The University Of Queensland AUSTRALIA | CREATE CHANGE

The art of IV care

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Acknowledgment of **Country**

The University of Queensland (UQ) acknowledges the Traditional Owners and their custodianship of the lands on which we work.

We pay our respects to their Ancestors and their descendants, who continue cultural and spiritual connections to Country.

We recognise their valuable contributions to Australian and global society.

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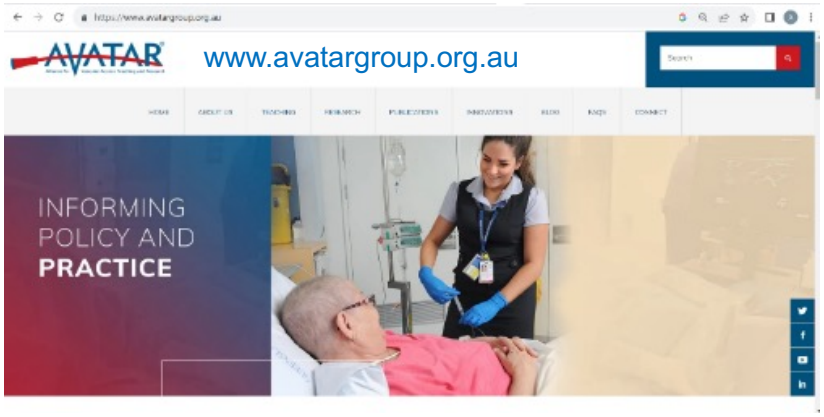

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- Healthcare Associated Infections
- Infection Prevention

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Alliance for Vascular Access Teaching & Research (AVATAR)®

Established 2007

Our vision: *"To make vascular access complications history"*

- 50+ RCTs; 350+ studies; 16,000+ patients randomised
- Collaboration with 500+ hospitals worldwide
- Formal partnership with multiple universities
- Global partners inc. U Michigan, U Colorado, Fed U Sao Paulo, Fed U Santa Catarina, U Galway, U Poitiers
- >$25m+ funding, 350+ publications
- Productive relationship with industry
- Impact on many major clinical practice guidelines & standards
- Substantial teaching & mentoring

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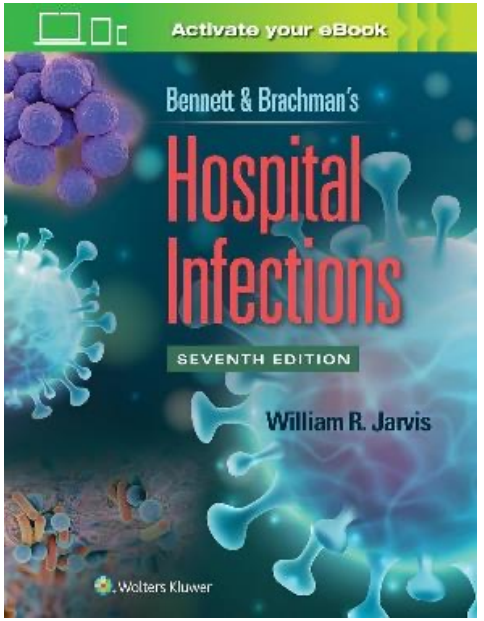
Objectives:

1. Review the concept of peripheral IV catheter (PIVC) infections
2. Understand evidence-based for infection prevention in PIVCs
3. Review the policy context for making PIVCs safer

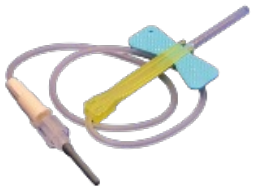
Outline of presentation

1. PIVC infections
2. PIVC localised infections
3. PIVC bloodstream infections
4. Non-infectious complications
5. Patient level infection prevention
6. System level infection prevention
7. Future directions

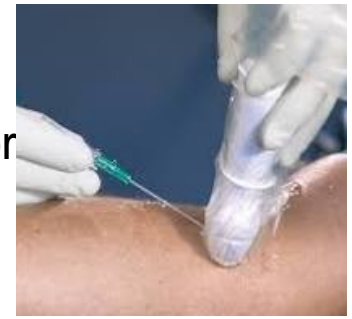


"Peripheral Venous Catheters" Gillian Ray-Barruel & Claire M Rickard Bennett & Brachman's Hospital Infections, 7th Edition

Peripheral intravenous catheters



- PIVCs are crucial ~2 billion sold globally/year
- 70%-90% prevalence in hospital patients
- Increasing use of ultrasound for insertion, especially for difficult IV access (DIVA), or therapy 6-14 days



- Peripherally compatible medication/fluids only
  - Gorski et al

- Three categories of PIVCs (INS Standards):
  - Short PIVC
  - Long PIVC
  - Midline PIVC - therapy ~≤14 days (MAGIC 2015)

✓ MAGIC Guidelines. Chopra et al. Annals of Internal Medicine 2015
✓ Gorski L et al. Development of an Evidence-Based List of Non-Antineoplastic Vesicants J Infus Nurs. 2024 (peripherally compatible agents)

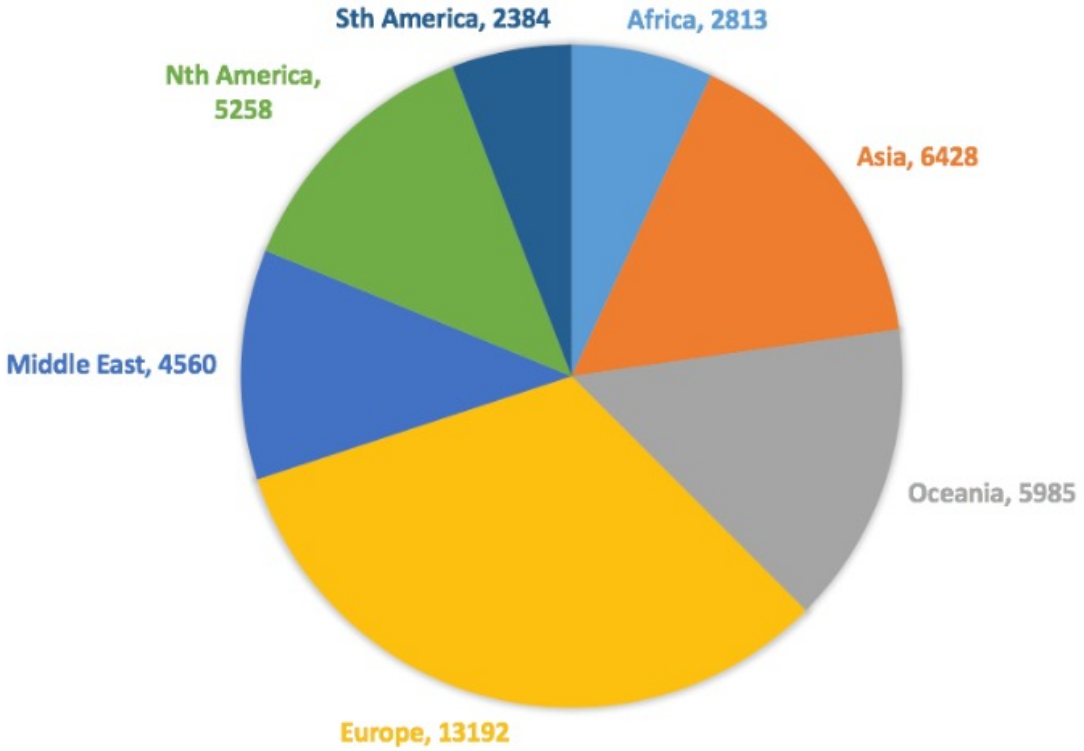
OMGPIVC
One Million Global Catheters
PIVC Worldwide Prevalence Study

