Vascular Access: It’s A Risky Business

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Discussion

• Australian vascular access device use
• How Australia is leading the world in vascular access management
• What we know now about preventing VAD related infection
• The role of humans and technology in VAD related infection prevention
• Using science to keep perspective
• Staying passionate
Vascular Access Use
VAD Use Comparisons

- Road Fatalities up to 31/10/15 (N=1020)
- Aussies w/ diabetes
- Aussies w/ asthma
- Nursing hours saved if adopt 7-day AS use
- Aussie Instagram Users
- Aussies Travelling O/S 2012
- Aussies FB Users 2015
- Aussie VAD Insertions

Estimated Device Usage

- Peripheral Cannulation: 13,500,000
- Central Line Catheter Insertions: 187,000
- PICC Line Insertions: 110,000
- Midline Catheter Insertions: 9,500
- Other Misc Procedures: 135,000

- Blacka, J. 2015. Personal communication.
Device Selection

- Consider need/alternatives & benefits/risks
- Vein size & condition
- Indication and duration
- Patient position during insertion
- Available as safety device with engineered safety feature
- Size according to intended use
- Use shortest and smallest gauge to meet need
- Compliance w/guidelines/regulations/accreditation criteria
- Known/suspected sensitivity to components
Device Insertion
### Device Insertion: AKA Multiple Opportunities and Places To Screw Up

<table>
<thead>
<tr>
<th>Device</th>
<th>Who Typically Inserts</th>
<th>Where Inserted (Location by Ward/ Dept)</th>
<th>Most Common Body Part Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC</td>
<td>Anaesthetists, Intensivists, Emergency Room Drs, Some RNs with extended practice roles.</td>
<td>Operating Theatre, Intensive Care, Emergency Room,</td>
<td>Right Internal Jugular vein, Left Internal Jugular vein, R &amp; L subclavian vein, right &amp; left axillary vein, Right or left femoral</td>
</tr>
<tr>
<td>PICC</td>
<td>RNs with extended practice roles (usually but not always) with Vascular access teams, Anaesthetists, Intensivists, Interventional Radiologists.</td>
<td>Specialist Procedure Rooms, (usually located in ICU, Recovery, Interventional Radiology, ER), Patient’s bed area.</td>
<td>Right / Left Basilic Vein, Right or Left Brachial Vein, Right or Left Cephalic.</td>
</tr>
<tr>
<td>Intraosseous</td>
<td>Every health care professional (RN, MO, Paramedic) with their ALS Certificate (advanced life support) is expected to be able to initiate IO access.</td>
<td>Wherever the emergency is Pre Hospital &amp; Hospital</td>
<td>R or L Humeral Head R or L Proximal Tibia R or L Distal Tibia R or L Distal Femur (kids)</td>
</tr>
<tr>
<td>Arterial Line</td>
<td>Anaesthetists, Intensivists &amp; Emergency Room Doctors. RNs with extended practice roles (generally in ICU / OR)</td>
<td>Operating Theatres, Intensive Care or Emergency Room.</td>
<td>R &amp; L Radial Artery R &amp; L Femoral Artery R &amp; L Brachial Artery</td>
</tr>
<tr>
<td>Peripheral IV</td>
<td>RNs &amp; ENs (who are credentialed IV Cannulaters) Interns, Residents, Registrars, Anaesthetists, Emergency Room Drs.</td>
<td>Wherever the cannula is required</td>
<td>R &amp; L Hand Veins R &amp; L Forearm Veins R &amp; L Ante cubital Veins Leg veins if desperate.</td>
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</tbody>
</table>
World Leaders in VAD Management
Effectiveness of a care bundle to reduce central line-associated bloodstream infections

Objectives: To determine the effectiveness of a care bundle, with a novel line maintenance procedure, in reducing the rate of central line-associated bloodstream infection (CLABSI) in the intensive care unit (ICU).

Design, participants and setting: Before-and-after study using CLABSI data reported to the Victorian Healthcare Associated Infection Surveillance System (VICNISS), in adult patients admitted to a tertiary adult ICU in regional Victoria between 1 July 2006 and 30 June 2014. VICNISS-reported CLABSI cases were reviewed for verification. An intervention was implemented in 2009.

Intervention: The care bundle introduced in 2009 included a previously established line insertion procedure and a novel line maintenance procedure comprising Biatch, daily 2% chlorhexidine body wash, daily ICU central line review, and liaison nurse follow-up of central lines.

Main outcome measures: CLABSI rate (cases per 1000 central line days).

Results: The average CLABSI rate fell from 2.2/1000 central line days (peak of 5.2/1000 central line days in quarter 4, 2008) during the pre-intervention period to 0.5/1000 central line days (0/1000 central line days from July 2012 to July 2014) during the post-intervention period.

