OMG – What is going wrong with PIVCs and how can we fix it?

Claire Rickard RN PhD
Principal Director, AVATAR group
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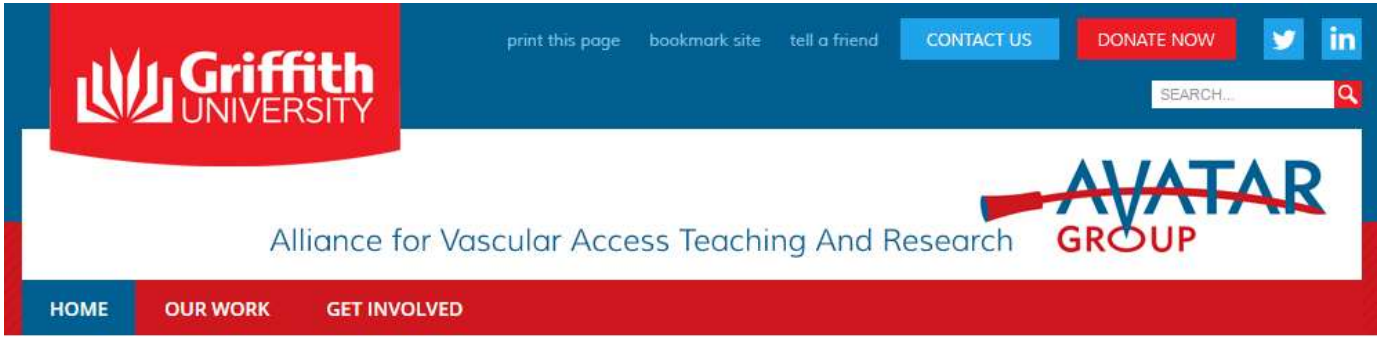
Professor, School of Nursing & Midwifery



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Vascular Access

PIVC complications

PIVC failure in the adult population: a systematic review (under review). Marsh N et al.

92 studies, 64 observational, 28 RCTs

75,433 participants

Overall failure 36%

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PIVCs

Complication	Studies (PIVCs)	%
Phlebitis	77 (62,294)	**16%**
Infiltration	40 (24,919)	**12%**
Occlusion	31 (32,672)	**8%**
Pain	23 (18,070)	**7%**
Leakage	17 (9,339)	**7%**
Dislodgment	36 (18,425)	**6%**
Local infection	11 (13,884)	**0.7%**
CRBSI	12 (14,954)	**<0.1%**

PIVC failure in the adult population: a systematic review (under review) Marsh N et al.

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PEDIATRICS. 2015. Ullman A et al.

Complications of Central Venous Access Devices: A Systematic Review

abstract

CONTEXT: The failure and complications of central venous access devices (CVADs) result in interrupted medical treatment, morbidity, and mortality for the patient. The resulting insertion of a new CVAD further contributes to risk and consumes extra resources.

OBJECTIVE: To systematically review existing evidence of the incidence of CVAD failure and complications across CVAD types within pediatrics.

DATA SOURCES: Central Register of Controlled Trials, PubMed, and Cumulative Index to Nursing and Allied Health databases were systematically searched up to January 2015.

STUDY SELECTION: Included studies were of cohort design and examined the incidence of CVAD failure and complications across CVAD type in pediatrics within the last 10 years. CVAD failure was defined as CVAD loss of function before the completion of necessary treatment, and complications were defined as: CVAD-associated bloodstream infection, CVAD local infection, dislodgement, occlusion, thrombosis, and breakage.

DATA EXTRACTION: Data were independently extracted and critiqued for quality by 2 authors.

RESULTS: Twenty-four cohort studies met the inclusion criteria, with mixed quality of reporting and methods. Overall, 25% of CVADs failed before completion of therapy (95% confidence interval [CI] 24.9%–25.2%) at a rate of 1.97 per 1000 catheter days (95% CI 1.71–2.23). The failure per CVAD device was highest proportionally in hemodialysis catheters (66.4% [95% CI 29.6%–63.6%]) and per 1000 catheter days in umbilical catheters (28.6 per 1000 catheter days [95% CI 17.4–39.8]). Totally implanted devices had the lowest rate of failure per 1000 catheter days (0.35 [95% CI 0.09–0.28]).