OMG Study sample

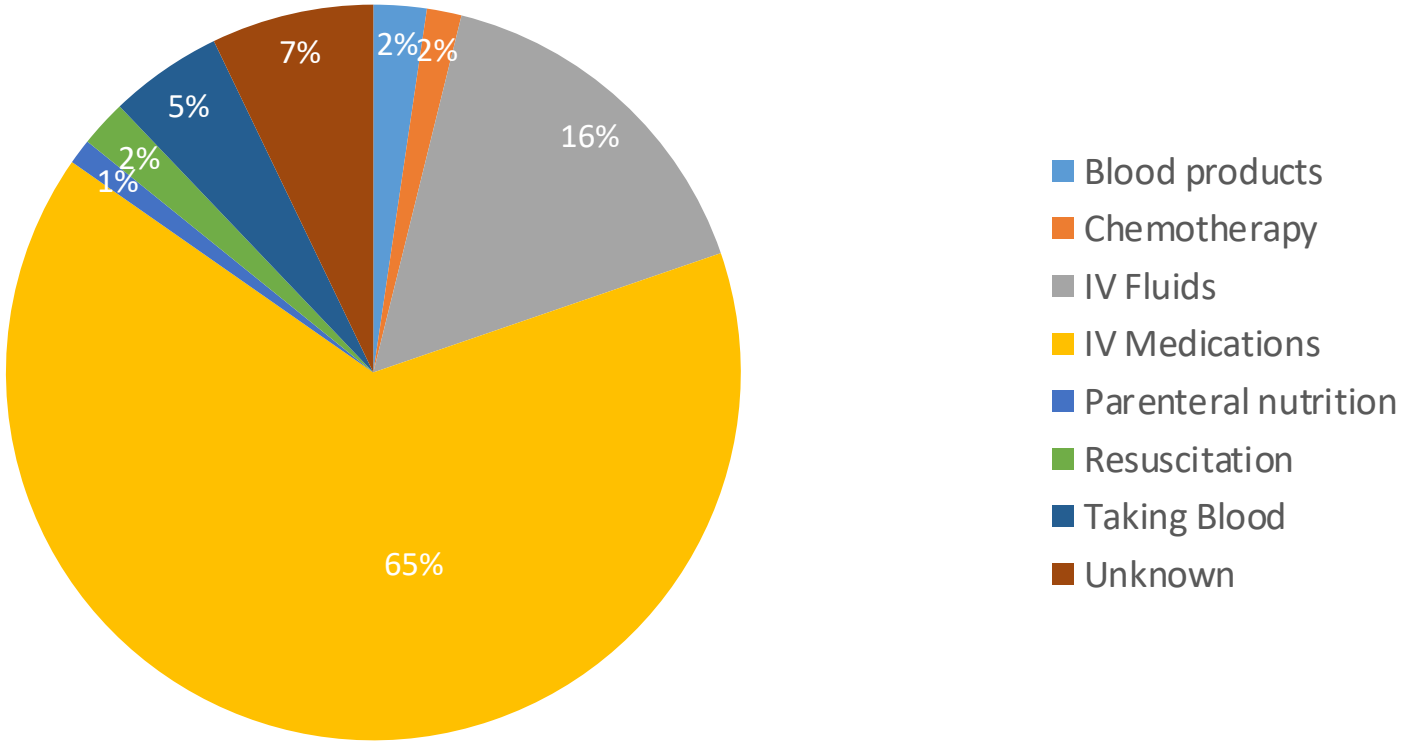
- 75,000 patients screened
- 415 hospitals
- 51 countries
- 15 languages
- 40,620 PIVCs

Alexandrou et al.

Journal of Hospital Medicine 2018

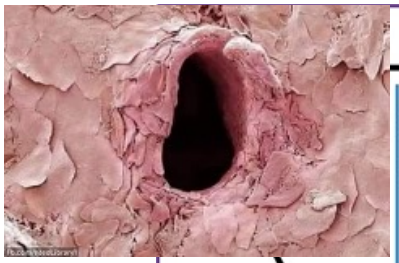


Reasons for PIVC insertion



PIVC Infections

- Localised and/or systemic infections
- 4%-6% of healthcare-acquired bloodstream infections (HABSIs) are associated with PIVCs
  - 13-23% of all HABSI caused by a vascular catheter
- Gram-positive/Gram-negative bacteria, fungi, polymicrobial infections
- Serious mortality, morbidity risks, costs - comparable with CVC infections
- Microorganism entry via wound or catheter
- Incidence low *per PIVC*, but total numbers high
- PREVENTABLE !!!



Localised PIVC infection

- Infection of vein or soft tissue
- Early: Pain, redness, warmth
- Late: Purulence, pustules, vesicles, boils

Surveillance definitions specify <u>without BSI</u>

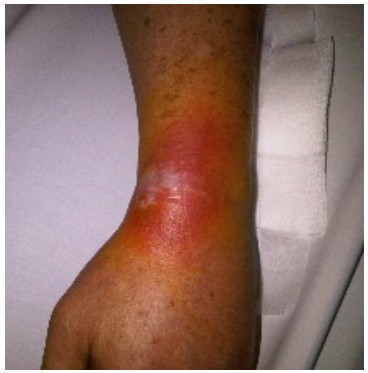
- *ECDC "CVS infection (arterial/venous)"*
  - Purulence (pus)
- *ECDC "Catheter related infection (CRI1-PVC)"*
  - *pus/inflammation AND PIVC tip culture ≥10^3 CFU/ml (quant) or >15^3 CFU/ml (semi-quant)*
- CDC – "VASC-arterial or venous infection"
  - Signs/symptoms (without other cause) AND catheter tip *>15^3 CFU/ml (semi-quant)*; OR,
  - purulence

Clinically can predict or co-exist with BSI

<u>Marsh et al. Int J Nurs Stud 2024</u>

Systematic review & meta-analysis

- 30 RCT or cohort studies 2001-2022
- Reported 0% to 5% incidence
- **236 infections in 22,403 PIVCs (1.5%)**
  - No difference in developing/developed economies
  - No difference in emergency department/other



Local infection RISKS

Risks thought to be extreme age (young/old), active cancer, burns, long-term steroids, IV drug use

Lee et al. J Hosp Infect 2010 46 cases, 4:1 matched controls. Multivariable regression

- **>24 hour continuous infusion** vs intermittent use (OR 5.2;1.9-14.2)
- **insertion in lower limb** (OR 8.5;2.1-34.4)
- **use of infusion pump** (OR 4.6; 1.2-17.0)
- **Neurology/neurosurgery** (OR 3.6; 1.2-10.2)

Signif on univariable only: Lipids (OR 20.8), PPN (OR 15.0)

Drugeon et al ARIC 2024 75 cases (local infection/colonised tip) 2ndary analysis of 3 RCTs
Cox multivariable regression

- **Insertion over a joint (wrist or antecubital fossa)** HR 1.72 (1.08-2.75)

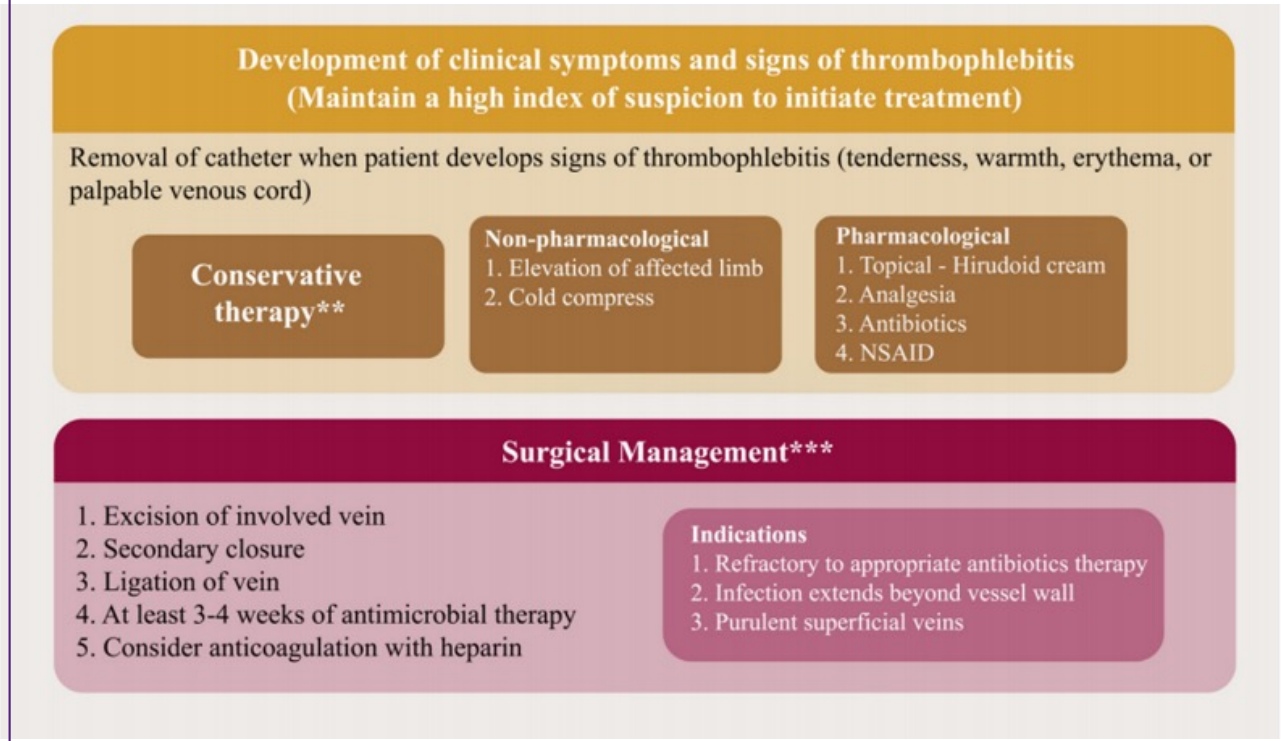
OMG PIVC
One Million Global Catheters
PIVC Worldwide Prevalence Study

In 40,600 PIVCs, **failed removal** common - 10% PIVCs had signs of phlebitis/infection

Lee et al. J Hosp Infect 2010 case-control study (46 cases)