Conclusion: Our study suggests that this care bundle, using a novel line maintenance procedure, can effectively reduce the CLABSI rate and maintain it at zero to 2 years.
Maintenance Bundle +/- Dedicated Trolley

Abstract. Introduction: Central venous access devices (CVADs) provide essential and reliable vascular access, but infection is a common and serious complication with paediatric patients. CVAD bundles have been demonstrated to effectively reduce central line-associated bloodstream infections (CLABSI), but primarily during CVAD insertion. Another emerging strategy to encourage best practice is the use of a dedicated CVAD trolley for maintenance.

Methods: A quality-improvement initiative was undertaken to improve CVAD maintenance and to evaluate the effectiveness of the chosen interventions at the Royal Children’s Hospital, Brisbane. Nursing staff from four wards within the hospital elected to participate and the wards were allocated to receive either Intervention A (CVAD maintenance bundle only) or Intervention B (CVAD maintenance bundle or dedicated CVAD trolley). Effectiveness of the interventions was evaluated by: (i) rate of CLABSI per 1000 catheter-days; and (ii) audits of clinician compliance with evidence-based CVAD maintenance strategies.

Results: During the initiative, the hospital-wide CLABSI rate decreased from 9.07 to 1.05 episodes per 1000 catheter-days ($P=0.01$). The rate of CLABSI in Intervention A wards reduced from 7.6 to 2.2 episodes per 1000 catheter-days ($P<0.001$) and in Intervention B wards reduced from 8.0 to 0.5 episodes per 1000 catheter-days ($P<0.001$). Hospital-wide audits of clinician compliance increased from 11.9% to 35% ($P=0.001$) in the Intervention A wards and to 83% ($P<0.001$) in the Intervention B wards.

Conclusion: Implementation of CVAD maintenance bundles and a dedicated CVAD trolley successfully reduced CLABSI and improved audited compliance to evidence-based practices within our tertiary paediatric hospital.
CVAD (central venous access device) Maintenance Bundle

Hand Hygiene
- Aseptic clinical hand wash (60 seconds) performed before all line access/maintenance procedures
- 5 moments* for hand hygiene

Scrub the hub
- 2% Chlorhexidine Gluconate and 70% Alcohol CVAD hub decontamination will be performed for 30 seconds with
- 20-30 seconds dry time before each hub access

ANTT (aseptic non-touch technique)
- Appropriate use of surgical or standard ANTT as per nursing standard
- ANTT used for all CVAD line maintenance and access procedures

Dressing
- Semi-permeable dressing will remain clean, dry and intact
- Dressing care will be documented daily on CVAD Nursing Activity Report

Patency
- Needleless Access Device (NAD) will remain clear and free of bloody residue
- NAD changes incorporated in dressing change or if NAD is visibly soiled
- NAD changes documented on CVAD Nursing Activity Report
- CVAD flushes freely and aspirates — patency documented daily on CVAD Nursing Activity Report

For information contact -
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Pager #59775 or e: abby_davidson@health.qld.gov.au

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Other Great Initiatives

• AVATAR Group
• Securement
• Dressing
• Routine replacement of device(s) and administration sets
• OMG
• Global overview of use, practices and outcomes
Preventing VAD-related Infection
ZERO ACCIDENTS IS OUR GOAL
FOR THE MINNEAPOLIS CONVENTION CENTER EXPANSION PROJECT
THE PROJECT TEAM HAS WORKED 137 DAYS REPRESENTING
76,000 WORK HOURS WITHOUT A LOST TIME ACCIDENT

TEAM MEMBERS
Central Line Associated Bloodstream Infection Issues

- 17% of Australian ICU patients receive CVCs\(^1\)
- NSW CLABSI rate around – 1.2/1000 catheter days
- Some organisations have achieved and maintained zero CLABSI
- Clinicians do not comply with evidence-based infection control practice recommendations
  - compliance with the clinician bundle between 61% to 90% & with the patient bundle between 74.1% to 91.8\(^2\)
  - overall hand hygiene compliance in Australia is only 78.3% (CI 95% 78.2-78.3)\(^3\)
- Some data regarding line management, securement, access and management
- Little data about organisational culture, incentives

3500 cases of bloodstream infections. Most of them are preventable.

In Australia each year there are approximately 3500 cases of bloodstream infections as a result of intravascular catheters. Many of these are central line associated bloodstream infections (CLABSI), and occur in intensive care units. Most of them are preventable.
Lack of long-term reliable CLABSI/1,000 line days data

• NSW 3.7 (95%CI 2.5-5.3)

• VIC 2.3 (95%CI 1.5-3.3)

• National 0.6 (95% CI 0.2–2.4)
Simple Facts

- Estimated overall incidence of infection 2.5%¹
- Catheter-related bloodstream infections (CR-BSIs) increase health costs and patient morbidity¹
- Common skin flora – *S. aureus, S. epidermidis & CNS* (gram +ve)
- Fungi as well as gram +ve and gram –ve organisms commonly cause CLABSI - Vancomycin-resistant enterococci, *Ps. aeruginosa* and Candida albicans²
- In one study resistant organisms accounted for 64.4% cultures²
- ICU CLs may be accessed > 16 times a shift³


