunneled + SAS)
SVC obstruction : FICC (tunneled-cuffed or tunneled + SAS)

Episodic use

Arm veins available: PICC- port
Arm veins not available: chest port
SVC obstruction: groin port or FICC (tunneled-cuffed or tunneled + SAS)

**Any need for infusion therapy, blood samples, emodynamic monitoring
in an adult patient**

Peripheral VAD

pH between 5 and 9
Non vesicant
Non irritant
Needed for less than 4 wks



Short peripheral cannula

Superficial vein of the arm available
Needed for < 1 week
Intra-hospital use

Long peripheral cannula

Superficial vein of the arm unavailable (US-guided insertion in deep veins of the arm)
Needed for < 1 week but < 3 weeks
Intra-hospital use

Midline catheter

Superficial vein of the arm unavailable US-guided insertion in deep veins of the arm)
Needed for > 3 weeks
Intra and extra-hospital use

Central VAD

I.V. solutions with pH < 5 or > 9
Drugs with osmolarity > 600 mOsm/l
Parenteral nutrition (>800 mOsm/L or >4-6 weeks)
Vesicant drugs and any drug potentially associated with endothelial damage
Hemodynamic monitoring
Repeated blood samples
Need for medium or long term i.v. line (months or years)

In-Hospital use



PICC ("brachially" inserted CVC)
First choice unless contraindicated (see table)

CICC ("cervical/thoracically" inserted CVC)
Deep arm veins unavailable or not suitable (see table)
Emergency
Anti-microbial catheter (until antimicrobial PICCs available on Italian the market)
More than 3 lumens needed or number of lumens conflicting with catheter-to-vein ratio

FICC ("Femorally" inserted CVC)
NON TUNNELED: emergency
TUNNELED: SVC obstruction

Extra-Hospital use
Day-Hospital, Home care, Hospice



Medium term (< 4 months)

PICC
As a first choice unless contraindicated
CICC
When PICC contraindicated (see table)
Possibly tunneled

Long term (> 4 months)

Episodic access (frequency < 1/week)
PORT (brachial/chest/groin – see table for indications/contraindications)
Frequent access (frequency > 1/week) and/or continuous infusion > 4 days/week
TUNNELED-CUFFED DEVICE (brachial/chest/groin – see table for indications/contraindications)





The DAV-EXP should not be considered as a fixed reference guideline; line choice will remain a clinical decision, made after assessing the needs of the individual patient and the resources of the unit/hospital/clinic etc.

Goal of IV access

“Correct device, placed in the correct vein, at first attempt and maintained, complication free, until iv therapy is complete”

Peripheral vs. Central

- What are the variables:
 - Patient issues
 - IV access device
 - For...(type and duration of iv therapy)
 - Available equipment
 - Available expertise both for insertion and **aftercare**
 - Urgency/location

Patient issues

SECONDARY QUESTIONS WHICH MAY REFINE LINE CHOICE IN INDIVIDUAL PATIENTS:

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Patient factors: cognitive function.

Patient Issues

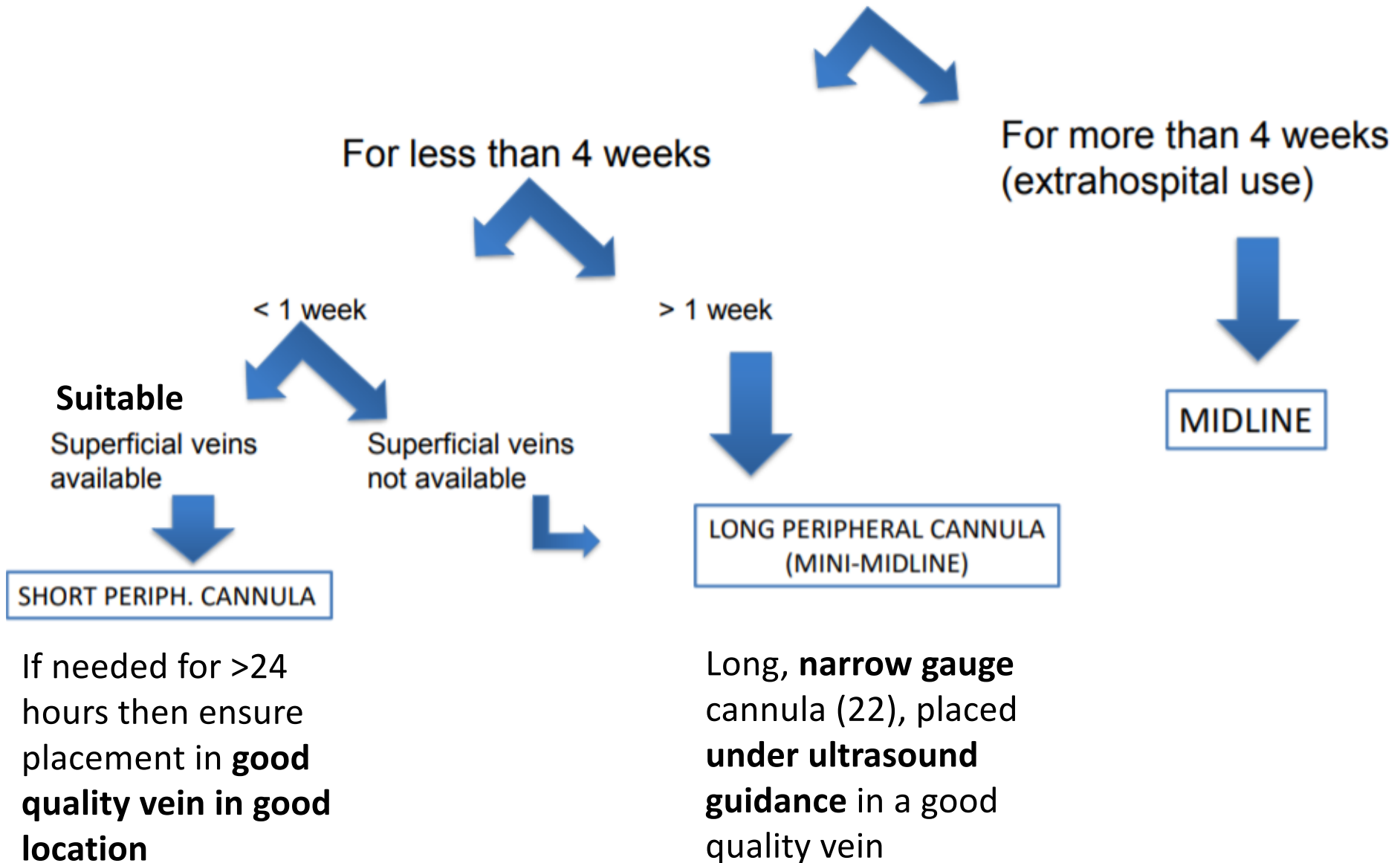
- Veins available, now and next
- Future need! Think about next time!



