

Healthcare associated infections in New Zealand: Prevalence, incidence, & prevention

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February 15, 2023

Disclosures

- Clinical Lead, NZ SSI Improvement Programme, HQSC Wellington
- Advisor IPC, Southern Cross Healthcare (Network hospitals)

Patient stories

- **Prospective study of 424 cases of *Staphylococcus aureus* bacteraemia: determination of factors affecting incidence and mortality**
- [P. C. Hill](#), [M. Birch](#), [S. Chambers](#), [D. Drinkovic](#), [R. B. Ellis-Pegler](#), [R. Everts](#), [D. Murdoch](#), [S. Pottumarthy](#), [S. A. Roberts](#), [C. Swager](#), [S. L. Taylor](#), [M. G. Thomas](#), [C. G. Wong](#), [A. J. Morris](#)
- Internal Medicine Journal 2001; 31: 97-103. <https://doi.org/10.1111/j.1444-0903.2001.00029.x>

Patient stories

- Hereina Te Moana Matenga Searanche
 - Aged 20 years
 - On leave from hospital: ambulatory, eating and drinking
 - Idle PIVC in place
 - Died of *S. aureus* infection
-
- **Two completely avoidable deaths**

Patient stories

- Hereina Te Mooana Matenga Searanche
 - Aged 20 years
 - On leave from hospital: ambulatory, eating and drinking
 - Idle iv catheter in place
 - Died of *S. aureus* infection
-
- **Two completely avoidable deaths**
 - **An idle iv line is medical malpractice**

Outline

- **NZ data**
 - Old and new
 - Prevalence, incidence, totals
- **Prevention strategies, 2022-23**
 - Shea/IDSA/APIC and others
 - What can we reasonably prevent?
- **How?**
- **Conclusions**

How many HAIs in NZ? Old

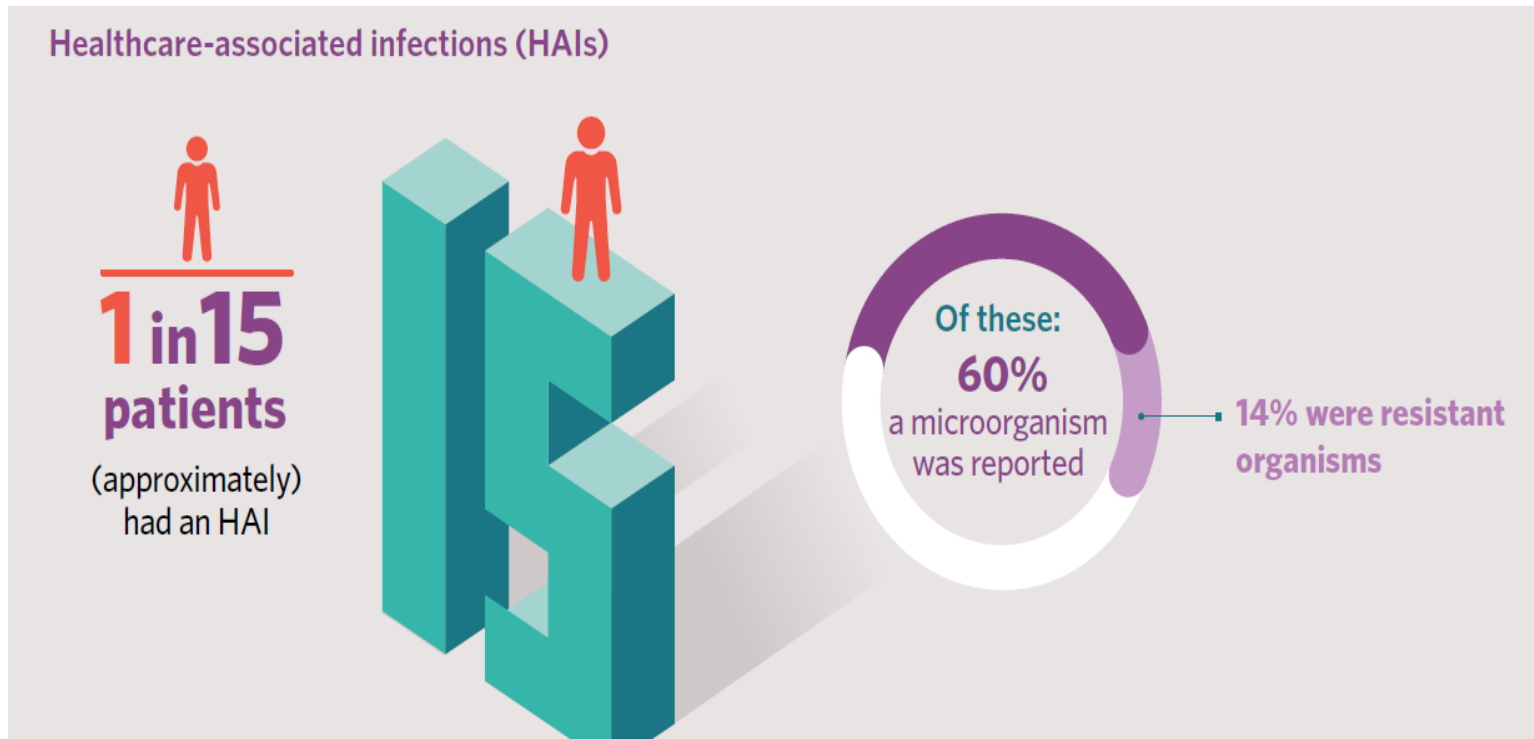
- PPS x7, ADHB only, 1996-1999:
- HAI rate 9.5%
- 10.7+/100 patients
- Incidence = 6.3%
- Cost, NZ: \$51m/85m = **\$136m/yr**
- Cost, 2022 (inflation 2.4%/yr, ~68%) = **\$228m**