Treatment Costs & Microbial Costs

• ~ 3500 Aussies CLABS1 each year
• Excess length of stay 2.4 ICU and 7.5 general ward days
  • ICU bed-day $AUD (2006) 3,021 = $7,250 excess cost per case – $22,128.750
  • Ward bed-day $AUD (2006) 843 = $6,322 excess cost per case – $22,127,000
• Diagnostic costs – catheter tip & two blood cultures
• Treatment costs
  • 2 weeks of Vancomycin
  • 10 days of Ticarcillin
  • 4 weeks Fluconazole

Extraluminal biofilm is the major source of CRBSI within the first week of catheterization in short-term catheters. Extraluminal biofilm is the major source of tunnel infections (exit site infections) in long-term catheters.

Intraluminal biofilm is the major source of CRBSI after 1 week in both short- and long-term catheters.

IVD-related BSI Risk Factors

• Underlying disease
• Prolonged hospitalization before device
• Insertion
  – Site (heavily colonized) and type
• Catheter management
  – Duration of insertion
  – Colonization of catheter hub from contaminated HCW hands
• Antibiotic use during catheterization
• Formation of biofilm
# Modifiable Risk Factors

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Risk Factor Hierarchy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion circumstances</td>
<td>Emergency &gt; elective</td>
</tr>
<tr>
<td>Skill of inserter</td>
<td>General &gt; specialized</td>
</tr>
<tr>
<td>Insertion site</td>
<td>Femoral &gt; subclavian</td>
</tr>
<tr>
<td>Skin antisepsis</td>
<td>70% alcohol, 10% povidone-iodine &gt; chlorhexidine solutions</td>
</tr>
<tr>
<td>Catheter lumens</td>
<td>Multilumen &gt; single lumen</td>
</tr>
<tr>
<td>Duration of catheter use</td>
<td>Longer duration of use greater risk</td>
</tr>
<tr>
<td>Barrier precautions</td>
<td>Submaximal &gt; maximal</td>
</tr>
</tbody>
</table>
Risk Management

- Standardised Insertion Technique
- Use of best-fit technology/devices/pharmacology for line life-cycle
- Education & competency testing, certification
- Process Compliance Monitoring
- Outcome Monitoring
- Sentinel review/case investigation
- Governance/communication/Frontline workers
- Bundles

Risk Management
Risk Factors Unique to Setting Where Line Inserted and/or Accessed – Emergency vs Scheduled and Ambulatory vs Inpatient
CLABSIs & Mortality

Relative risk of hospital mortality associated with CR-BSI estimated to be 1.06 or absolute increase in mortality just under 1%

How does that impact the families of the 3500 Australians who develop CLABSI each year?
Prioratised Needs
Respect For Risks Associated w/ Peripheral IVs and Prevention
Intravascular device use, management, documentation and complications

• 30-80 % of people admitted to hospital receiving a PVC during their stay
• 0.1% or 0.5 per 1,000 catheter days
• 58.7% (n=321) of patients had one or more vascular devices
  • 190 (86.4%) PVCs, 25 (11.4%) PICCs and 5 (2.3%) CVCs.
  • 22.3% inserted by a doctor,
  • 20.5% by the intravenous service,
  • 10% by trained ward nurses and
  • 47% it was not known who inserted the device.

Evaluation of a Pilot Educational Program on Safe and Effective Insertion and Management of Peripheral Intravenous Catheters

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Samantha Keogh, PhD, RN
Claire Rickard, PhD, RN

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Abstract

Peripheral intravenous catheter (PIVC) insertion and subsequent care have been highlighted as areas for improvement in the management of intravascular devices; however, only the fundamentals of PIVC care are routinely taught to registered nurses in Australia. In 2013, a vascular access-focused elective postgraduate course, Peripheral Intravenous Access and Care (8035NRS) was commenced for students enrolled in any of the Griffith University master’s degree programs. It was developed with the intent to translate research knowledge into practice by providing access to the latest research findings and current best practices in peripheral intravenous access. Topics covered preinsertion, insertion, and postinsertion care and were developed for the online environment, which is known to be conducive to individual student learning styles. Learning activities included viewing short videos delivered by local and international clinical researchers. This course is the first known university-provided, postgraduate academic course on this subject in Australia, and possibly 1 of the few available internationally. The course succeeded in its aim of increasing knowledge and skills about safe, evidence-based PIVC insertion and care to registered nurses. Its development and implementation at the postgraduate level may be regarded as a strategy to provide a greater understanding regarding scope and relevance for nursing practice and for informed decision making on optimum integration at the undergraduate level. This ultimately will increase positive patient outcomes and the patient experience of vascular access.