- 17% purulence or cellulitis
- Purulence cultures:
  - 43% *S. aureus*
  - 7% CNS
  - 7% *E.coli*
  - 4% negative
- 13% BSI AND local inflammation
- 2% had a matched BSI
- BSI Organisms: *S. aureus,* CNS, *E. coli, Flavo indologenes, K pneumoniae, Strep mitis*
- **57% persisting local inflammation >3 days after removal**
- **13% had abscesses & needed surgical drainage/ debridement**

Management of thrombophlebitis/local infection (Heng et al Am J Med 2020)



***Di Nisio et al 2015 *** Mermel et al 2009*

PIVC – Bloodstream Infections (PIVC-BSI)

BSIs "associated" (no other source) or "related" to a PIVC (micro evidence of source)

ECDC Surveillance – "Catheter Related Infection (CRI)"

- CRI2-PVC: General PVC-related infection (no positive blood culture)
  - quantitative ***PVC culture*** ≥ 10^3 CFU/ml or semi-quantitative PVC culture >15 CFU
  - AND ***clinical signs improve*** within 48 hours after catheter removal
- CRI3-PVC: Microbiologically confirmed PVC-related bloodstream infection
  - **BSI 48 hours** before or after catheter removal (if any)
  - AND positive culture with the **same micro-organism** of either:
    - quantitative **PVC culture** ≥ 103 CFU/ml or semi-quantitative PVC culture > 15 CFU
    - positive culture from **purulence** from insertion site

USA CDC – No specific PIVC BSI definition "Report intravascular infections with organism(s) identified from the **blood** and meeting the **LCBI criteria**, as BSI-LCBI" i.e. Primary BSI

IDSA diagnostic definition (2009) "Catheter-related BSI" applied to any vascular catheter: **BSI** with **no other source, clinical signs** & symptoms of infection, catheter **tip** culture with **matched organism**

Suspect PIVC-BSI? Act quickly!

Remove PIVC – Source control

Clinically assessed

1. Examine **old** and **new** PIVC sites. Up to 80% of cases are from old sites. Touch the site, look at the site, ask the patient about pain. PIVC site pain and redness (fair skin) have reasonable specificity but poor sensitivity. Purulence and cellulitis are more sensitive
2. Signs/symptoms: New malaise, chills, hypotension, ↑CRP, systemic inflammatory response syndrome (low or high body temperature, elevated heart rate, elevated respiratory rate, low or high white blood cell count) all with no other known cause. Fever has high sensitivity but poor specificity.

Microbiologically investigated (gram stain and culture, add fungal culture if immunocompromised)

1. Two sets of peripherally drawn blood cultures
2. Culture purulent discharge
3. Remove PIVC and culture tip (roll plate or broth)

Diagnosis

- Confirmed = growth of pathogenic organism in ≥1 blood culture, or a common commensal in 2 blood cultures
- Negative BC/other cultures or no site symptoms does not mean no infection.
- Strongly suspicious if +ve site signs/symptoms, especially purulence OR condition improves after PIVC removal
- No value in routinely culturing all PIVC tips

PIVC-BSI

- Rates are low per PIVC and *may* have decreased over the decades

		BSI %	Rate
Marsh et al. Int J Nurs Stud. 2024	38 RCT/cohort studies. PIVC "associated" BSI. 2001-2022	**78 in 437,255 PIVCs 0.02%** (95%CI 0.009-0.08)	0.04/1000 days
Maki et al. Mayo Clin Proc 2006	11 prospective studies. PIVC "related" BSI. 1966-2005	13 BSI in 10,910 plastic PIVCs **0.1%** (95%CI 0.1-0.2).	0.5/1000 days

- Incidence *generally* lower in inception cohorts – inclusion criteria is a PIVC then look forward see if BSI occurs
- Generally *higher* in surveillance reports – inclusion criteria is a BSI then look back to examine PIVC data
- Incidence is *likely* higher in countries with developing economies

		BSI %	Rate	Other
Rosenthal et al. ICHE 2020	42 countries. 149,609 ICU patients. PIVC "associated" BSI	**1,689/139,465 patients (1.2%)**	**2.4/1,000 PIVC-days**	Crude mortality 18% compared to 7%

- Rates increased with COVID-19 pandemic. Hazard ratio [HR] 2.71 (85%CI 1.2-6.3) *Pianca et al ARIC 2024*

PIVC-BSI Risks

Australian experience

18 prospective studies (2007-2023)

- **6 PIVC-BSI in 14,606 PIVCs (0.04%)**
- 3 x *E Cloacae* (incl 1 *Citrobacter braakii*), *Proteus mirabilis, P Aeruginosa, S aureus*
  - All in **large metropolitan hospitals**
  - All had **multiple PIVCs** during admission & **difficult IV access**
  - Commonly **male, older** age and **comorbidities**
  - **Gastrointestinal procedures/drains** and **cancer** common
  - Common **failure to remove** despite **symptoms** &/or **idle** PIVC

Sasaki et al PLOS One 2020

Case series 99 PIVC-BSI in cancer

- Median 67 years (IQR 59-74)
- Median Pitt score 1 (IQR 0-3)
- Median PIVC dwell 5 days (IQR 4,7)
- Most (71%) received PPN

Predictors of GNegBSI (vs GPosBSI)
Multivariable analysis:

- **≥ 65 years** OR 3.07 (1.1-6.8)
- **Showering** OR 3.15 (1.1-9.3)
- **≥ 2 Pitt BSI score** OR 7.0 (2.5-19.2)
- **PPN** OR 0.31 (0.1-0.98)

Pianca et al. ARIC 2024

Case-control study 37 PIVC-BSI

- 76% inserted in ED
- 44% in place >4 days

Univariate analysis:

- **ICU admission** HR 33.4 (15.5-72.3)
- **Large gauge ≤16** HR 4.8 (1.2-19.1)
- **Female** HR 0.33 (0.13-0.8)

PIVC-BSI Outcomes

This is a deadly condition

All cause 30 day **mortality 13%** in 62 cases *(Sato, BMC 2017* Unadjusted predictors:

- Early infection (<3 days) (OR 17.7, p=0.02)
- All immunodeficient

- **Attributable mortality 10.4%** *Pujol et al*
- **Comparable to CVC** (12%/13%) *Tatsuno*

Mortality is higher for *S. Aureus*

30 day all-cause **mortality 18%** of 256 PIVC-BSI *S. aureus* cases

Multivariate analysis for mortality risk:

- MRSA OR 2.9 (1.1-7.3)
- Inappropriate antibiotics >1 day OR 4.1 (1.5-11.0)
- Sepsis OR 14.4 (6.1-34.2)
- Complicated BSI (persistence/implanted devices/metastatic infection/purulence) OR 2.3 (1.4-3.7) *Rodriguez, JHI, 2024*

Treatment is challenging

- Average hospitalisation 23 days
- 20% persistent BSI 48-72 hours later *Rodriguez*
- 15% ICU admission (sepsis & multi organ failure)
- Antibiotic therapy 5-100 days *Sato*

Metastatic infections can develop

(Rodriguez 2024)

- 4% osteomyelitis (3% *Sato*)
- 4% endocarditis (2% *Pujol*)
- 2% pulmonary infections/empyema (4% *Pujol*)
- 2% peritonitis
- 1% septic arthritis (12% *Pujol*)
- 1% cellulitis (5% *Sato*)

PIVC-BSI Treatment

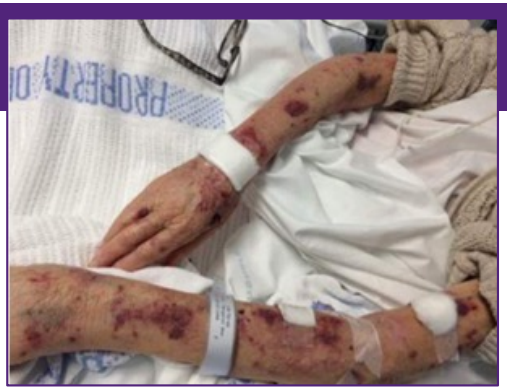
- Remove PIVC! Do not wait for BC results.
- Consider severity of patient's condition
- 49% do not get appropriate initial treatment *Tatsuno*
- If starting empirical therapy cover *S. aureus* and Gram-negative bacilli, guided by local antibiograms
- Consider less common pathogens in subgroups e.g., on previous antibiotics, immune suppression, prolonged hospitalisation, multiple comorbidities
- Review culture results and adapt treatment as needed
- *S. aureus* or *C. albicans* require at least 14 days of treatment, and follow-up cultures at 72 hours. Rule out secondary foci like endocarditis/osteomyelitis
- Complicated infections e.g., persistent BSI, metastatic infection, implanted devices -> prolonged treatment

Capdevila et al. Expert consensus document on prevention, diagnosis and treatment of short-term peripheral venous catheter-related infections in adults. Cirugia Cardiovasc 2016

Chaves et al. Diagnosis and treatment of catheter-related bloodstream infection: Clinical guidelines of the Spanish Society of Infectious Diseases and Clinical Microbiology and (SEIMC) and the Spanish Society of Spanish Society of Intensive and Critical Care Medicine and Coronary Units (SEMICYUC). Med Intensiva 2018.