LIMITATIONS: The inclusion of nonrandomized and noncomparator studies may have affected the robustness of the research.

CONCLUSIONS: CVAD failure and complications in pediatrics are a significant burden on the health care system internationally.

CVAD failure average 25%

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CVAD complications

Complication	Studies (CVADs)	%
Suspected infection	19 (9306)	17%
Occlusion	5 (807)	11%
Thrombosis	22 (7224)	10%
Dislodgement	16 (4934)	2%
CLABSI	14 (20,297)	2%
Local infection or phlebitis	7 (2044)	1%

Takashima M et al, Critical Care Medicine 2018 Complication and Failures of Central Vascular Access Device in Adult Critical Care Settings

The economic burden of vascular access devices in public hospitals in Queensland.
Australian Health Review, 2018. Tuffaha H et al.

- Population 4.7 million

Argentina 44 million

- 2.75 million VADs used in 2016 in public hospitals
- Cost of $59 million ($10 million products)
- 2.69 million were PIVCs – about ¾ are inserted successfully
- 60,000 CVCs – about 50,000 are inserted successfully

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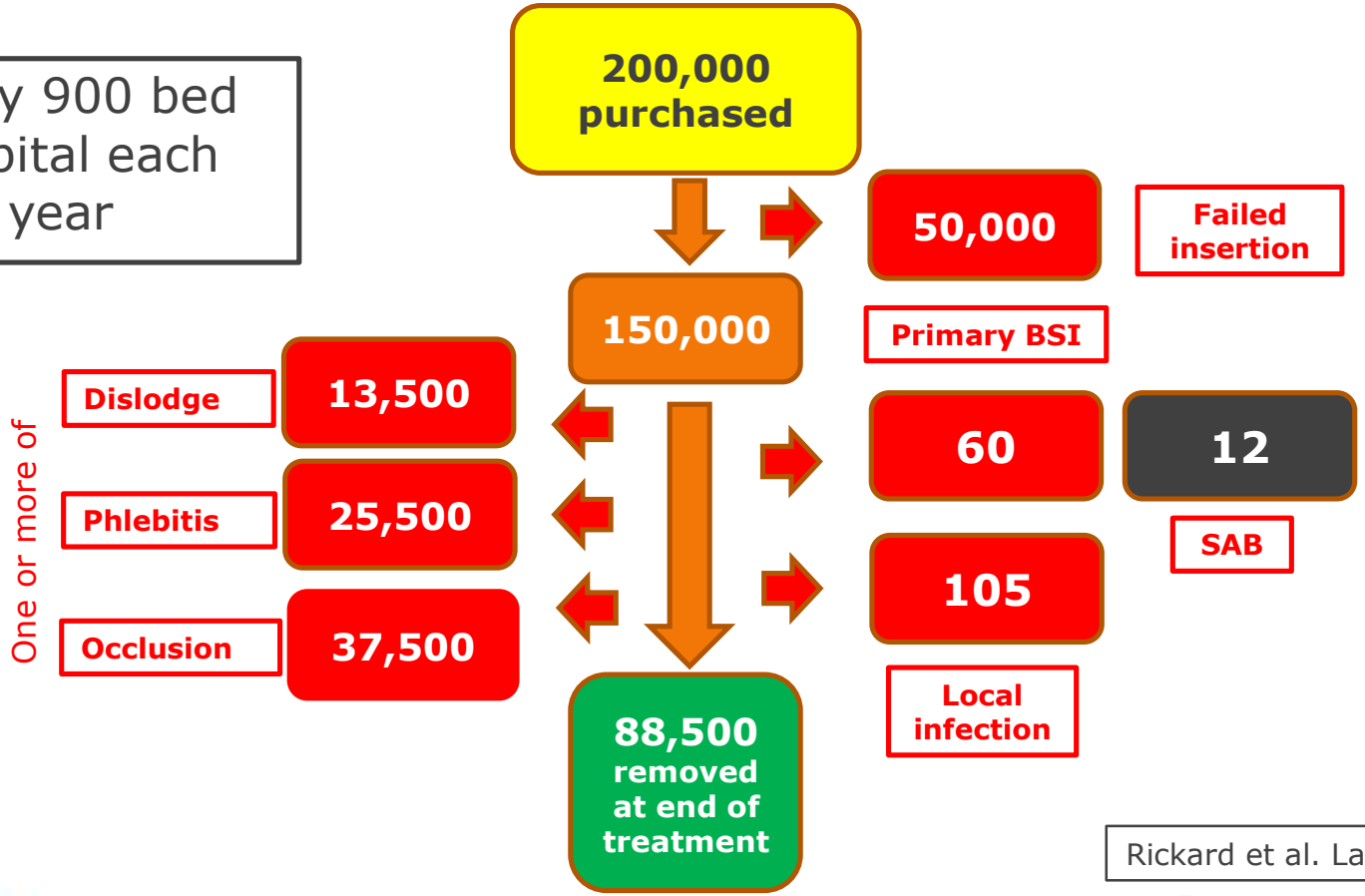
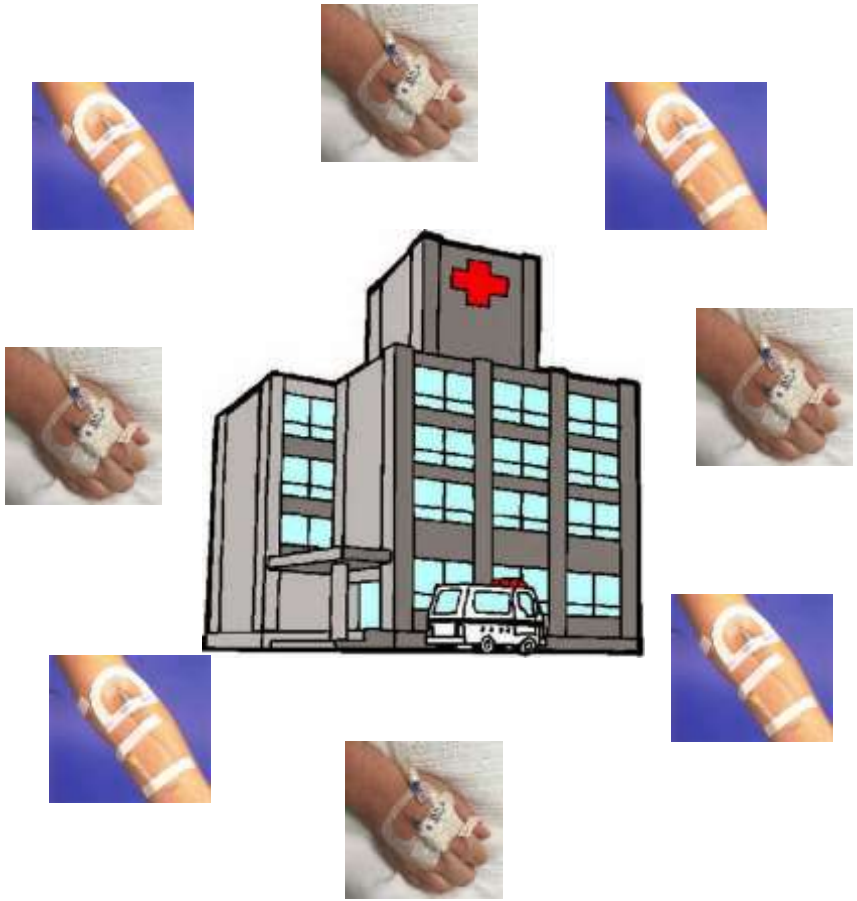
In my 900 bed hospital each year



Rickard et al. Lancet 2018



But – does my hospital know it has these problems??

- The problems we have
  - Failed insertions
  - Phlebitis
  - Occlusion
  - Dislodgement
  - Thrombosis
  - Infiltration, extravasation
  - Local & bloodstream infections
  - **PIVCs**
  - **Central venous catheters**

- The problems we measure
  - CLABSI

➢ Only one problem measured
➢ In only one device type

My hospital ~1000 CLABSI/ year

But ~ 112,000 PIVC and ~13,000 CVC problems each year

– why don't we measure these?

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“If you can’t measure it, you can’t improve it”
Peter Drucker

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Vascular access specialist

How many KPIs do we want?

Hospital Executive

What KPIs should we collect?

What can we learn from other industries?