Keywords: insertion and management of PIVCs, peripheral intravenous catheters, postgraduate education
Education & Awareness on Infection Risk and Prevention
Education & Awareness on Infection Risk and Prevention

• Not well addressed in undergraduate courses in Australia – medicine and nursing
• Significant & disproportionate focus to date on hand hygiene
• National focus on aseptic non-touch technique & competency
• Patients, families and carers generally unaware of their role in prevention and advocacy
• Slow and random promotion of standardised practice in ICU-setting with minimal uptake in non-ICU areas eg. renal, interventional radiology, ER and oncology
• Substantial national research – not translated to the bedside
How Humans and Technology Can Prevent VAD-related Infection
Selected Novel Technologies

• Sutureless securement devices
  • ↓ BSI in 2 studies

• Dressings
  • Chlorhexidine-impregnated sponge - ↓ 60%

• Antimicrobial impregnated catheters
  • 12/16 studies ↓ in CVC-related BSIs ~ 40%

• Iodine-containing catheter hub
  • Unequivocal results

• Mechanical Access Valve (MAV) IV Access Systems
  • Patient vs HCW safety
  • Pre-filled syringes
New Technical/ Product Development
New Technical/ Product Development

• Better human factors – usage, storage
• More attractive design
• Intuitive & easy to use by ageing workforce (visual cues)
• Use of forcing functions to prevent misuse
• Inbuilt alarms
• Inbuilt compliance monitoring
• Inclusion of “best practice” information with product
• Packaging and presentation to enable seamless insertion, maintenance and access
• Product innovation drives guidelines and standards rather than reverse
Examples of Technology Driven Infection Prevention Solutions

• Easy-to-use skin preparation
• Ultrasound guided insertion
• Securement devices
• Engineered devices eg. Needleless connectors
• Antiseptic impregnated dressings

How do we address the issue of biofilm?

• Nanotechnologies, improved device composition and design

• ANTISEPTIC AND ANTIMICROBIAL COATED CATHETERS
Using Science To Keep Perspective
Use of Chlorhexidine and CHG-coated Central Venous Catheters
Antimicrobial Catheters

• Arrowgard introduced in 1990
• External catheter surface impregnated with combination of silver sulfadiazine (SSD) and chlorhexidine (Chlorhexidine)
• Designed to reduce catheter colonisation
• Demonstrated good in vitro broad spectrum efficacy
• Subsequent publication of additional in vitro and invivo studies as well as economic studies
• Extended dwell times and greater understanding of CLABSI cause lead to 2nd generation
By 2005

• 19 RCTs, 3 meta-analyses & 2 cost-benefit analyses
• CDC recommended use of antimicrobial-impregnated CVCs in selected clinical situations
• 13 of the 17 published studies that examined the effect of antimicrobial-impregnated CVCs on rates of CVC-related BSI found either a statistically significant reduction or a strong trend toward a reduction in rates of BSI
• Evidence that 40% of intravascular device–related BSIs are preventable with the use of antimicrobial-impregnated CVCs
• Support their selective use in situations in which rates of CVC-related BSI remain unacceptably high despite adherence to standard infection-control practices

Current Recommendations

Recommended by CDC


Recommended by ANZICS

Central Line Insertion and Maintenance Guideline
April 2012

Recommended by SHEA

Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

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Antibiotic/Antiseptic Catheters

Use an antimicrobial or antiseptic-impregnated CVC in adults whose catheter is expected to remain in place >5 days if, after implementing a comprehensive strategy to reduce rates of CR-BSI, the rate has not sufficiently decreased.

The comprehensive strategy should include the following 3 components:

• educating persons who insert and maintain catheters,
• use of maximal barrier precautions, and
• a 0.5% chlorhexidine preparation for skin antisepsis during central venous catheter insertion.
ANZICS Antimicrobial central lines

**Antimicrobial central lines**\(^{17,18}\)

Chlorhexidine and silver sulphadiazine coated lines (not silver-only),\(^{19}\) and rifampicin and minocycline lines should be considered

- If the CLABSI rate remains high in spite of good compliance with the insertion and maintenance guidelines
- For patients who will have a central line in-situ >7 days\(^{20}\)
- For patients at particular risk of CLABSI, eg. burns, immunocompromised

Other factors to consider are:\(^{21}\)

- Both types of catheter have limited antimicrobial action against some organisms.
- If rifampicin and minocycline lines are frequently used, there should be monitoring for the development of resistance.
- Hypersensitivity reactions to chlorhexidine-coated central lines have been reported, albeit rarely.