Infect Control Hosp Epidemiol 2003; 24: 214-223

How many HAIs in NZ? Now

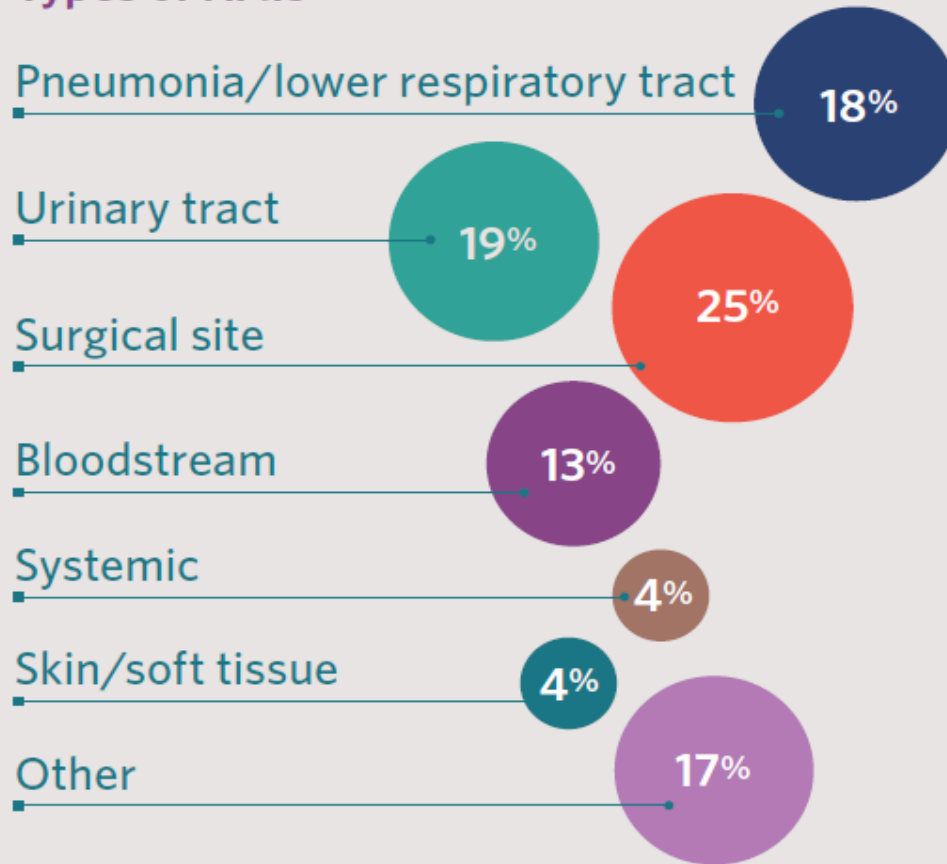
- National Point Prevalence Survey 2021
- Conducted February to June
- 5,469 adult patients
- 313 wards / 31 hospitals / 20 DHBs
- **PPS results, J Hosp Infect 2023; 131: 164-72:**
 - 361 patients with 423 HAIs
 - HAI rate 6.6% patients
 - 7.7/100 patients