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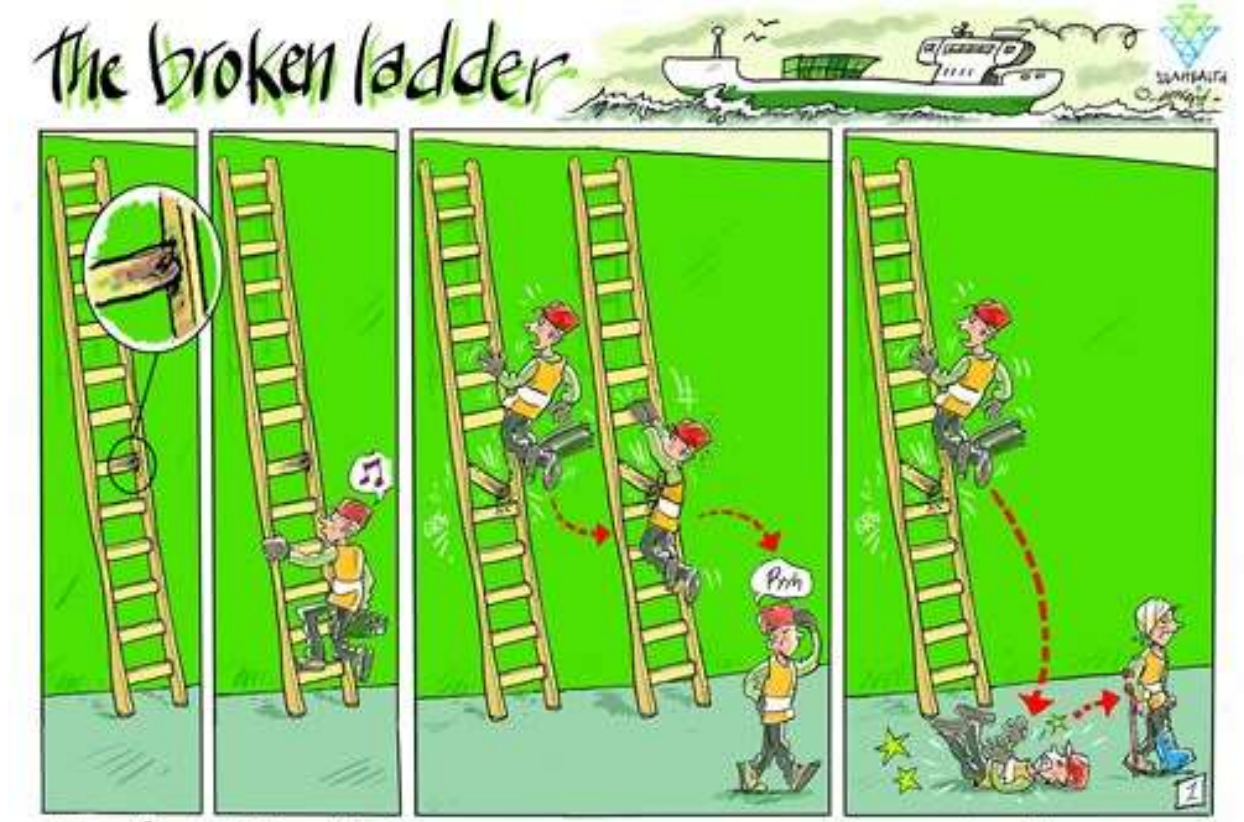