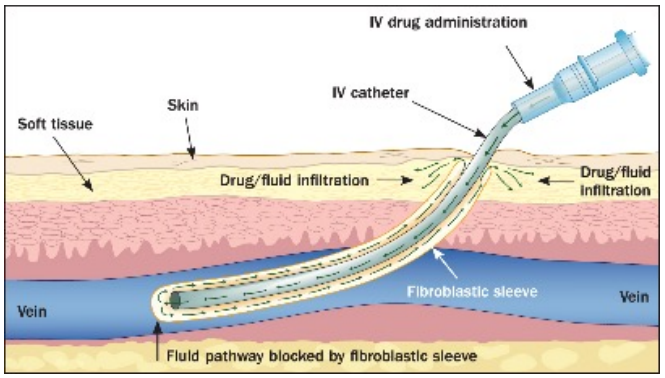
Mermel et al. Clinical practice guidelines for the diagnosis and management of intravascular catheter-related infection: 2009 Update by the Infectious Diseases Society of America. Clin Infect Dis 2009.

Non-infectious PIVC complications



Insertion failure Carr et al BMJ Open 2019

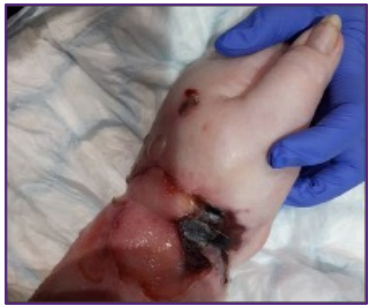
- First attempt success ~50% inpatients, ~80% emergency dept
- Difficult IV access (DIVA) now 50%-70% of hospital patients
- Difficult insertions → poor aseptic technique



Post-insertion failure - 1 in 3 PIVCs fail

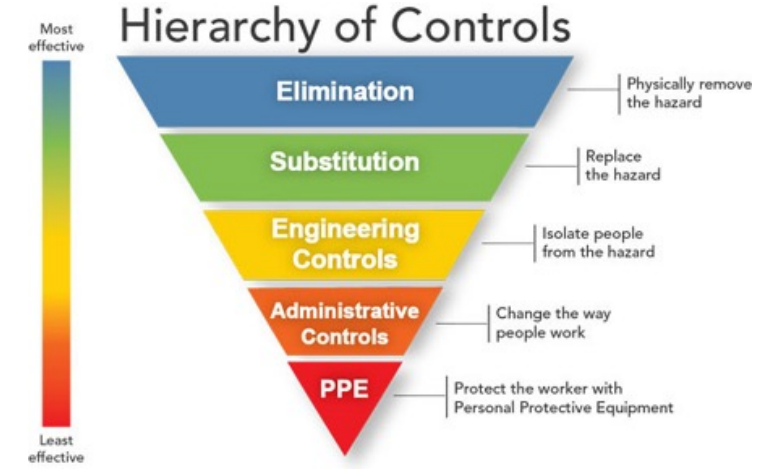
- Phlebitis ~19%
- Infiltration or extravasation ~10-15%
- Occlusion ~10%
- Dislodgement ~10%

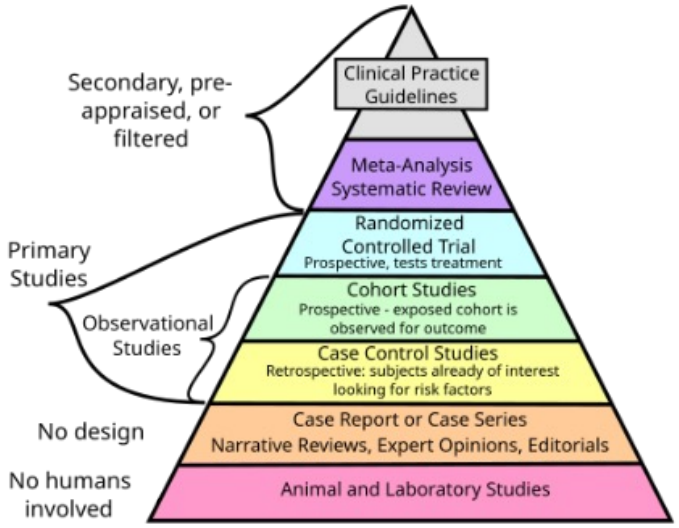
Marsh et al J Adv Nurs 2020; Marsh et al IJNS 2024

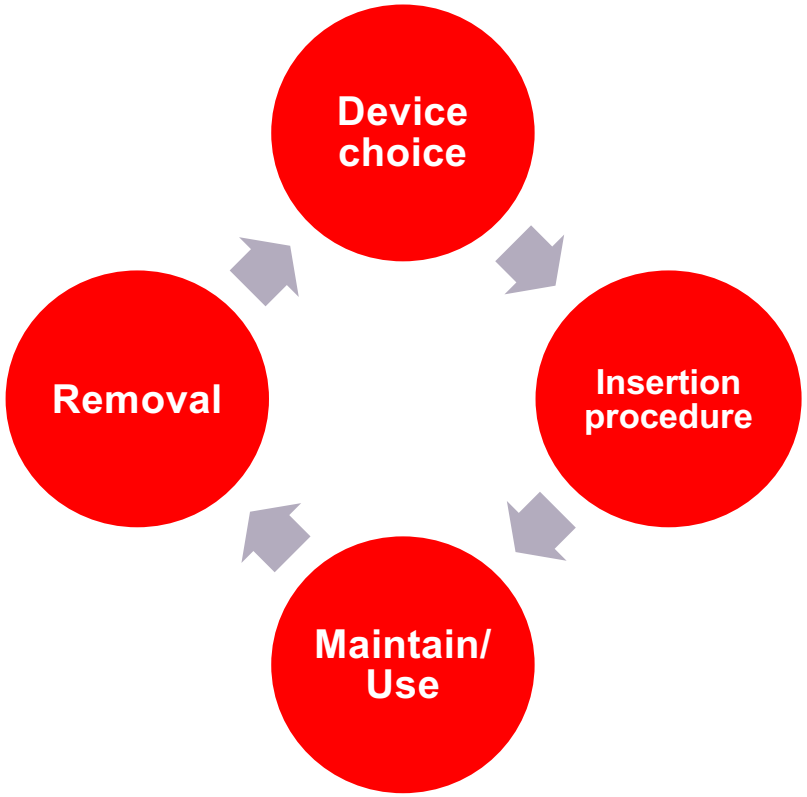


- All cause pain, anxiety, interrupt therapy (delayed/missed doses)
- Increase costs and repeated insertions (which risk infection)

Prevention of PIVC Infections

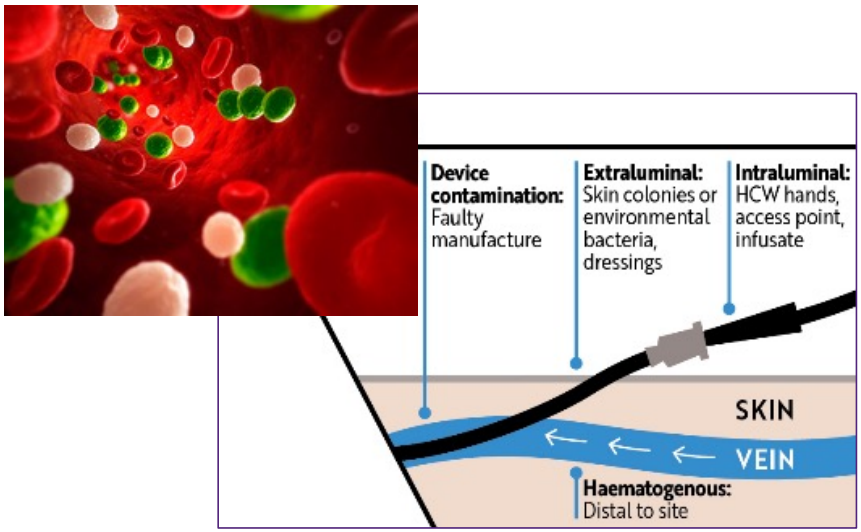






1. Protection is needed at each point in PIVC life-cycle

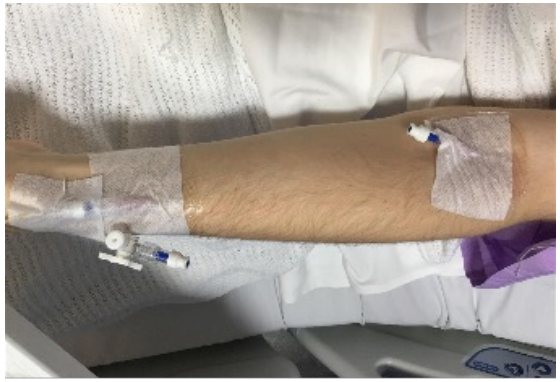
2. Protection is needed extraluminally (from skin) and intraluminally (internal PIVC)



Infection prevention fundamentals

- Hand hygiene by healthcare workers is the #1 strategy to prevent PIVC infection
- WHO's 5 moments of hand hygiene all apply to PIVC care
- Hand hygiene is vital at insertion and every time the PIVC is accessed
- Observational study of RNs giving IV meds. Hand hygiene 11% for all 5 moments. 33% before med preparation. 43% before administration. 65% post-administration. ED and glove use had poorer compliance ($P < .01$) Slater et al. 2018 AJIC
- Patient hand hygiene is also vital, but the PIVC site and dressing must stay dry

Device Choice



At the pre-insertion/device choice stage:

- Avoid unnecessary insertions “just in case”
- Many PIVCs never used
- Do not insert PIVCs only for blood draws (OMG Study 5%)
- Alternative: oral, subcutaneous, intramuscular, intraosseous
- Campaigns, especially in emergency department "are you 80% sure?"