• Implement after assessment when unacceptably high rates occur despite high compliance with basic prevention practices

• Special Approach Technologies:
  • Antiseptic impregnated CVCs in adult patients (I)
    • Consider duration and CLABSI rates
  • CHG containing dressings (I)
    • Unclear as to benefit if daily HG bathing is already established and vice versa
  • Antiseptic-containing hub/connector cap/port protector (I)
    • Effectiveness of 5 second antiseptic scrub is basic practices
  • Antimicrobial locks (I)
    • Balance development of resistance with subtherapeutic drug concentrations

• Removing special approach technology after return to baseline is a local decision
CVAD Post Insertion Management

• Single use 2% chlorhexidine gluconate in 70% isopropyl alcohol solution is the preferred antiseptic agent for insertion and dressing of CVADs
  • If this is not available, chlorhexidine 0.5% in 70% alcohol or iodine in alcohol should be used
  • Solutions must not be decanted into smaller containers and unused portions must be discarded. Where a patient demonstrates chlorhexidine sensitivity topical povidone iodine 10% in 70% alcohol may be used

Chlorhexidine Sensitivity
Chlorhexidine Antiseptic Properties

- Been used widely as an antimicrobial agent since mid 1970s
- Mouth rinses, cosmetics, contact lens solution, skin creams
- Used clinically urinary antiseptic/ lubricant, implanted mesh
- Increasing use in clinical settings – skin preparation and hand hygiene solution
- Broad spectrum of action, rapid acting & persistent
Safety When Using Chlorhexidine

• Patient reactions are rare & typically minor
• Staff safety is not an issue
• Manufacturers’ instructions should be followed including paying attention to label warnings
CHG-Associated Anaphylaxis

- Chlorhexidine introduced in 1954
- Adverse reactions (mostly mild and skin related) reported for last 30 years
- Type 1 hypersensitivity first reported 1984
- Over ten years ~ 50 case reports published
- High rate in Japan
- Most anaphylaxis related to anaesthesia and surgery

Four cases of anaphylaxis to chlorhexidine impregnated central venous catheters: a case cluster or the tip of the iceberg?

Editor—We describe four cases of anaphylaxis caused by chlorhexidine in patients undergoing anaesthesia for cardiothoracic procedures in our Trust over a 12 month period. In all of these cases, anaphylaxis was preceded by insertion of a central venous catheter (CVC) impregnated with silver sulphadiazine and chlorhexidine (ARROWgard Blue®). All patients received standard anaphylaxis management including the administration of i.v. epinephrine, steroids, and antihistamines. In each patient, a tryptase increase from baseline was demonstrated in the early postreaction sample, indicating mast cell degranulation and confirming the clinical impression of anaphylaxis. Allergen-specific IgE testing (ImmunoCAP®) to chlorhexidine was also positive in all cases.

The first patient experienced two separate episodes of chlorhexidine-associated anaphylaxis. He had his initial procedure abandoned after developing anaphylaxis. An ARROWgard Blue® CVC was inserted immediately before his reaction, but the significance was not noted at the time. After investigation under the allergy team, he was found to be positive to chlorhexidine by specific IgE. His surgery was rescheduled and in light of his previous episode, all antiseptic preparations containing chlorhexidine were removed from the theatre. He had a second anaphylactic reaction after insertion of a second ARROWgard Blue® CVC. The external sterile set packaging did not

Chlorhexidine is a chlorophenyl biguanido antiseptic with two identical epitopes. This type of chemical conformation is known to be capable of cross-linking IgE antibodies on the surface of mast cells and basophils, subsequently causing histamine release in sensitized individuals in a manner similar to succinylcholine. Sensitization to chlorhexidine is undoubtedly through exposure, although this does not appear to be more common in health-care professionals who work in an environment where chlorhexidine is ubiquitous.¹

First reports of anaphylaxis to this substance appeared in medical literature 25 yr ago² and subsequent reports have been published sporadically since, mainly involving reactions from topical applications to skin and mucous membranes (ophthalmic wash, urinary catheterization, rectal examination, and intranasal administration).³⁻⁷ The severity of these cases prompted the Food and Drug Administration (FDA) in 1998, to issue an alert to the medical community about the potential for serious hypersensitivity reactions to chlorhexidine-impregnated medical devices.⁸

The incidence of chlorhexidine anaphylaxis is likely to be vastly under-represented; in a world-wide review in 2004, there were only 50 reported cases over a 10 yr period.⁹ In response to our recent cases, the Immunology Department in Southampton is currently undertaking a historical review of patients who have had an episode of intraoperative allergy. They have so far discovered 19 patients with positive chlorhexidine 'ImmunoCAP' tests in Wessex out of 86 cases tested in the last 36 months. Of the 86 patients tested, 16 were anaesthetic referrals and of these seven tested positive for chlorhexidine 'ImmunoCAP'.

The Importance of Checking Packaging and Patient History

• “...as it was not widely appreciated that central lines may be pre-coated with Chlorhexidine and (as is routine practice) the line was handed to us already open, none of us thought to check the package insert...”

• CHG-impregnated CVCs are contraindicated for patients with known hypersensitivity

UK Medical Device Alert 2012/075

- Be aware of the potential for an anaphylactic reaction to chlorhexidine.

- Ensure that known allergies are recorded in patient notes.

- Check the labels and instructions for use to establish if products contain chlorhexidine prior to use on patients with a known allergy.

- If a patient experiences an unexplained reaction, check whether chlorhexidine was used or was impregnated in a medical device that was used.