Poor dressing -> Bloodstream Infection -> Death

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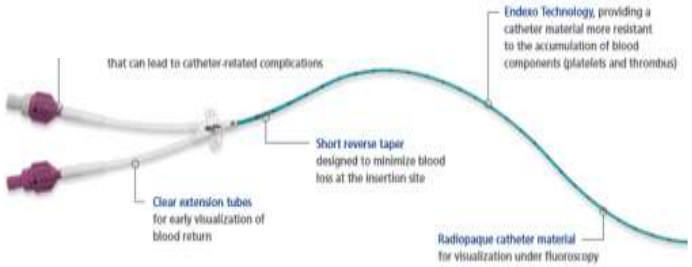
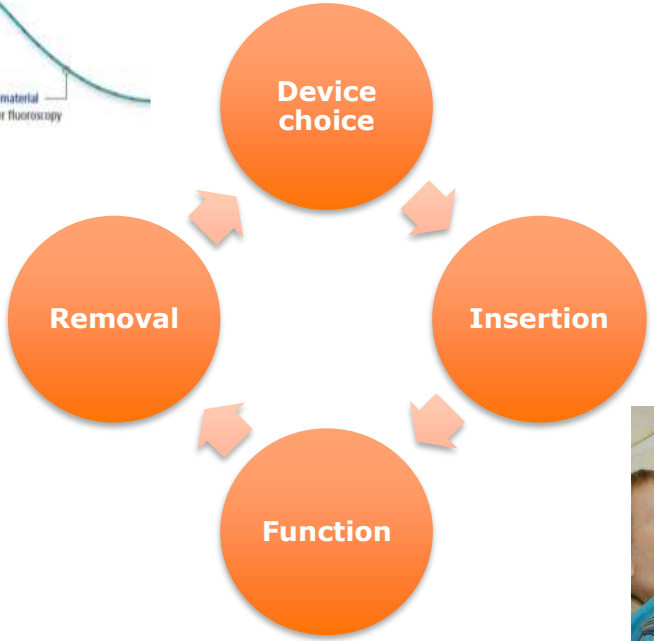
Quality measures can be:

- Outcome KPI – collect at/soon after catheter removal
  - Pull charts/EMR
- Process KPI – collect at any time during dwell
  - Audit inpatients





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What do we want?

1. Inserted on the first attempt
2. Keeps working and no infection
3. Comfortable for the patient
4. Patient engaged in care
5. Removed when therapy complete

- Documented in medical record

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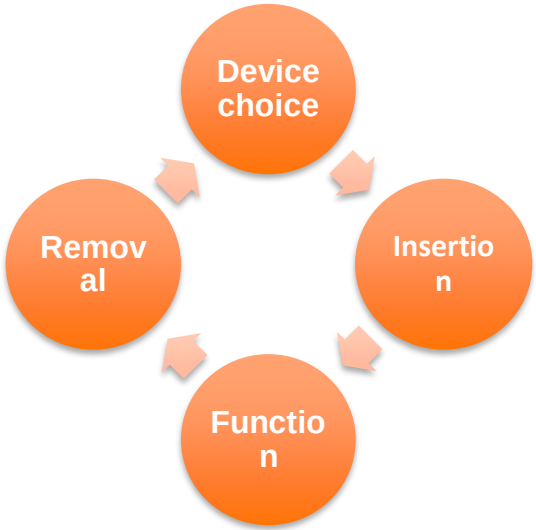
Poor choice

Outcome KPI



Delayed/ unsafe removal

Poor insertion

=

Device failure

Poor maintenance

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KPI: Device Failure

Now

- PIVC – 36%
- CVAD – 25%

Benchmark

- PIVC – 10%
- CVAD – 5%

Device Failure – PIVCs

- Any complication at removal

Device Failure – CVADs

- Any complication at removal

+ plus

- Reversible complications during dwell

Device Failure – PIVCs

- Phlebitis, Pain
- Occlusion
- Infiltration, Extravasation
- Dislodgement, Leaking
- Primary BSI
- Local infection

Device Failure – CVADs

- Thrombosis, Pain
- Reversible/Non-reversible Occlusion or Fracture
- Infiltration, Extravasation
- Dislodgement, Leaking
- Dislodgement
- Primary BSI
- Local infection

Patient centred care

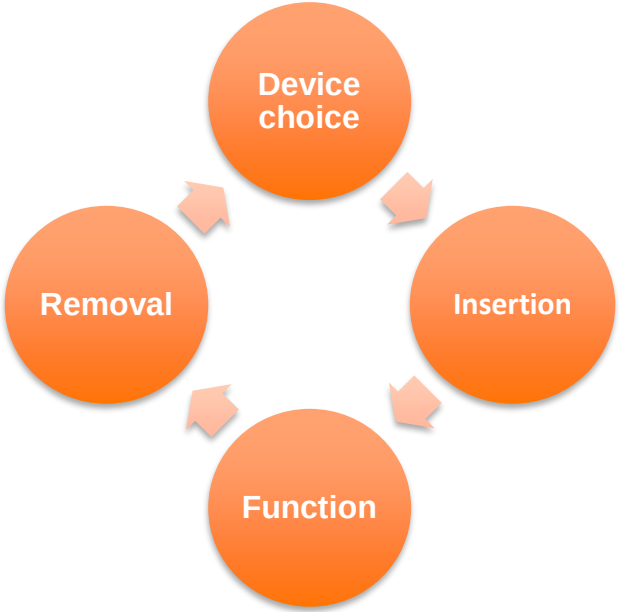
- Patient Reported Outcome Measures – PROMs
  - Pain
  - Anxiety
- Patient Reported Experience Measures – PREM
  - Multiple attempts at IV cannulation