PPS 2021 Results

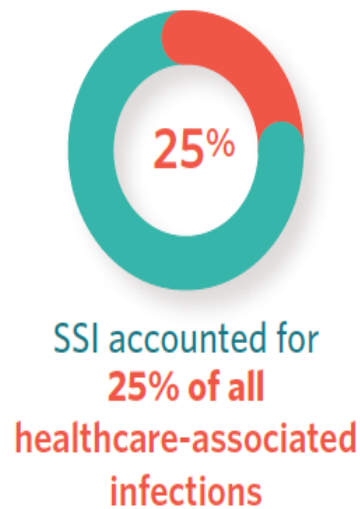


PPS 2021 Results

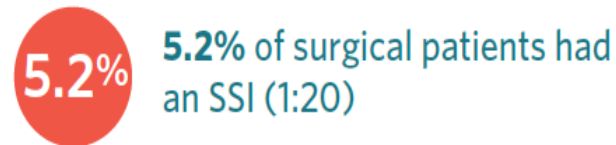
Types of HAIs



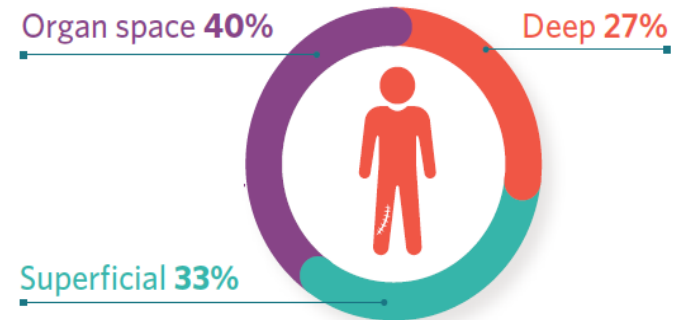
PPS 2021 Results: SSI



Proportion of surgical patients with an SSI



SSI type



PPS 2021 Results: UTI

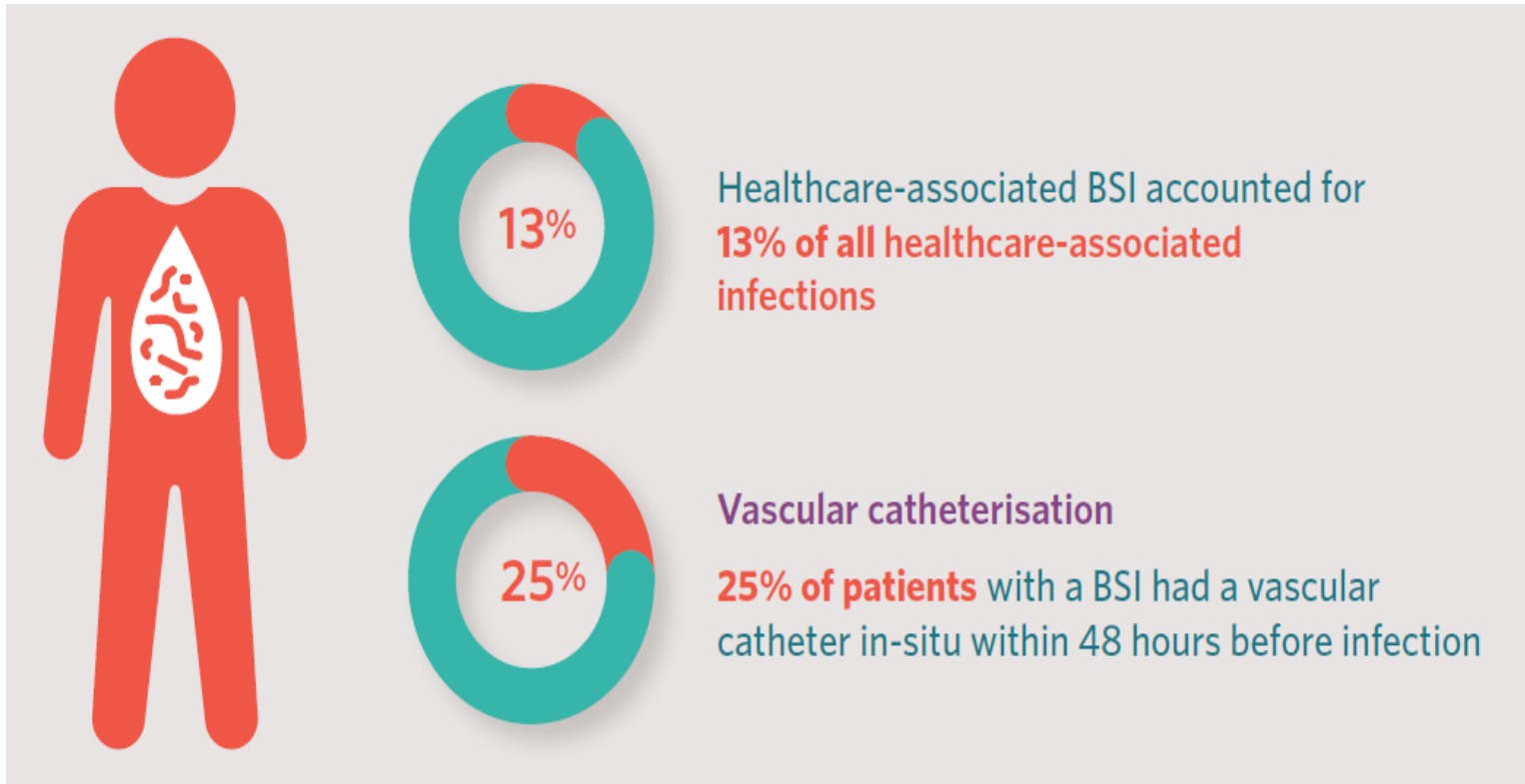


UTI accounted for
19% of all healthcare-associated infections

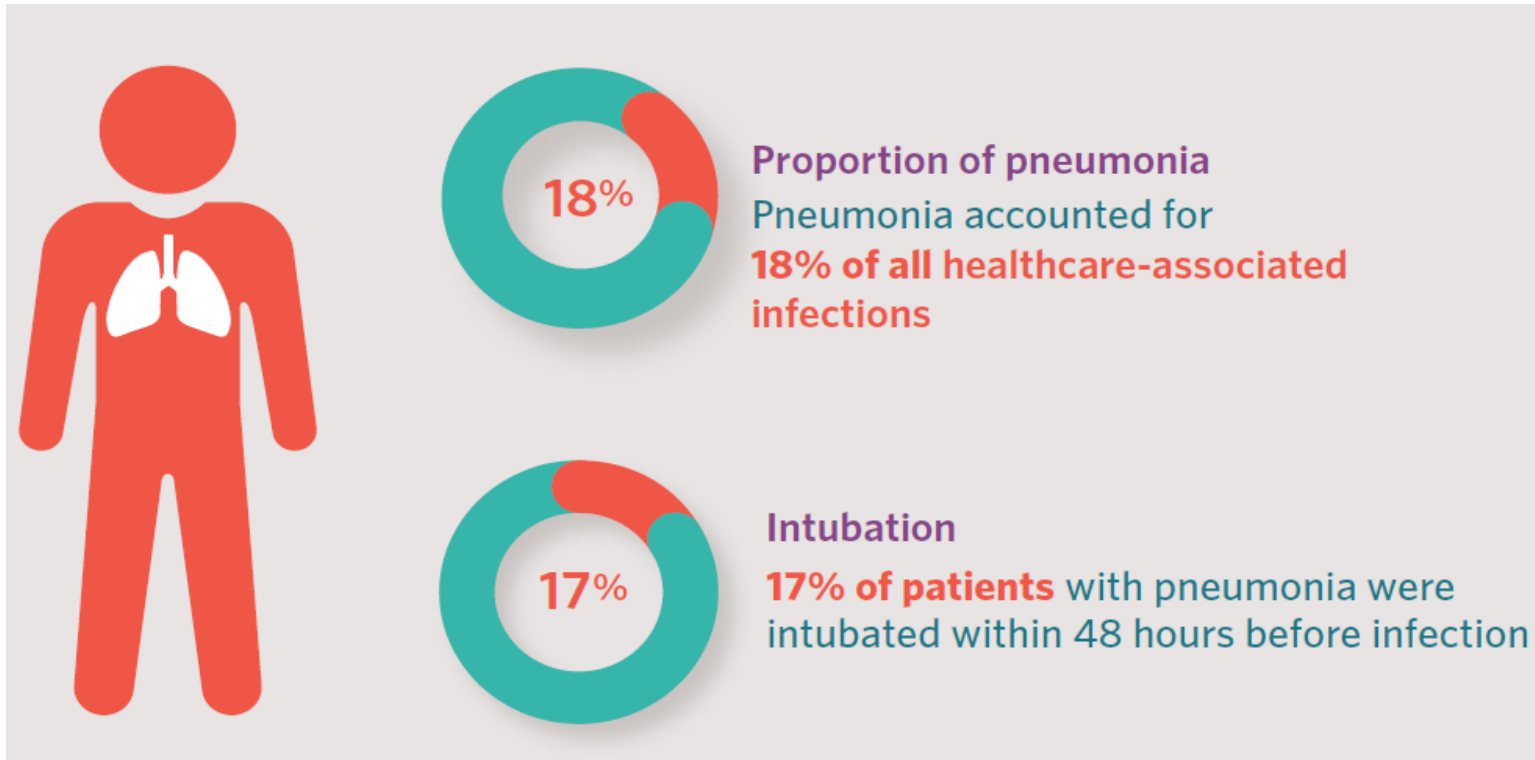


Urinary catheterisation
49% of patients with a UTI had a catheter
in situ within 7 days before onset of infection

PPS 2021 Results: BSI



PPS 2021 Results: Pneumonia



Devices

| Device type | Device present | Prevalence |
|-------------|----------------|------------|
| Any | 3,585 | 66% |
| PVC | 2,922 | 53% |
| CVC | 549 | 10% |
| IDC | 967 | 18% |
| Ventilation | 52 | 1% |

How many HAIs in NZ? Now

- PPS results:
 - HAI rate 6.6%
 - 7.7/100 patients

Rhame and Sudderth (1981)

$$IP = PP \cdot \frac{LA}{LN - INT}$$

- Incidence = 3.9%
- HAIs = incidence x admissions

How many HAIs in NZ? Now

- 2019 DHB adult admissions:
 - Total 480,000
- Number of HAIs: Admissions x incidence (3.9%)
 - **HAIs = 18,720**

Preventing HAIs: 1985, 2011, 2018

- Am J Epidemiology, 1985; 121: 182-205. Haley RW, et al.
- ICHE, 2011; 32: 101-104. Umscheid CA, et al.
- ICHE, 2018; 39: 1277-1295. Schreiber PW, et al.

Preventing HAIs: Original data USA

- Intensive IPC Programmes reduces HAIs (30-35%)
 - Organised surveillance
 - IPC physician
 - IPC nurse/250 beds
 - Feedback SSI rate to surgeons
- With IPC = 32% lower rate
- No IPC = 18% HAI increase 1970-1976

Am J Epidemiology 1985; 121: 182-205. Haley RW, et al.

Preventing HAIs

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY FEBRUARY 2011, VOL. 32, NO. 2

ORIGINAL ARTICLE



Estimating the Proportion of Healthcare-Associated Infections That Are Reasonably Preventable and the Related Mortality and Costs