Available Equipment and Expertise

- Very variable. Need to work with what you have
- Specialist staff, Skilled staff
 - PICC/midline **EARLY**, where indicated
- ULTRASOUND and skills to use it – PROPERLY!
- Do you have a wide range of IV access devices available?
 - Especially peripheral devices (PIVs)

Peripheral venous access



(TvB : WOCOVA)

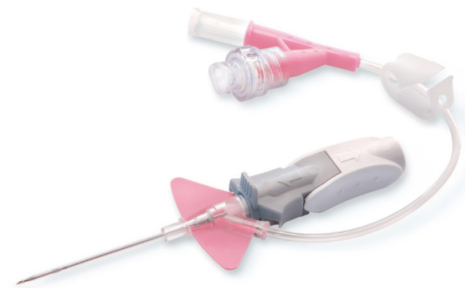
Specialist peripheral iv (PIV)

- “Simple” specialist peripheral cannulae
- “Complex” specialist peripheral cannulae
 - Insertion skill
 - Gauge
 - **Length**
 - Material
 - Fixation

Our Experience

- Long, narrow PIVs, placed under ultrasound guidance, in a good vein, in a good location, using best practice, last A LONG TIME.

BD Nexiva



Standard PIV is
approximately
25mm long

Catalogue Number	Gauge	O.D	I.D	Length
BD383538	20G	1.10mm	0.64mm	1.75" (44mm)

BBraun Introcath
Safety Deep
Access



64mm

Our Experience

- Use narrowest gauge you can
 - Be brave, 22G as standard
- **Long cannulae are revolutionary**
 - Distance of tip from vein wall puncture
 - Especially in obese or those with lax skin
 - Less chance of catheter tip coming out of vein
 - Especially in children
 - Especially in patients in whom longevity is problematic

Reaching One Peripheral Intravenous Catheter (PIVC) Per Patient Visit With Lean Multimodal Strategy: the PIV5Rights™ Bundle

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THE PERIPHERAL BUNDLE

Integration of a Process Using the 5 Rights for
PIVC Placement/Maintenance

1. RIGHT PROFICIENCY

- ✓ Experienced Vascular Access Specialty Team (VAST) trained in ultrasound guided peripheral catheter assessment and placement

2. RIGHT INSERTION

- ✓ Placement with no more than 2 attempts
- ✓ Sterile components and aseptic technique
- ✓ Catheter securement

3. RIGHT VEIN & CATHETER SELECTION (Vessel Health and Preservation)

- ✓ EBP site/catheter selection with avoidance of joints and danger zones
- ✓ Ultrasound assessment and placement for PIVC placement as needed with small linear transducer
- ✓ Validate catheter size and length with vein size, a focus on forearm placement

4. RIGHT SUPPLIES & TECHNOLOGY

- ✓ IV start kit
- ✓ CHX Antimicrobial, bordered securement dressing
- ✓ Anti-reflux needleless connector
- ✓ Alcoholic CHG skin disinfection
- ✓ 22g/1.75" Catheter