- Report allergic reactions to products containing chlorhexidine to the MHRA.
Recent National Concerns Regarding Chlorhexidine

ANZCA Guidelines

Guidelines on the Perioperative Management of Patients with Suspected or Proven Hypersensitivity to Chlorhexidine

1. INTRODUCTION

1.1 Chlorhexidine (1:10 Cl-Hexachlorophene) is a broad-spectrum antiseptic that is extensively used in healthcare environments. Its many applications include, but are not limited to, antiseptic solutions and gels for the disinfection of skin and its lubricants for modelling urinary catheter insertion. It may be incorporated into central venous catheters, dressings, surgical dressings and other medical devices. It is also widely available in the community in many presentations such as antiseptic hand rubs, mouthwashes, toothpastes and throat lozenges.

1.2 Recognition of the efficacy of chlorhexidine has seen its use dramatically increase within the hospital and community environments in recent years. Hypersensitivity to chlorhexidine has an unknown incidence, but is currently still rare. Concomitant with widespread use, however, there have been increasing reports of hypersensitivity to chlorhexidine, usually immediate type hypersensitivity (in its severe form, anaphylaxis).

1.3 Ready identification of all products containing chlorhexidine is difficult with non-uniform standards of labelling. Frequent changes of products used by, and available to, the practitioner, make the task of avoiding the antigen during the patient's hospital stay particularly difficult.

1.4 Careful planning and precautions are necessary to prevent harm to patients with known chlorhexidine hypersensitivity. Patients diagnosed with or suspected of having chlorhexidine hypersensitivity have the right to expect that they will not be exposed to chlorhexidine during an episode of care if they have informed staff that they have chlorhexidine hypersensitivity.

2. PURPOSE AND SCOPE

These guidelines are intended to provide information for healthcare practitioners to assist with perioperative management of patients with proven or suspected hypersensitivity to chlorhexidine.

1.2 Recognition of the efficacy of chlorhexidine has seen its use dramatically increase within the hospital and community environments in recent years. Hypersensitivity to chlorhexidine has an unknown incidence, but is currently still rare. Concomitant with widespread use, however, there have been increasing reports of hypersensitivity to chlorhexidine, usually immediate type hypersensitivity (in its severe form, anaphylaxis).
Common Features of Reports

• Reaction to Chlorhexidine occurs during multi-body site exposure to Chlorhexidine – urinary catheter insertion/ skin preparation & insertion of impregnated CVC

• In multi-case series reports of Chlorhexidine hypersensitivity most reactions occur after urinary tract mucousal contact with Chlorhexidine vs insertion of impregnated CVC¹

• Specific reports of reaction to Chlorhexidine impregnated CVCs are rare and most often Chlorhexidine sensitivity known prior to insertion²


Anaphylaxis to CHG-coated CVCs: Current Thinking

BACKGROUND: Anaphylactic reactions to chlorhexidine are rare but are being reported increasingly in association with a variety of products.

METHODS: We report three cases of anaphylaxis to chlorhexidine in patients presenting for cardiac surgery.

RESULTS: In each case, anaphylaxis was precipitated by the insertion of a central venous catheter impregnated with chlorhexidine acetate. Subsequent investigations confirmed chlorhexidine as the causal agent.

CONCLUSION: Extensive use of chlorhexidine to reduce hospital-acquired infections has the potential to sensitise a small proportion of patients, leading to life-threatening anaphylaxis on subsequent exposure.

Other Important Considerations

• What type of Chlorhexidine?
  • Chlorhexidine digluconate (CHG) – dissolves in water and delivers molecule effectively (scrub solutions, dressings, oral solutions)
  • Chlorhexidine diacetate (CHA) or chlorhexidine base (CHX) – no easily soluble, used for slow release of chlorhexidine from product surface (catheter surface)

• How is Chlorhexidine bonded to surface?

• How long is it protective?

• How is it released?

• Has it passed Biological evaluation of medical devices ISO 10993-1-2009?

• Chlorhexidine has non-specific action so true resistance unlikely – no chlorhexidine-resistant bacterial or fungal strains reported despite >60 years use

Modified with permission from K Giare-Patel. Chlorhexidine – the agent, the legacy, the novelty and the safety. AVA 2015.
Staying Passionate
Current Beliefs & Focus

• CLABSI prevention is possible
• Requires rigorous policy and guidelines
• Specific education and training
• Continuous implementation of quality improvement initiatives
• Good governance
• Clinician compliance
AIM for Zero

• Permanent culture change to zero tolerance for all HAIs including CLABSIs
• Includes maintenance bundle in addition to insertion bundle
• Bundles applied house wide not just in ICU
• Involves all organisations and all clinical settings
• Education, Competency and Privileging of Staff including Physicians
• Strong clinical and executive leadership

Modified with permission from Ed Septimus, Personal Communication, 23 Nov 2015.
Objective: Identify the longest period a central line remains free from central line-associated bloodstream infection during an 18-month insertion-bundle project.

Design: Prospective cohort.


Patient Intensive care unit adult patients whose central line was inserted in the intensive care unit.