Craig A. Umscheid, MD, MSCE;^{1,2,3} Matthew D. Mitchell, PhD;¹ Jalpa A. Doshi, PhD;^{1,3}
Rajender Agarwal, MD, MPH;¹ Kendal Williams, MD, MPH;^{1,3} Patrick J. Brennan, MD^{2,3,4}

RESULTS. As many as 65%–70% of cases of CABS and CAUTI and 55% of cases of VAP and SSI may be preventable with current evidence-based strategies. CAUTI may be the most preventable HAI. CABS has the highest number of preventable deaths, followed by VAP. CABS also has the highest cost impact; costs due to preventable cases of VAP, CAUTI, and SSI are likely less.

Preventing HAIs

Infection Control & Hospital Epidemiology (2018), **39**, 1277–1295

doi:10.1017/ice.2018.183



Original Article

The preventable proportion of healthcare-associated infections 2005–2016: Systematic review and meta-analysis

Peter W. Schreiber MD¹, Hugo Sax MD Prof^{1,2}, Aline Wolfensberger MD¹, Lauren Clack PhD¹,
Stefan P. Kuster MD, MSc^{1,2} and Swissnoso^a

¹Division of Infectious Diseases and Hospital Epidemiology, University and University Hospital of Zurich, Zurich, Switzerland and ²Swissnoso, National Center for Infection Control, Bern, Switzerland



Preventing HAIs: ICHE 2018

- 5,226 articles
- 144 included (143 high risk of bias)
- 35-55% reductions possible
- Ratios for **multifaceted** interventions:
 - 0.54 CAUTI
 - 0.46 CLABSI
 - 0.55 VAP
 - 0.46 SSI

How many preventable HAIs in NZ?

- HAIs =18,720

| HAI | PPS % | Number | Preventable | N Preventable? |
|-----------|-------|--------|--|----------------|
| SSI | 25 | 4,680 | 0.46 | 2,150 |
| UTI | 19 | 3,560 | 0.54 of CAUTI $(0.54 \times 0.49) = 0.26$ | 925 |
| Pneumonia | 18 | 3,370 | 0.55 of VAP $(0.55 \times 0.17) = 0.09$ | 303 |
| BSI | 13 | 2,430 | 0.46 of CLABSI $(0.46 \times 0.25) = 0.12$ | 292 |
| Other | 25 | 4,680 | 5%? | 234 |

- Total preventable 3,904 (21%)?