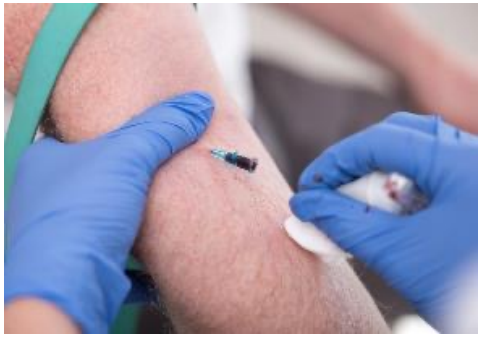
Hawkins et al
Acad Emerg
Med 2018

PIVC utilisation

42% → 32%

Insertion procedure

- Hand hygiene by inserter (5 moments)
  - Soap and water if visibly soiled
  - Alcohol-based hand-rub
- Skin disinfection of potential insertion site
  - Clip (don't shave) hair if more than sparse
  - Clean skin with soap and water if visibly soiled
  - Use >0.5% chlorhexidine in ~70% alcohol (preferred) – allow to dry to ensure killing occurs
  - Povidone iodine in alcohol can be used if CHG sensitivity/unavailable *Guenezan Lancet ID 2021*
- Wear clean non-sterile gloves and plastic apron for standard risk PIVC insertion
- If patient immunocompromised, or if site must be re-palpated after disinfection, wear sterile gloves
- Sterile field and aseptic non-touch technique: keep 'key parts' sterile i.e., catheter, connections
- Ultrasound guided: sterile gloves, sterile field, sterile probe cover (do not apply plastic dressing to cover). Low level disinfection of probe is adequate if not soiled with blood
- Avoid insertion over joint unless procedural PIVC. Forearm PIVCs are preferred



Who should insert?

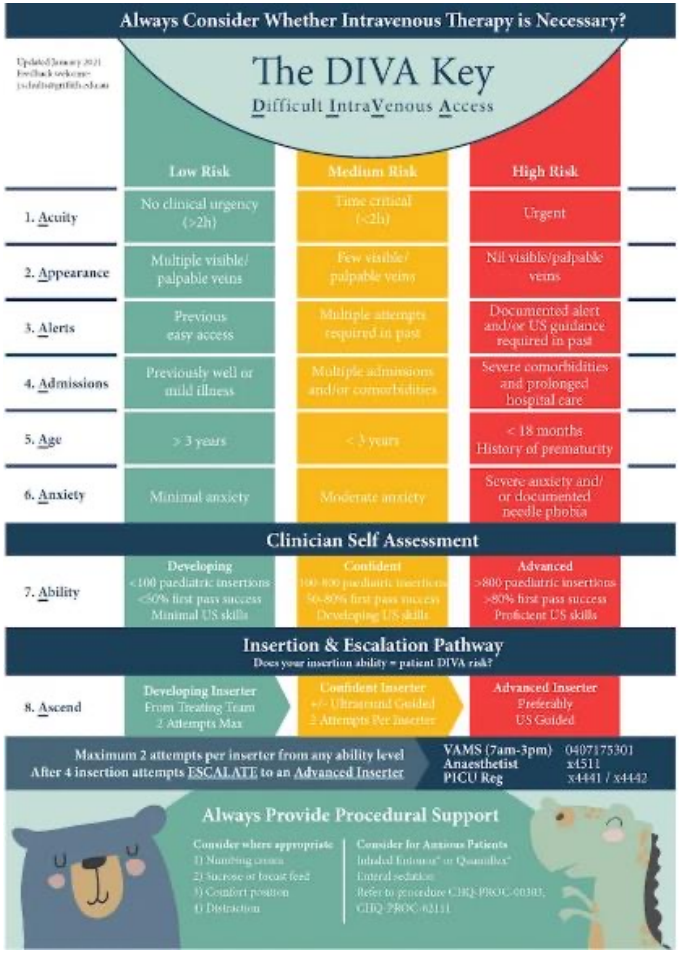
- Inserter competence must match patient difficulty. Each puncture risks infection
- Competence reflects procedural volume and recency, not by seniority
- Organisations need a mix of novice to advanced inserters (with ultrasound)
- Is patient a DIVA (difficult IV access)? Read the chart. Ask the patient. Assess the veins.
- Developing inserters should gain experience on less-difficult patients
- After assessment, refer to a more experienced inserter, if you do not have high confidence
- No more than two attempts by any clinician → refer to a more advanced inserter
- Medium and large organisations should have dedicated nurse inserters, with ultrasound skills, who undertake difficult insertions, and train the broader inserter workforce
  - 100% insertion success vs 82% generalist inserters. Forearm placement 70% vs 34%. Generalists 48% still had no PIVC 24 hours later Marsh et al Trials 2018

Healthcare worker education & training

- Many studies show that knowledge and practice is suboptimal
- USA CDC: all staff who insert or care for PIVCs require initial training & competency test
- Cover: anatomy, site selection, assessment, compatible therapy, adverse events, consent and education, documentation, vein preservation and infection prevention
- Periodic reassessment of knowledge and adherence is also needed
- Nurses, medical doctors and other inserters should receive identical training
- Refresher training for new equipment or policies
- Include theory, practical demonstration, hands-on-practice on simulation equipment, followed by mentored and supported development of expertise in clinical practice

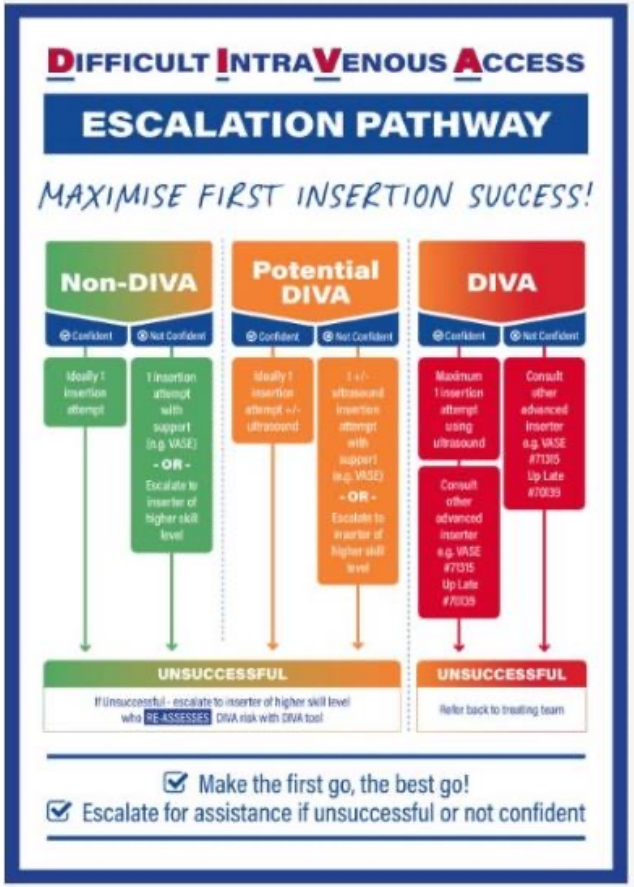
A "successful insertion" is not just “getting it in” but a PIVC that remains comfortable, functional and free of complications… including infection

PIVC insertion clinical pathways



https://www.avatargroup.org.au/difficult-iv-access-resources.html

Schults et al. BMC Health Serv Res 2023
Schults et al. BMC Health Serv Res 2022



Insertion site selection

- Consider vein quality and patient's preferences (e.g. dominant arm)
- Placement over a joint encourages micromotion, which may increase risk of skin bacteria entering the wound *Drugeon et al ARIC 2024*
- If patient will sleep with the PIVC, then the forearm is most comfortable
- The forum also promotes PIVC function, as the bones provide "a splint" effect
- In adults, upper extremities are preferred and have less infection risk. In babies, the upper or lower limbs or the scalp are suitable
- In kidney patients, the dorsal veins are preferred
- Offer local anaesthetic and distraction for both children and adults