5. RIGHT ASSESSMENT & CARE

- ✓ Assessment for catheter function, dressing adherence and necessity of the device twice daily
- ✓ Hub disinfection with passive port protectors and alcohol wipes between access
- ✓ Pulsatile flushing twice daily per protocol
- ✓ Dressing change at 7 days for all catheters
- ✓ Peripheral catheter (PIVC) maintained by team until clinically indicated discontinuation

THE RESULTS

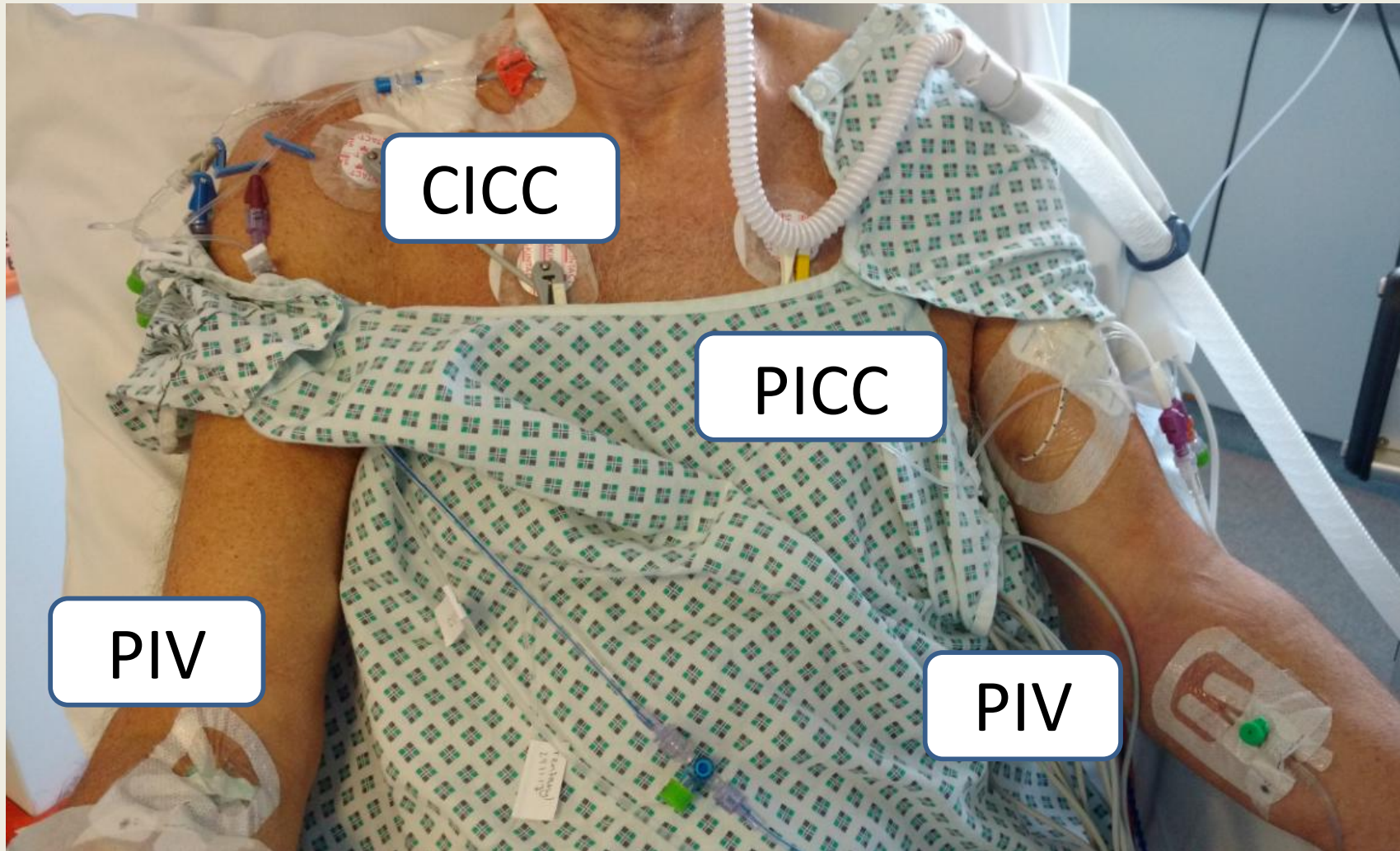
Variable	Group 1 (n=94)	Group 2 (n=113)
Success Rate (therapy completed)	15%	89%
Dwell Time, Hours (mean $\pm$ SD, P<0.001)	29.6 $\pm$ 18.0	71.4 $\pm$ 58.8
Complication Rate (%, P<0.001)	40%	11%
Cost/Bed/Year (2018 USD)	\$4,781	\$1,405

In Conclusion

Peripheral vs. Central

- Essential to consider **all** factors when deciding:
 - Skills, aftercare, device availability, next time etc.
- Timely PICC
- **Long, narrow** PIVs, placed **properly** under ultrasound guidance, in a **good** vein, in a **good** location, following best practice, which are then **well looked after**, do **VERY WELL** for patient.

If all else fails, just put everything in...



Thank You for listening!

Dr Matt Jones

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