Excess cost and inpatient stay of treating deep spinal surgical site infections

James Barnacle, Dianne Wilson, Christopher Little, Christopher Hoffman, Nigel Raymond

index hospitalisation and 23 (82%) were re-admitted. The average excess SSI cost was NZ\$51,434 (range \$1,398–\$262,206.16) and LOS 37.1 days (range 7–275 days). Infections following metalware procedures had a greater excess cost (average \$56,258.90 vs. \$11,228.61) and LOS (average 40.4 days vs. 9.7 days) than procedures without metalware.

NZMJ 2018; 131: 27-34

**Excess cost associated
with primary hip and knee
joint arthroplasty surgical
site infections: a driver
to support investment
in quality improvement
strategies to reduce
infection rates**

N Gow, C McGuinness, AJ Morris, A McLellan, AE Hardy, JT Munro,
SA Roberts

during the initial admission for joint arthroplasty and 6 patients were readmitted with an SSI. Compared to the control patients, SSIs were associated with an excess mean cost of \$40,121 and an excess mean LOS of 42 days.

NZMJ 1 April 2016, Vol 129 No 1432
ISSN 1175-8716 © NZMA
www.nzma.org.nz/journal

Excess cost associated with *Staphylococcus aureus* poststernotomy mediastinitis

Arlo Upton, Pat Smith, Sally Roberts

Results *S. aureus* PSM was associated with longer average length of hospital stay, 42.6 ± 18.7 vs 10.4 ± 4.0 days ($p=0.005$). The mean cost per patient in New Zealand dollars was $\$30,527 \pm \$10,489$ for controls and $\$76,104 \pm \$31,460$ for cases, and the mean excess cost associated with *S. aureus* PSM was $\$45,677$ per patient.

The excess cost associated with healthcare-associated bloodstream infections at Auckland City Hospital

Andrew Burns, Lesley Bowers, Nick Pak, Jean Wignall, Sally Roberts

admitted as a consequence of this episode of infection, group 2. An episode of HA-BSI increased the length of the hospital admission by 9.7 days and 7.9 days in group 1 and group 2, respectively. The excess cost associated with an episode of HA-BSI was \$20,394 in group 1 and \$11,139 in group 2.

- Group 2= haemodialysis patients

HAIs in NZ: bed days occupied

HAIs =18,720

| HAI | PPS % | N HAIs | xs LOS days ¹ | Total days |
|-----------|-----------------|--------|--------------------------|--|
| SSI | 25 | 4,680 | 9.8 | 45,860 |
| UTI | 19 | 3,560 | 0 | 0 |
| Pneumonia | 18 | 3,370 | 16.3 | 54,930 |
| BSI | 13 | 2,430 | 11.4 | 27,700 |
| Other | (25) 15% | 2,800 | 14.0 | 39,200 |
| Totals | | | | 167,700 ~2.7% all bed days 2018 (460 beds) |

¹ Journal of Hospital Infection 2021; 114: 23e31

Preventing HAIs in NZ: what's the prize?

| HAI | N Preventable | xs LOS days ¹ | Days |
|-----------|---------------|--------------------------|---|
| SSI | 2,150 | 9.8 | 21,070 |
| UTI | 925 | 0 | 0 |
| Pneumonia | 303 | 16.3 | 4,940 |
| BSI | 292 | 11.4 | 3,330 |
| Other | 234 | 14.0 | 3,280 |
| Totals | 3,904 | | 32,620 (90 beds for a year) (19% of all HAI beds) |

¹ Journal of Hospital Infection 114 (2021) 23e31

Preventing HAIs SHEA/IDSA/APIC

- Compendia of recommendations: 2008, 2014
- Highly collaborative effort, above three and:
 - Joint Commission, AHA, Societies, CDC
- Core practices to prevent six HAIs
- Two published 2022, Hand Hygiene 2023, rest in 2023?
- Evidence reviewed
- Section on how to implement

SHEA/IDSA/APIC Practice recommendations (open access)

- **Essential practices** (2014, basic principles)
- **Additional approaches** (2014, special approaches)
- Methods
- Rationale & Statement of concern
- Quality of evidence: high/moderate/low
- Detection of the HAI
- Recommendation strategies (Quality of evidence)
- Not recommended, no recommendation, unresolved
- Process and outcome measures
- Implementation: engage/educate/execute/evaluate

Implementation: engage/educate/execute/evaluate

- **Engage:**

- Multidisciplinary teams, champions, peer networks

- **Educate:**

- Evidence based, active/multifaceted, patients/family, edn. materials

- **Execute:**

- Standardise, daily rounds, redundancy (reminders), family prev. care

- **Evaluate:**

- Measure, real time, feedback, identify barriers

CVC use

- 47% Haem/Onc
- 28% Vascular surgery
- 12% General surgery
- 8% Orthopaedic
- 6% General medicine









Preventing CLABIs: SHEA/IDSA/APIC

Infection Control & Hospital Epidemiology (2022), **43**, 553–569
doi:10.1017/ice.2022.87