Equipment selection

- Length of PIVC - two thirds should be in the vein to avoid infiltration. Longer PIVCs needed for deeper veins. In adults, PIVCs range from 2.5-10cm.
- Diameter of PIVC - a smaller catheter in a larger vein will cause less irritation, thrombus and failure. PIVCs available in 14G to 26G.
- Safety engineered devices with retractable needles avoid needlesticks and infection risk
- Blood control PIVCs do not allow blood to flow back and reduce blood exposure/infection risk
- Integrated PIVC (inbuilt stabilisation wings and short extension tubing) reduce failure Rickard 2021
- Ported PIVC - potential increased infection due to injection port so close to the tip
- Three-way tap - Potential increased infection risk due to multiple openings
- Steel needles-risk needlesticks, avoid or use only for very short infusion
- Use single use products including tourniquets and antiseptics
- Sterile dressing (not non-sterile tape) and non-sterile but clean securement

Evidence-based bundles

- A set (max 5) of prevention strategies is more effective than a single approach, especially when supported through multiple modes of support to promote compliance
- A systematic review of PIVC bundles found no consistent approach Ray-Barruel Inf Dis Health 2023

Insertion bundle example items	Maintenance bundleexample items
Hand hygiene	Review need for PIVC
CHG alcohol skin prep	Check dressing integrity
Sterile dressing	Remove PIVC at set time points
Needleless connector	Scrub the hub
Integrated catheter	Alcohol caps
Standardised insertion trolley	Assessment tool
CHG dressing	Extension tubing
Sterile gloves	Prefilled flush syringe

PIVC Maintenance – infection risks

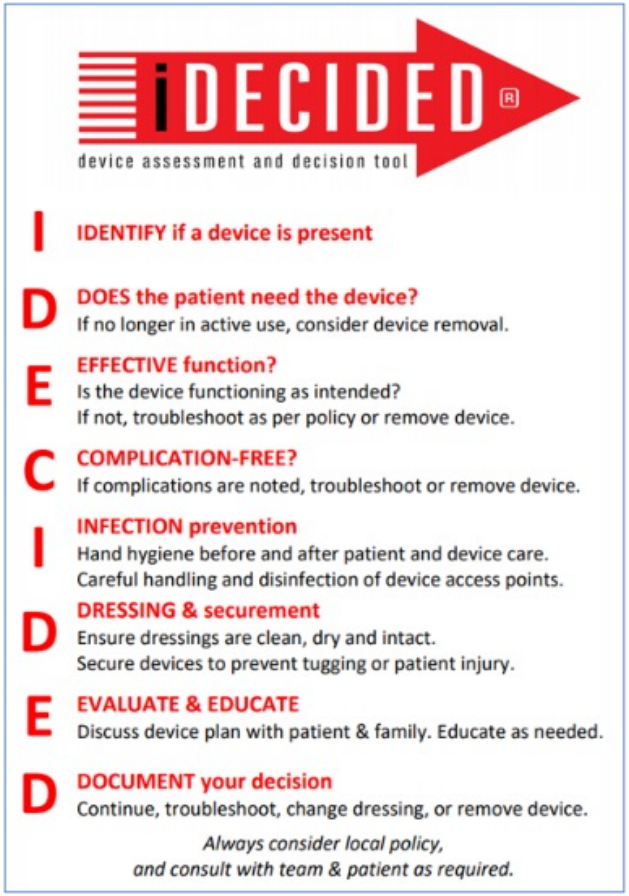
Concerns	Global
Idle (unnecessary)	14%
Dressing soiled, wet or loose	21%
Insertion site 1 or more symptoms	10%
PIVC malfunction	10%
Insertion date and time undocumented	40%
No daily assessment documented	36%
No documentation of IV flush (function)	36%

OMGPIVC
One Million Global Catheters
PIVC Worldwide Prevalence Study

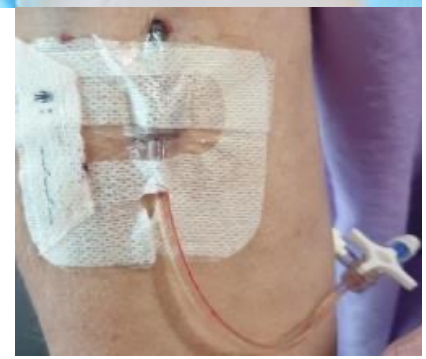
N = 40,620

Assessment and monitoring

- Regular assessment needs to be done, documented, and acted upon
- Assess infusion site and infusion set at least four hourly for adults, and one to 2 hourly if high risk
- Continue 48 h after PIVC removal
- Documentation is commonly extremely poor
- I-DECIDED is the only monitoring tool comprehensively validated and shown to reduce complications. Available in multiple languages
  https://www.avatargroup.org.au/i-decided.html



Patency, flushing, and blood sampling



- ANTT & hand hygiene for all PIVC use
- Choose single-use equipment, medications & fluids
- Continuous saline infusion or regular slow injection
- Gentle push-pause technique “don’t rush the flush”
- Avoid disconnections – promote closed system
- Is PIVC still in vein? Aspirate blood. Look, feel, ask
- Blood sampling – generally avoid but use gentle aspiration to avoid haemolysis
- No blood should be visible in the PIVC or tubing (OMG: common problem)

Cluster RCT (n=619) of best practice education and prefilled saline flush syringes reduced PIVC failure (30% vs 22%, p=0.03) Keogh et al. BMC Med 2020

Medication management

- Preparation of medications is a risk for contamination and infection
- 100 x contamination if prepared in clinical area not pharmacy
- Single use vials/syringes always superior to multi-use
- Major outbreaks can occur through sharing of vials/syringes between patients

Add on equipment/infusion tubing for standard infusions:

✓ Blood, lipids (e.g., fats, propofol), PN tubing - discard after each bag/bottle/24 hr

✓ Avoid disconnection/reconnection of infusion sets. Always use new infusion sets for a new PIVC.

✓ Replace infusion sets if there is malfunction, contamination or particulates

Multisite RCT (N=2944) funded by Australian NHMRC found no difference in CRBSI when infusion sets replaced every 4 or 7 days for CVC (short or long term), PICC, or peripheral arterial catheters *Rickard et al Lancet 2021*

Connectors, ports, extension

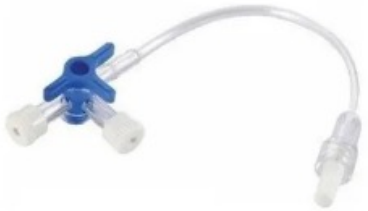
- More entry points = ↑chance of infection. Minimise lumens and injection ports (ideally 1 only)
- Use needleless connectors not hard caps. Select connectors based on smooth (easily cleaned) surface, simple internal path, monitor performance of new products
- Change after blood infusion or for occluded PIVC (may be blocked)
- RCT ↓ PIVC failure with integrated PIVC adj HR 0.82 (0.69-0.96) Rickard et al J Hosp Med 2023

A

B

C

D



E

F

G

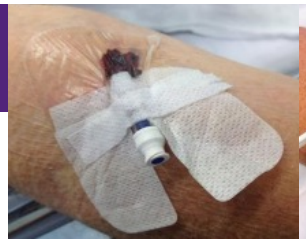
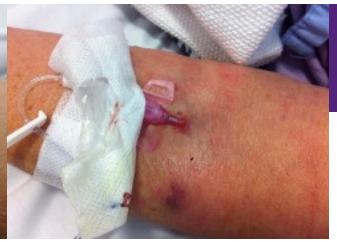
Decontamination before access

- Remove microorganisms from injection port or tubing connection point
- Without decontamination 50% are contaminated. Often skin or mouth orgs. ED insertion & sicker patients statistically ↑ growth *Slater et al AJIC 2017*
- Technique matters "scrub the hub" (top and sides), and use ANTT

1. **70% isopropyl alcohol wipes** cheap, effective & dry rapidly – 5 seconds
2. >0.5% chlorhexidine in alcohol wipes - dry time 20 sec, may be 'sticky'
3. 10% povidone iodine wipes - dry time 6 min – impractical *Slater et al AJIC 2018*
4. Alcohol caps fit onto connectors, effective in non-randomised studies

Factorial RCT of antiseptic (alcohol or chlorhexidine in alcohol wipes) and duration (5, 10 or 15 seconds). Non-signif but **alcohol wipes** had best effect (99% decontamination); **5 seconds** (100% decontamination) *Slater et al AJIC 2020*

Pilot RCT (N=180 cancer CVCs): CLABSI – 0% **chlorhexidine in alcohol** wipes, 2% - alcohol wipes, 2% - alcohol caps (not-signif) *Rickard et al AJIC 2020*