Intervention: Compliance with the insertion bundle for central lines during the first 13-month roll-out period and the last 6 months.

Main Outcome: The cumulative line days that remained free to infection-free before the longest probability of central line-associated bloodstream infection, in 100 chances, was identified using conditional probability modeling. An adjusted central line-associated bloodstream infection rate was calculated for these cumulative line days and thereafter where the probability for infection increased with additional dwell time.

Results: The lowest probability identified for central line-associated bloodstream infection was in 100 chances regardless of the phase of the project or central line type. During the first 13 months of the project, the close to infection-free period finished by the end of day 7 for the total central line-associated bloodstream infection rate of 1.0 3.3/1000 line days. By the last 6 to infection-free period was within the end of day 9, giving us an adjusted central line-associated bloodstream infection rate of 0.8 1.5/1000 line days. For dialysis types, the close to infection-free additional line days, from day 1 to day 3.5, 15.5/1000 line days (95% confidence interval 6.8–2.4).

Conclusions: The success of the by improved analysis that identified was extended to the first 9 days to the 7 day for dialysis, peripherally inserted central lines. In the intensive care unit patients their zero risk for central line-associated bloodstream infection increased with the duration of in the intensive care unit and peripherally inserted central lines (95% confidence interval 0.2–2.4).

Kim Wan; bloodstream infections patient safety; risk free

Bloodstream infection rate of 1.8 (95% confidence interval 0.9–3.3)/1000 line days. By the last 6 months of the project the close to infection-free period was extended by 2 additional line days to the end of day 9, giving us an adjusted central line-associated bloodstream infection rate of 0.9 (95% confidence interval 0.5–1.5)/1000 line days. For dialysis and unspecified central lines, the close to infection-free period was extended by 5 additional line days, from day 2 with a rate of 4.3 (95% confidence interval 0.9–12.5)/1000 line days to day 7, giving a rate of 0.8 (95% confidence interval 0.2–2.4)/1000 line days.

Conclusion: The success of the insertion bundle was identified by improved analysis that identified the safest dwell time was extended to the first 9 days for centrally inserted lines and up to day 7 for dialysis, peripherally inserted central catheters, and unspecified central line types. Given that three quarters of intensive care unit patients have their central line removed by day 7, zero risk for central line-associated bloodstream infection should be achievable in the majority of patients where clinicians comply with the clinician and patient insertion bundles.
Gold Coast Hospital
This is a public hospital
108 Nerang Street
Southport, QLD 4215
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Go to this hospital's website

Staphylococcus aureus bacteraemia (SAB)

Staphylococcus aureus bacteraemia is a serious bloodstream infection (sometimes called SAB or ‘golden staph’) that may be associated with hospital care.

The aim is to have as few cases of SAB as possible. One of the most effective ways to minimise the risk of SAB and other healthcare associated infections is good hand hygiene.

The national benchmark for states and territories (public hospitals) is no more than 2 cases per 10,000 days of patient care. For hospitals where there are fewer than 5,000 days of patient care, a comparison cannot be made with the national benchmark. For some private hospitals, rates but not counts of cases are shown. For more information about state and territory SAB rates see: Hospital performance: staphylococcus aureus bacteraemia (SAB) in Australian public hospitals.

The cases shown are for SAB associated with care provided by this hospital for the period 1 July 2010 to 30 June 2011.

16 cases of SAB occurred during 271,163 days of patient care.
There were 0.39 cases per 10,000 days of patient care.

See more current hospital information published by Queensland

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Designing incentives for good-quality hospital care

Is now the time to send a signal that poor-quality care should not be rewarded in activity-based funding?

Public hospitals in Australia are in for a shake-up over the next few years, with boards being reimbursed in many states and activity-based funding (ABF) being rolled out nationally. ABF will replace global or historic budgets for hospitals in most states. National casemix classifications will be agreed and the work of hospitals described and priced using those classifications. Australian refined diagnosis related groups (AR-DRGs) will be used for inpatients, and other classifications will describe outpatient, emergency department, mental health and subacute activity.

The national introduction of ABF will immediately improve transparency of federal funding support for hospital activity. The rhetoric associated with ABF also emphasizes efficiency of hospital care. Much of this will depend on how states, who will manage the system, pass on incentives to local hospital networks. However, the National Health Reform Agreement goes further and declares that the Independent Hospital Pricing Authority (IHPA) will have regard to, among other things, clinical safety and quality (clause B12a) in setting a "national efficient price" for hospital activity. It is probably a stretch to add "quality improvement" as a third objective (in addition to funding transparency and clinical safety), but certainly the National Health Reform Agreement signals a potential role for the IHPA in this area.

Non-pay for non-performance

Routine hospital datasets used for ABF distinguish between patients' comorbidities present on admission and hospital-acquired complications. In the US Medicare system, a limited list of hospital-acquired conditions has been excluded from being used in assigning cases to their casemix classification and thus affecting activity-based payment. The current non-pay for non-performance regime shifts only a small amount of funding around, but has been extensively debated, perhaps because of its potential to affect hospital reputation.