SHEA/IDSA/APIC Practice Recommendation

Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update

Niccolò Buetti MD, MSc, PhD^{1,2,a} , Jonas Marschall MD, MSc^{3,4,a} , Marci Drees MD, MS^{5,6} ,
Mohamad G. Fakih MD, MPH⁷ , Lynn Hadaway MEd, RN, NPD-BC, CRNI⁸, Lisa L. Maragakis MD, MPH⁹,
Elizabeth Monsees PhD, MBA, RN, CIC^{10,11} , Shannon Novosad MD MPH¹², Naomi P. O'Grady MD¹³,
Mark E. Rupp MD¹⁴ , Joshua Wolf MBBS, PhD, FRACP^{15,16} , Deborah Yokoe MD, MPH¹⁷ and
Leonard A. Mermel DO, ScM^{18,19} 



Preventing CLABSIs

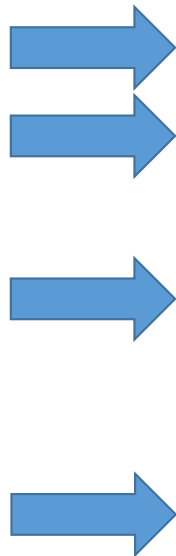
Table 1. Summary of Recommendations to Prevent CLABSI

| Essential Practices |
|--|
| <p><i>Before insertion</i></p> <ol style="list-style-type: none"> 1. Provide easy access to an evidence-based list of indications for CVC use to minimize unnecessary CVC placement (Quality of Evidence: LOW) 2. Require education and competency assessment of HCP involved in insertion, care, and maintenance of CVCs about CLABSI prevention (Quality of Evidence: MODERATE)⁷⁴⁻⁷⁸ 3. Bathe ICU patients aged >2 months with a chlorhexidine preparation on a daily basis (Quality of Evidence: HIGH)⁸⁶⁻⁹⁰ <p><i>At insertion</i></p> <ol style="list-style-type: none"> 1. In ICU and non-ICU settings, a facility should have a process in place, such as a checklist, to ensure adherence to infection prevention practices at the time of CVC insertion (Quality of Evidence: MODERATE)¹⁰¹ 2. Perform hand hygiene prior to catheter insertion or manipulation (Quality of Evidence: MODERATE)¹⁰²⁻¹⁰⁷ 3. The subclavian site is preferred to reduce infectious complications when the catheter is placed in the ICU setting (Quality of Evidence: HIGH)^{33,37,108-110} 4. Use an all-inclusive catheter cart or kit (Quality of Evidence: MODERATE)¹¹⁸ 5. Use ultrasound guidance for catheter insertion (Quality of Evidence: HIGH)^{119,120} 6. Use maximum sterile barrier precautions during CVC insertion (Quality of Evidence: MODERATE)¹²³⁻¹²⁸ 7. Use an alcoholic chlorhexidine antiseptic for skin preparation (Quality of Evidence: HIGH)^{42,129-134} <p><i>After insertion</i></p> <ol style="list-style-type: none"> 1. Ensure appropriate nurse-to-patient ratio and limit use of float nurses in ICUs (Quality of Evidence: HIGH)^{34,35} 2. Use chlorhexidine-containing dressings for CVCs in patients over 2 months of age (Quality of Evidence: HIGH)^{45,135-142} 3. For non-tunneled CVCs in adults and children, change transparent dressings and perform site care with a chlorhexidine-based antiseptic at least every 7 days or immediately if the dressing is soiled, loose, or damp. Change gauze dressings every 2 days or earlier if the dressing is soiled, loose, or damp (Quality of Evidence: MODERATE)¹⁴⁵⁻¹⁴⁸ 4. Disinfect catheter hubs, needleless connectors, and injection ports before accessing the catheter (Quality of Evidence: MODERATE)¹⁵⁰⁻¹⁵⁴ 5. Remove nonessential catheters (Quality of Evidence: MODERATE) 6. Routine replacement of administration sets not used for blood, blood products, or lipid formulations can be performed at intervals up to 7 days (Quality of Evidence: HIGH)¹⁶⁴ 7. Perform surveillance for CLABSI in ICU and non-ICU settings (Quality of Evidence: HIGH)^{13,165,166} |
| <p>Additional Approaches</p> <ol style="list-style-type: none"> 1. Use antiseptic- or antimicrobial-impregnated CVCs (Quality of Evidence: HIGH in adult patients^{38,39,169-171} and Quality of Evidence: MODERATE in pediatric patients)^{172,173} 2. Use antimicrobial lock therapy for long-term CVCs (Quality of Evidence: HIGH)¹⁷⁷⁻¹⁸⁴ 3. Use recombinant tissue plasminogen activating factor (rt-PA) once weekly after hemodialysis in patients undergoing hemodialysis through a CVC (Quality of Evidence: HIGH)¹⁹⁰ 4. Utilize infusion or vascular access teams for reducing CLABSI rates (Quality of Evidence: LOW)^{193,194} 5. Use antimicrobial ointments for hemodialysis catheter insertion sites (Quality of Evidence: HIGH)¹⁹⁷⁻²⁰¹ 6. Use an antiseptic-containing hub/connector cap/port protector to cover connectors (Quality of Evidence: MODERATE)²⁰²⁻²⁰⁸ |

Preventing CLABSIs

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Preventing CLABSIs: Essential Practices

Before insertion

1. **Provide easy access to an evidence-based list of indications for CVC use to minimize unnecessary CVC placement** (Quality of Evidence: LOW)
2. **Require education and competency assessment of healthcare personnel (HCP) involved in insertion, care, and maintenance of CVCs about CLABSI prevention** (Quality of Evidence: MODERATE)⁷⁴⁻⁷⁸
 - a. Include the indications for catheter use, appropriate insertion and maintenance, the risk of CLABSI, and general infection prevention strategies.
 - b. Ensure that all HCP involved in catheter insertion and maintenance complete an educational program on essential practices to prevent CLABSI before performing these duties.^{79,80}
Periodic retraining with a competency assessment may be of benefit.⁸¹