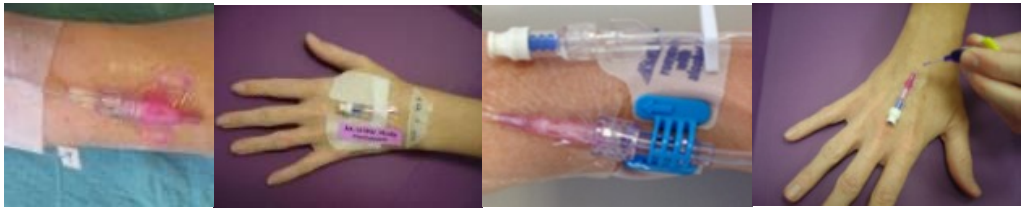



Dressing and securement

- OMG 21% dressings not clean, dry and intact. CVC evidence: intact unchanged dressings ↓ infection
- Non-sterile tape common in developing economies. Must use sterile dressings (transparent or gauze)
- Securement is also important to ↓ infection through ↓ micromotion
- Dressing "reactions" are rare and may be due to non-dry skin prep
- Skin protectant and gum mastic adhesive are useful adjuncts

4-arm RCT (N=1708 patients) funded by Australian NHMRC

1. Standard polyurethane (controls) 43% PIVC failure
2. Bordered polyurethane 40% PIVC failure
3. Sutureless securement device (+ standard PU) 41% PIVC failure
4. Tissue adhesive (+ standard PU) 38% PIVC failure (NS) *Rickard Lancet 2018*



3-arm RCT: Integrated securement dressing + tissue adhesive ↓ failure adj HR 0.47 (0.26-0.84) over integ dressing alone or bordered PU
Charters JAMA Peds 2024

Patient/Family education & engagement

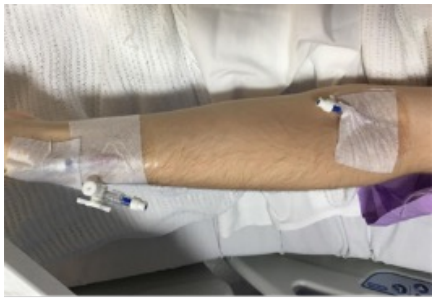
Patients can reduce infection risk through:

- their behaviour – keep PIVC dry
- monitoring & reporting complications
- advocate for hand hygiene & scrub the hub
- asking each day about PIVC removal

- If patient doesn't know why they have a PIVC - 7 x chance it is unnecessary
- It is hard for them to speak up about concerns, we need to ask & encourage
- Especially aged, sicker, mental illness, emergency admits, non-native speaker
- Providing flyers, apps, videos can help to reinforce information

PIVC removal

- Each day of PIVC therapy holds risk
- Remove as soon as possible
- Failed or delayed PIVC removal is common



14% idle (≥24 hours), 10% painful/site symptoms, 10% PIVC malfunction – but **staff had not removed**
Idle status highest in 23% North America, 23% Australia & New Zealand, 15% Europe, 10% Middle East
Most hospitals had a **72 hour or 72-96 hour removal policy** at the time of the OMG Study

OMG PIVC
One Million Global Catheters
PIVC Worldwide Prevalence Study

Good (clinically indicated) reasons for PIVC removal

1. Treatment is complete – *no regular therapy prescribed, not highly unstable*
2. PIVC does not work – *occluded, dislodged, leaking, infiltrated/extravasated*
3. PIVC is painful – *phlebitis, pain on injection, haematoma*
4. Infection suspected – *local or BSI*
5. PIVC contaminated - *emergency insertion without ANTT or skin prep)*

Should we impose a maximum dwell and when?

Historically, PIVCs removed 24, 48, 72 or 96 hrly

- Infections still occurred
- Patients did not like extra insertions
- Inserters finding more patients with difficult veins
- Complacent culture where time was the only risk
- Poor documentation means dwell often unknown

Multi-site RCT funded by Australian NHMRC.
N=5907 PIVC removed 72-96 hr or clinically indicated.
No difference in risk. *Rickard et al Lancet 2012*

Cochrane SRMA. Now 10 RCTs N=10,208 PIVC-BSI
clinically indicated 0.02%; routine 0.04% *Charles, 2024*

Clinical practice guidelines now recommend:

✓ clinically indicated removal, and/or
✓ routine removal (if structures for monitoring and preventing infections not in place)

Where are we at with this?

1. Most PIVCs fail or are removed by Day 3

→ Clinically indicated only slightly increases dwell

→ Routine 120 hour could be an option

2. Implementation studies have reported both ↑ and ↓ in BSIs when policy changed to clinically indicated

→ Education, standards likely more important

3. Clinical decision making needs support to avoid non-removal of symptomatic or idle PIVCs

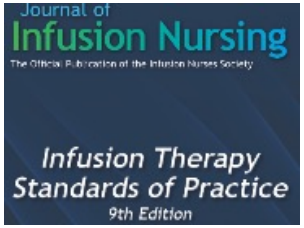
- "Just in case" its needed (patient safety/comfort)
- In case I get in trouble (non-autonomy/poor team culture)
- It has to stay in for 3-4 days (misunderstanding)
- I didn't know they had a PIVC (poor assessment and documentation)
- I've never seen a PIVC-BSI (low awareness)
- I can't insert a new PIVC/no-one can help me (poor skills/skillmix)

Standards

Australian federal government implemented mandatory PIVC Standards in 2021

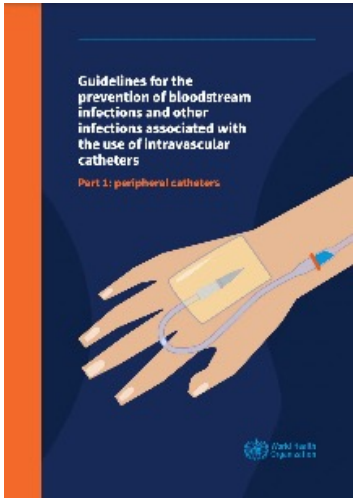
Ten quality statements and associated indicators for quality & safety monitoring https://www.safetyandquality.gov.au/

1. Assess intravenous access needs
2. Inform and partner with patients
3. Ensure competency
4. Choose the right insertion site and PIVC
5. Maximise first insertion success
6. Insert and secure
7. Document decisions and care
8. Routine use: inspect, access and flush
9. Review ongoing need
10. Remove safely and replace if needed



Guidelines

WHO 2024




Special Article

2016 Expert consensus document on prevention, diagnosis and treatment of short-term peripheral venous catheter-related infections in adults☆

Josep A. Capdevila, María Guembe, José Barberán, Arístides de Alarcón, Emilio Bouza, M. Carmen Fariñas, Juan Gálvez, Miguel Angel Goenaga, Francisco Gutiérrez, Martha Kestler, Pedro Llinares, José M. Miró, Miguel Montejo, Patricia Muñoz, Marta Rodríguez-Creixems, Dolores Sousa, José Cuenca, Carlos-A. Mestres, on behalf the SEICAV, SEMI, SEQ and SECTCV Societies

SAGE journals

Consensus paper

European recommendations on the proper indication and use of peripheral venous access devices (the ERPIUP consensus): A WoCoVA project

Mauro Pittiruti, Ton Van Boxtel, Giancarlo Scoppettuolo, Peter Carr, Evangelos Konstantinou, Gloria Ortiz Miluy, Massimo Lamperti, Godelieve Alice Goossens, Liz Simcock, Christian Dupont, Sheila Inwood, Sergio Bertuglio, Jackie Nicholson, Fulvio Pinelli, and Gilda Pepe