    Walton et al BMJ Safety & Quality 2017
  - Communication by inserter

    Larsen et al Brit J Nurs 2017

Outcome KPIs

1. PREM – Multiple insertion attempts



2. PROM - Pain

3. Device Failure

Process KPIs

What predicts failure?

Process KPI: Device Selection

- Peripherally compatible medication – Yes or No

Process KPI: Device Insertion

- Aseptic insertion – Yes or No
  - Hand hygiene performed,
  - ANTT
  - Hair clipped on hirsute patients
  - Skin decontamination CHG in alcohol, allowed to dry
  - Sterile dressing applied

Device Maintenance KPI

I-DECIDED™ INSTRUMENTO DE EVALUACIÓN & DECISIÓN IV

Device Removal KPI

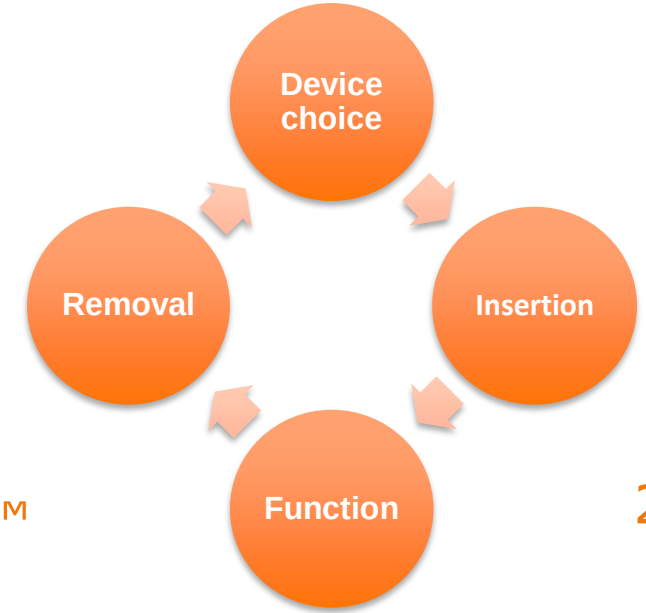
Clinical monitoring, documentation and decision making tool
Replaces VIP, INS tools

Dr Gillian Ray-Barruel
g.ray-barruel@griffith.edu.au

	I-DECIDED™ INSTRUMENTO DE EVALUACIÓN & DECISIÓN IV
I	IDENTIFICAR Si el paciente tiene un catéter IV.
D	¿EL DISPOSITIVO IV ES NECESARIO? Considere la retirada si no se utilizó en las últimas 24 horas, o es improbable su uso en las siguientes 24 horas. Considere el cambio a medicamentos orales.
E	¿EFECTIVO funcionamiento? Siga las recomendaciones de la institución sobre la verificación y el mantenimiento de la permeabilidad.
C	¿COMPLICACIONES en el sitio de inserción IV? Dolor ≥ 2/10, enrojecimiento, edema, fuga, infiltración, extravasación, endurecimiento, cordón venoso palpable o purulencia
I	INFECCIÓN prevención Higiene de manos. Realizar antisepsia de las conexiones & permitir secar. Uso cuidadoso de los dispositivos de administración.
D	DETERMINAR CURACIÓN & sujeción. Curación limpia, seca e intacta. Catéter IV y tubuladuras aseguradas.
E	EDUCAR & EVALUAR. Discutir el plan de cuidado IV con el paciente y la familia
D	DOCUMENTAR su decisión. Mantener, cambiar la curación, o quitar el catéter IV. Siempre considere la política de su institución y consulte a el equipo y el paciente, según necesidad.