There are several options within the area of non-pay for non-performance, relating to which complications should not attract payment for their management, and what financial impact should be imposed.

In its most narrow implementation, non-payment can be targeted at those complications that are clearly preventable and should never occur, with wrong-site surgery being an issue in Australia, but would only shift a trivial proportion of payments. In addition, as the US list can be challenged, a better path might be to use the work of the Australian Commission on Safety and Quality in Health Care to create our own shortlist of conditions linked to quality of care. The list should only include conditions where responsibility for the adverse event can be clearly attributed to the hospital and its staff, perhaps by failure to implement the Commission’s standards, such as those relating to patient identification. Initially, the impact could
Payment for Performance - Victoria
Payment for Non-Performance - Queensland

• “...penalties still do exist for any HCA BSI. (inpatient and non inpatient) I believe it is $12000 per episode. I have heard anecdotally that occasionally some of the larger facilities have received a double whammy if there was more than one organism (which they have been arguing against).

• More recently with the healthcare purchasing agreements being reviewed, I believe they were looking at establishing a baseline and penalties would apply over that. What that ‘baseline’ is I have no idea. I suspect for smaller facilities like Redland it will be zero.

• Has it actually helped at our facility? – the million dollar question – for our facility it is used as a big stick but honestly when I investigate I often find there is no recommendations except improving documentation”

QLD-based ACIPC member response to question regarding non-payment.
Welcome to AVAS

The Australian Vascular Access Society (AVAS) is an association of healthcare professionals founded to promote the emerging vascular access specialty. Today, its multidisciplinary membership advances research, professional and public education to shape practice and enhance patient outcomes, and partners with the device manufacturing community to bring about evidence-based innovations in vascular access.

Recognised as the Australian national authority in vascular access, AVAS is dedicated to exceeding the public’s expectations of excellence by setting the standard for vascular access care.

The Society seeks to uphold the highest standards of ethical behaviour in all its organisational interactions. It is the responsibility of each AVAS member, including the Society executive, staff, volunteers and members, to act in a manner consistent with these ethical guidelines.
ACIPC.org.au – Infection Prevention & Control
Engagement & Facilitating Change – None 100% Effective

• Webinars -> increasing
• Online discussion forums (NB foster “group think” & inaccurate information distillation)
• Use of Key Opinion Leaders
• Online publications and interactive websites
• Conference attendance – exposure to “new” science and devices
• Public/ private partnerships – joint evaluations
• Expert forums
• Use of facilitated focus groups is untapped
• Limited networking outside of Australia other than by KOLs and academics
• Hospital-based multi-disciplinary QI projects eg.
How Tim Spencer Remains Passionate

As an experienced operator of 15 years, being an expert clinician in vascular access has given me the ongoing desire to push the boundaries within my scope of practice and also assist and develop other professionals in their pursuit of a vascular access career. Moving from a blind sticking, landmark technique to utilising state-of-the-art ultrasound practices, not only in pre-assessment for vessel health, but for direct visualisation and intra-procedural monitoring and assessment, this allows me to make a concise clinical decision on which device is the best for the patient, for the therapy and for the duration of treatment. Achieving this experience can be challenging when clinicians are undertaking new and diverse roles, but it is the leaders in vascular access who will continue to challenge the boundaries of clinical practice in modern healthcare and stimulate those who aim to follow in their footsteps.
How Evan Alexandrou Remains Passionate

I maintain my passion to reduce catheter acquired infection because we still have much to learn and teach with regard to best catheter, best vessel, best anatomical placement and best practice with managing that device. We need to remember that complications from vascular access devices are preventable adverse events that can be reduced and even eliminated with the right education and attitude.
How Cath Murphy remains Passionate

Infection Control Plus Pty Ltd
Published by Cath Murphy (2) · 27 mins ·

This little guy is 35 days old and a precious family friend. He has had four courses of antibiotics and multiple IVs already in his little life. Last week four doctors attempted at least 12 times to cannulate him. Not one Dr or assisting nurse performed hand hygiene. Like me they, commented on his cuteness and his vulnerability. What will it take for healthcare workers to do the right thing always? Looking forward to telling his story in more detail tonight in Brisbane.
Amazing how the sight of someone you love with a peripheral IV and a urinary catheter can fill you with fear. Thank you to all the nurses at MAU, Robina Hospital who performed hand hygiene, removed devices as soon as possible and respected asepsis. This family member is very grateful.
Summation

• Millions of $AUD and hours of manpower invested in understanding and improving practice and reducing healthcare associated infections (HAIs) especially vascular access related infections.

• Raised clinician, media and public awareness yet minimal impact in terms of reduction

• ? Exhausted input from clinicians, government, academics and infection prevention community

• Remaining solutions are technology-based and involve welcoming medical industry to the infection prevention table as equal partners

• Clinicians and procurement staff must assess new offerings and review protocols only after thorough and thoughtful review of science and current information.