Bringing guidelines to the bedside

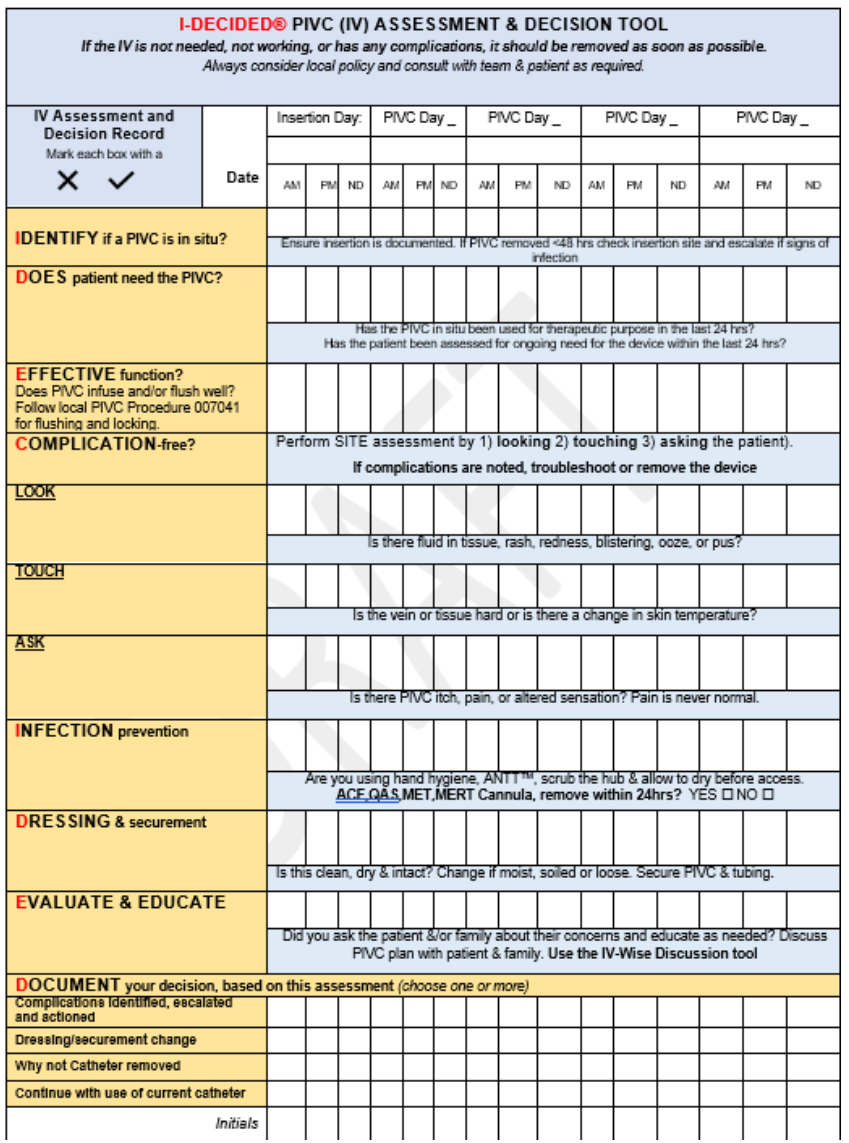
- Clinicians are busy
- We try to synthesise guidelines as a tool
- This is also a documentation record
- And can be used for audits
- It is based off the I-DECIDED® tool
- Can be paper or iEMR charted
- Reverse of form has algorithm on choosing the right device and right inserter, considering prescribed therapy and DIVA status


ORIGINAL RESEARCH

OPEN ACCESS

International recommendations for a vascular access minimum dataset: a Delphi consensus-building study

Jessica Schults [1,2,3] Tricia Kleidon [2,3] Vineet Chopra,[4] Marie Cooke,[1,3] Rebecca Paterson,[2] Amanda J Ullman [1,3] Nicole Marsh,[3,5] Gillian Ray-Barruel,[1,3,6] Jocelyn Hill,[7] Ilker Devrim,[8] Fredrik Hammarskjold,[9] Mavilde L Pedreira,[10] Sergio Bertoglio,[11] Gail Egan,[12] Olivier Mimoz,[13] Ton van Boxtel,[14] Michelle DeVries,[15] Maria Magalhaes,[16] Carole Hallam,[17] Suzanne Oakley,[18] Claire M Rickard[1,3]


I-DECIDED® PIVC (IV) ASSESSMENT & DECISION TOOL

If the IV is not needed, not working, or has any complications, it should be removed as soon as possible.
Always consider local policy and consult with team & patient as required.

IV Assessment and Decision Record Mark each box with a ✕ ✓	Date	Insertion Day:			PIVC Day _			PIVC Day _			PIVC Day _			PIVC Day _		
		AM	PM	ND	AM	PM	ND	AM	PM	ND	AM	PM	ND	AM	PM	ND
IDENTIFY if a PIVC is in situ?		Ensure insertion is documented. If PIVC removed <48 hrs check insertion site and escalate if signs of infection														
DOES patient need the PIVC?		Has the PIVC in situ been used for therapeutic purpose in the last 24 hrs? Has the patient been assessed for ongoing need for the device within the last 24 hrs?														
EFFECTIVE function? Does PIVC infuse and/or flush well? Follow local PIVC Procedure 007041 for flushing and locking.																
COMPLICATION-free?		Perform SITE assessment by 1) **looking** 2) **touching** 3) **asking** the patient). **If complications are noted, troubleshoot or remove the device**														
LOOK		Is there fluid in tissue, rash, redness, blistering, ooze, or pus?														
TOUCH		Is the vein or tissue hard or is there a change in skin temperature?														
ASK		Is there PIVC itch, pain, or altered sensation? Pain is never normal.														
INFECTION prevention		Are you using hand hygiene, ANTT™, scrub the hub & allow to dry before access. ACE,QAS,MET,MERT Cannula, remove within 24hrs? YES ☐ NO ☐														
DRESSING & securement		Is this clean, dry & intact? Change if moist, soiled or loose. Secure PIVC & tubing.														
EVALUATE & EDUCATE		Did you ask the patient &/or family about their concerns and educate as needed? Discuss PIVC plan with patient & family. **Use the IV-Wise Discussion tool**														
DOCUMENT your decision, based on this assessment *(choose one or more)*																
Complications identified, escalated and actioned																
Dressing/securement change																
Why not Catheter removed																
Continue with use of current catheter																
Initials																

The future (?)

- Harmonised PIVC global guidelines for infection prevention
- PIVCs surveilled and reported as often as CVCs
- Increasing ultrasound guided insertions
- Increasing use of sterile gloves for insertion
- ↑ use of antimicrobial dressings and connectors for PIVCs
- IV therapy nurse roles overlap with infection prevention roles
- Robot inserted PIVCs with consistent aseptic technique
- Sensors in PIVCs that send documentation directly to iEMR
- PIVCs monitor themselves for microbial entry, biofilm and alert
- Better use/access to clinical informatics – predictive AI

But the basics still need doing today, tomorrow and forever

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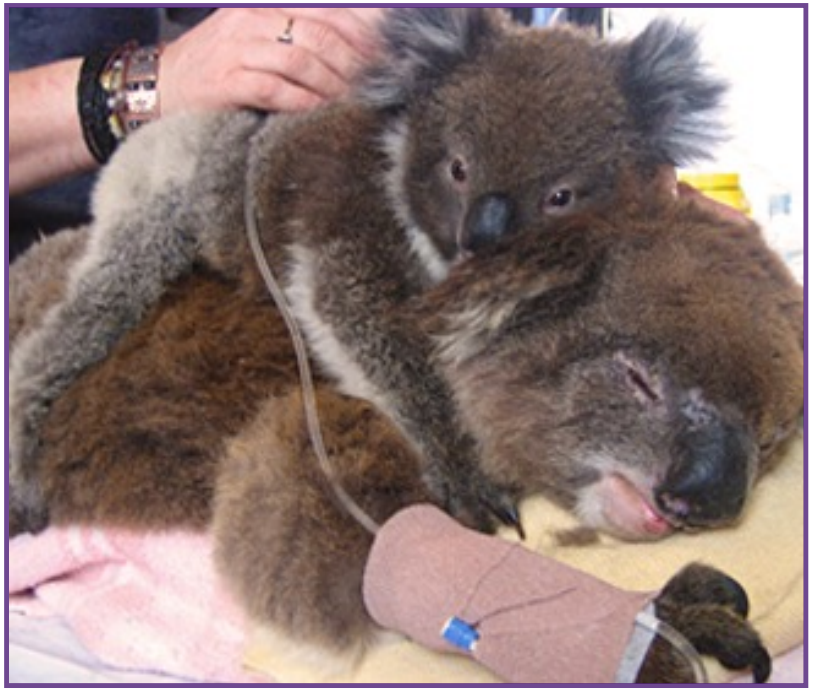

2025 Teleclass Education Topics

(most of them at least)

FEBRUARY

6 ... Policy and Practice for Environmentally Sustainable Products in Healthcare: Joining the Dots
With Prof. Mahmood Bhutta, UK

13 ... Food Safety of Fresh Produce: An Old Food Safety Problem Nut With New Solutions
With Prof. Keith Warriner, Canada

20 ... To aeruginosa or Not to aeruginosa: How Significant are Pseudomonads in Waterborne Healthcare Infections
With Prof. Helen Rickard and Prof. Elaine Cloutman-Green, UK

19 ... The Art of IV Line Care
Australasian Teleclass
With Prof. Claire Rickard, Australia

26 ... WHO Teleclass ... The Global Situation of Infection Prevention and Control and the Case for Action and
Afro-European Teleclass Investment in Improving It
With Prof. Benedetta Allegranzi, Switzerland, and Dr. Michele Cecchini, France

MARCH

4 ... Preventing MRSA Bacteraemia: An Achievable Outcome Even in High Endemic Hospitals
Afro-European Teleclass
With Prof. Michael Borg, Malta

13 ... The Next Pandemic - Are We Prepared?
With Prof. Michael Klompas, US

20 ... Frugal Innovation for Low-Resource Settings
With Prof. Davide Piaggio, UK

APRIL

3 ... Assessment of Mould Remediation in a Healthcare Setting Following Extensive Flooding
With Manjula Meda, UK

10 ... Use of Artificial Intelligence for Healthcare-Associated Infection Surveillance
With Prof. Ruth Carrico, US

22 ... Cost Analysis of a Hand Hygiene Improvement Strategy in Long-Term Care Facilities

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