Preventing CLABSIs: Essential Practices

3. **Bathe ICU patients >2 months of age with a chlorhexidine preparation on a daily basis** (Quality of Evidence: HIGH)⁸⁶⁻⁹⁰
 - a. In long-term acute-care hospitals (LTACHs), daily chlorhexidine bathing may also be considered as a preventive measure.⁹¹
 - b. The role of chlorhexidine bathing in non-ICU patients remains unclear.^{92,93} One cluster-randomized study found

Preventing CLABSIs: Essential Practices

At insertion

1. **In ICU and non-ICU settings, a facility should have a process in place, such as a checklist, to ensure adherence to infection prevention practices at the time of CVC insertion** (Quality of Evidence: MODERATE)¹⁰¹
 - a. Ensure and document adherence to aseptic technique
 - i. Checklists have been suggested to ensure optimal insertion practices. If used, the documentation should be done by someone other than the inserter.
 - ii. Observation of CVC insertion should be done by a nurse, physician, or other HCP who has received appropriate education (see above) to ensure that aseptic technique is maintained.
 - iii. HCP should be empowered to stop the procedure if breaches in aseptic technique are observed.
2. **Perform hand hygiene prior to catheter insertion or manipulation** (Quality of Evidence: MODERATE)¹⁰²⁻¹⁰⁷
 - a. Use an alcohol-based waterless product or soap and water.
 - i. Use of gloves does not obviate hand hygiene.
3. **The subclavian site is preferred to reduce infectious complications when the catheter is placed in the ICU setting** (Quality of Evidence: HIGH)^{33,37,108-110}

Preventing CLABSIs: Essential Practices



4. **Use an all-inclusive catheter cart or kit** (Quality of Evidence: MODERATE)¹¹⁸
 - a. A catheter cart or kit that contains all necessary components for aseptic catheter insertion should be available and easily accessible in all units where CVCs are inserted.
5. **Use ultrasound guidance for catheter insertion** (Quality of Evidence: HIGH)^{119,120}
 - a. Ultrasound-guided internal jugular and femoral vein catheterization reduces the risk of noninfectious complications associated with CVC placement¹²¹ but the use of ultrasound may lead to a breach in aseptic technique.¹²²
 - b. It is unclear whether ultrasound-guided subclavian vein insertion reduces risk of infectious complications.

Preventing CLABSIs: Implementation

- Integrating best practices
- Incorporating a culture supporting implementation
- Four Es:
 - Engage: champions/stakeholders
 - Educate: HCWs, patients
 - Execute: checklists, etc
 - Evaluate: process/outcome data

Devices

| Device type | Device present | % all patients |
|-------------|----------------|----------------|
| Any | 3,585 | 66 |
| PVC | 2,922 | 53 |
| CVC | 549 | 10 |
| IDC | 967 | 18 |
| Ventilation | 52 | 1 |

Sources of healthcare-associated *Staphylococcus aureus* bacteraemia in New Zealand acute hospitals

Ruth Barratt, Grace Clendon, Barbara Gibson, Sally A Roberts

- January 2017 to June 2021
- 1,887 HA-SAB; 1,575 complete data
 - **Devices 65%**
 - SSI 12%
 - No source ID 13%
 - Other 22%

- NZMJ 2022 Oct 7; 135(1563). ISSN 1175-8716

Sources of healthcare-associated *Staphylococcus aureus* bacteraemia in New Zealand acute hospitals

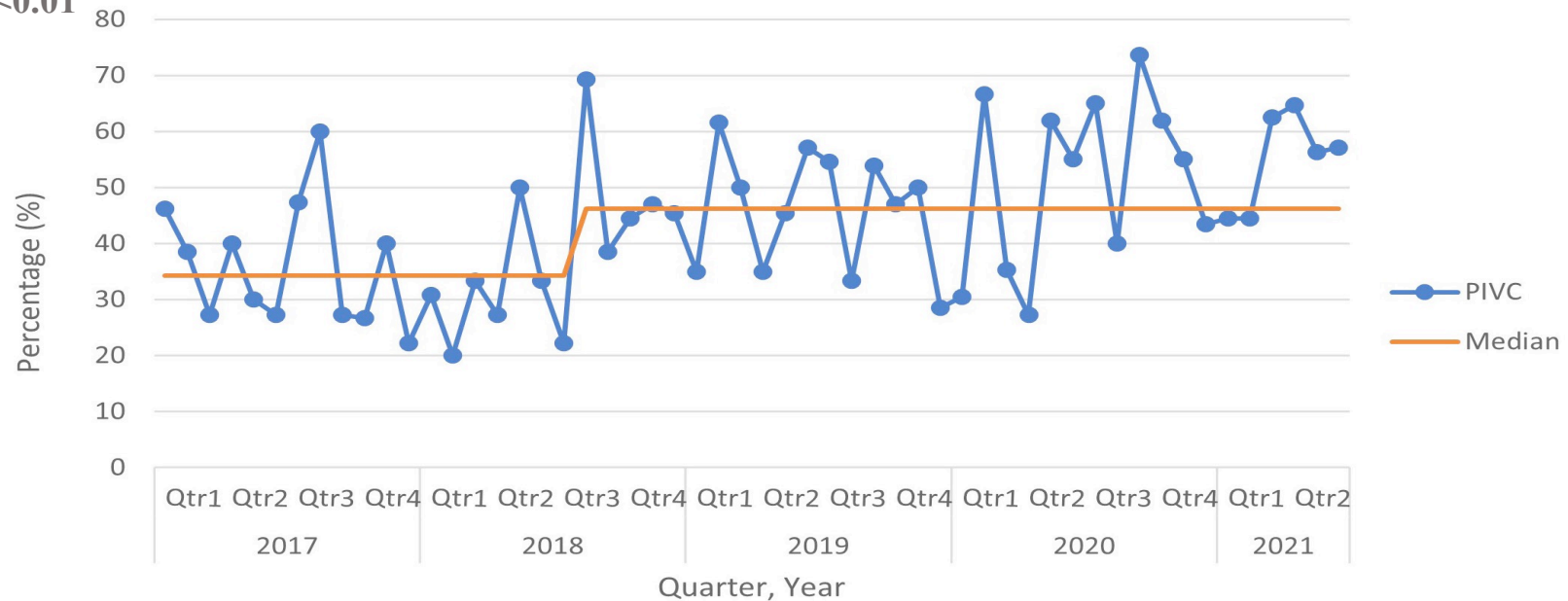
Ruth Barratt, Grace Clendon, Barbara Gibson, Sally A Roberts