1. Peripherally compatible meds

KPIs



1. PREM – Multiple insertion attempts

2. Aseptic insertion

2. PROM - Pain

3. Device Failure

3. I-DECIDED™

What do we want?

1. Inserted on the first attempt
2. Keeps working and no infection
3. Comfortable for the patient
4. Patient engaged in care
5. Removed when therapy complete

- Documented in medical record

To ensure representative measures:

- Choose one or more measures (Peripherally compatible meds; Aseptic Insertions; I-DECIDED; PREM; PROM; Device failure)

If you can't audit ALL patients

- Obtain complete list of all hospitalised patients on one day/date
- Decide how many patients you can audit
- Divide total number by number you can audit – this will give you an 'n'
- Take every 'nth' patient on the list and audit them

This means you don't introduce bias into the measures

Global VA Registry

Towards better health system data

- Current feasibility study
- Scoping of minimum dataset
  - Literature review
  - Interviews/focus groups
  - eDelphi survey
- Validate measures
- Consumer views, IT/privacy issues

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OMG Study

J Hospital Medicine 2018
Alexandrou et al.

- 40620 patients
- 409 hospitals
- 51 countries
- 15 languages
- 4 million datapoints

Aim: to benchmark processes of care

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OMG - Latin America

1. Argentina
2. Bolivia
3. Brazil
4. Chile
5. Colombia
6. Mexico
7. Panama
8. Peru
9. El Salvador
10. Venezuela

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Gracias! Thank you!

Findings of OMG Study

Idle **14%**

Suboptimal dressing **21%**

Phlebitis **10%**

No documented site assessment **36%**

PIVC malfunction **10%**

No documented insertion date/time **49%**

Area of flexion 75**%**

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WORLDWIDE PRIORITIES
No documentation last 24h
~~Idle PIVs~~
Symptomatic PIVs
Substandard dressings
LATIN AMERICA
Reduce 18 gauge use
Reduce use of non-sterile tape as PIV dressing
Use dressing PLUS securement
Reduce blood in line
OMGPIVC
One Million Global Catheters
PIVC Worldwide Prevalence Study
Baptist Hospital of Miami
CENTRE HOSPITALIER MÉMORI
FRANCE ÉTATS-UNIS DE SAINT-LO

Care “Bundles”

1. Why do we need bundles and what are they?
2. What items are in published PIVC bundles, and what evidence is there of effectiveness?
3. What items should be in PIVC bundles?

Choosing bundle 'items'

- ✓ Must be based on level 1 evidence
- ✓ Are ALL necessary
- ✓ Can be answered "yes"/"no" if done/not done
- ✓ Must occur every day

Bundles associated with:

- ✓ Inconsistent items (23 in 5 studies)
- ✓ Focus on infection prevention but ignore other complications
- ✓ Some studies found reduced PIV-BSI and PIV-SAB
- ✓ Reduced number of starter kits
- ✓ Trend to reduced infiltration
- ✓ Improved documentation

Bundles don't work by themselves. Sustainability is not guaranteed.
Multi-modal approach must include cultural and system changes.

- Freixas et al. Clin Micro Infection, 2013; 19(9)
- Rhodes et al. J Hospital Infection, 2016; 94(1)
- De Vries M et al. J Assoc Vasc Access, 2016; 21(2)
- Upadhyaya et al. J Infection Prevention, 2018; 19(1)
- Watterson et al. J Pediatric Nurs 2018; online early.

Bundle - definition

"A structured way of improving the processes of care and patient outcomes:

a small, straightforward set of evidence-based practices — generally three to five —

that, when performed collectively and reliably, have been proven to improve patient outcomes".

www.ihi.org

What PIVC interventions are proven in RCTs or meta-analyses?
Takashima et al 2015 Vascular Access

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Items with RCT Evidence (2005-2015)

Takashima et al 2015 Vascular Access

Scoping Review:

94 PIVCs and 2 midline RCTs published

75% adults / 25% paediatrics

84% hospital / 16% home setting

Most (61%) RCTs on insertion topics:

- **30 pain relief**
- **21 technology guided**
- **4 device type**

Less (39%) RCTs on maintenance topics:

- **12 add-ons/connectors**
- **8 flushing**
- **7 removal time-frame**
- **5 dressing & securement**
- **2 blood sampling**

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Bundle items with RCT evidence

Gonzalez Lopez et al
J Hosp Infect 2014

- Integrated PIVC with flatter profile against skin

Signif 1 day longer function

Bugden et al
Annals Emerg Med 2016

- Tissue adhesive
- 1-2 drops

Signif 10% reduced PIV failure

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Bundle items with systematic review evidence

Offer vapocoolant spray

Griffith et al 2016 Cochrane Systematic Review
9 RCTs, 1070 paeds-adults
Signif reduction in pain (33 to 20 out of 100)
72% said they would want it again

Do not routinely remove PIVCs

Webster et al. 2015 Cochrane SR
7 RCTs, 4895 patients
No diff in complications or infections
Signif cost savings and less procedures

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Evidence from cohort studies

Significant predictors of failure

1. Insertion at flexion point
2. Traumatic insertion
3. Gauge size/length
4. Poor securement
5. Multiple use

Marsh et al. J Hospital Medicine, 2018; 13:83-89; Wallis et al Infect Cont Hosp Epi 2014

Infection prevention bundle items (strong epidemiological evidence)

- ANTT & hand hygiene on insertion - *and during use*
- Skin decontamination with CHG in alcohol
- Sterile dressing
- Consider removal daily
- Decontaminate access points before each use

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Reducing risk must cover the entire dwell

PIVC <u>Insertion</u> bundle

+ PIVC <u>Maintenance</u> bundle

We need both

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Insertion bundle

1. Use ANTT & hand hygiene
2. Offer vapocoolant spray
3. Decontaminate skin with alcoholic CHG & let dry
4. Use an integrated PIVC
5. One-two drops of glue to entry point & under hub with a sterile dressing

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Maintenance bundle

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E	¿EFECTIVO funcionamiento? Siga las recomendaciones de la institución sobre la verificación y el mantenimiento de la permeabilidad.
C	¿COMPLICACIONES en el sitio de inserción IV? Dolor ≥ 2/10, enrojecimiento, edema, fuga, infiltración, extravasación, endurecimiento, cordón venoso palpable o purulencia
I	INFECCIÓN prevención Higiene de manos. Realizar antisepsia de las conexiones & permitir secar. Uso cuidadoso de los dispositivos de administración.
D	DETERMINAR CURACIÓN & sujeción. Curación limpia, seca e intacta. Catéter IV y tubuladuras aseguradas.
E	EDUCAR & EVALUAR. Discutir el plan de cuidado IV con el paciente y la familia
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VASCULAR

Vascular AccesS Catheter Use in Latin AmeRica

- Argentina
- Brazil
- Chile
- Colombia
- Mexico

2018-2019

Academic study with funding from BD

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Lead investigator

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Latin America Lead Investigator

- Prof Mavilde Pedreira, Unifesp, Brazil

Lead study contacts

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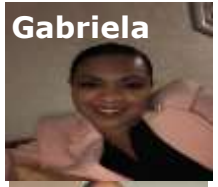
Marcela

Martha



Silvia

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Objectives

1. What is happening with PIVCs in my hospital?
2. How does my care compare to best practice guidelines?
3. Are PIVCs causing bloodstream infection risk?
4. Are patients having a good experience ?
5. What is the economic burden of PIVCs?
6. How can we improve?

Each hospital will receive an individual report

Aim:a more indepth LATAM study than the OMG study

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- 10,000-15,000 PIVCs to be audited
  - ✓ different regions from each country
  - ✓ adult and paediatric patients
- Fed Uni Sao Paolo gives training and data coordination
- Patient consent verbal (preferred) or written only if required by local policy/committee
- Data collected electronically (preferred) or paper

Hospitals will audit:

- PIVC site, dressing, securement, pain or other problems
- Insertion details, date, inserter (nurse/doctor)
- IV medication and fluid orders
- Hospital policies related to IVs

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Invitation to participate

Cirlia Alvarez
cirlia.alvarez@swissmedical.com.ar
Facebook/Twitter:
@VascularStudy

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AVAS

Australian Vascular Access Society
Promoting safety and excellence in Vascular Access

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