- Devices:
 - CVC 50%
 - PVC 45%
 - IDC 3%
- Proportion HA-SAB due to devices increased 60% to 70%
- NZMJ 2022 Oct 7; 135(1563). ISSN 1175-8716

Sources of healthcare-associated *Staphylococcus aureus* bacteraemia in New Zealand acute hospitals

Ruth Barratt, Grace Clendon, Barbara Gibson, Sally A Roberts

PIVC-related HA-SAB as a percentage of total HA-SAB events by quarter, 2017–2021: 34% to 46%, $p < 0.01$



- NZMJ 2022 Oct 7; 135(1563). ISSN 1175-8716



AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE



- ~8m patients get PIVC/year
- ~70% of hospital patients get an PIVC
- 1:3 adults have “difficult” veins
- 40% patients need >1 attempt
- 50% emergency department PVICs not used
- ~70% removed because of complications

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE



- Endorsed by 19 organisations
- 10 quality statements
 - #2: Inform and partner with patients
 - #3: Ensure competency
 - #7: Document decisions and care
 - #9: Review ongoing need (remember the patient histories)
 - #10: Remove safely and replace if needed

3

Ensure competency

Indicator 3: Evidence of a locally approved policy that ensures healthcare professionals are competent in PIVC insertion, monitoring, and removal. The policy should specify the:

- Competency a clinician must demonstrate to insert a PIVC, including for more complex and technology-assisted insertions
- Competency a clinician must demonstrate to monitor and remove PIVCs
- Organisation's process to assess and monitor the ongoing competency of clinicians, including for more complex insertions
- Organisation's process to assess adherence to the policy.

■ For clinicians

Review and document the ongoing clinical need for a patient's PIVC at least once per day, or more often if clinically indicated. Review whether switching from IV to oral therapy is possible. Remove the PIVC immediately if it is no longer required.^{12,15,16,18,23,34}

If extended IV therapy is anticipated, consider whether an alternative device, such as a peripherally inserted central catheter or central line, should be inserted (see quality statement 1).

■ For health service organisations

Ensure that policies are in place which describe the need for at least daily review of ongoing need for IV access, and for immediate removal of PIVCs when they are no longer needed.^{12,15,16,18,34}

Remove safely

In considering the above factors, healthcare facilities may routinely follow one of the following two options:

Option 1: Replace a PIVC every 72 hours

This practice is based on observational studies that show an increased risk of bloodstream infection with PIVCs left in place for more than 72 hours.

Option 2: Replace a PIVC based on clinical indication

A strategy of replacing a PIVC when a clinical indication for replacement is identified (rather than routinely at 72 hours) may be considered only when there is:

- Surveillance of PIVC-related bloodstream infection performed at the facility
- Comprehensive documentation of insertion, maintenance and removal of PIVCs (audit results demonstrate a sustained compliance with daily PIVC assessment documentation)
- Compliance with competency requirements for insertion and management.



Preventing VAP & nv-HAP: SHEA/IDSA/APIC

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SHEA/IDSA/APIC Practice Recommendation

Strategies to prevent ventilator-associated pneumonia, ventilator-associated events, and nonventilator hospital-acquired pneumonia in acute-care hospitals: 2022 Update

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Preventing VAP/nv-Hospital Acquired Pneumonia

- Separate adult/neonate/paediatric sections
 1. Despite pneumonia's clinical importance, our ability to conduct accurate pneumonia surveillance is very limited.
 - a. Pneumonia is usually defined by clinical, radiographic, and microbiological criteria. These signs are neither sensitive nor specific relative to histopathology.^{6,38-40} In addition, the signs and symptoms used to diagnose pneumonia are subjective, which leads to substantial interobserver variability.^{8,12,13,41-43} Administrative data are similarly inaccurate.^{11,44-47} Improvements in VAP rates do not reliably correlate with improvements in outcomes.^{48,49}
 - i. The weaknesses of traditional pneumonia surveillance definitions limit their utility for measuring the impact of care improvement programs and for benchmarking quality of care between different healthcare facilities.⁵⁰⁻⁵³



Preventing VAP/VAEs Adults

Table 2. Summary of Recommendations to Prevent VAP and/or VAE in Adult Patients

| Category | Rationale |
|--|---|
| Essential practices | Good evidence that the intervention decreases the average duration of mechanical ventilation, length of stay, mortality, and /or costs. Benefits likely outweigh risks. |
| Intervention | Quality of Evidence |
| Avoid intubation and prevent reintubation • Use high-flow nasal oxygen or noninvasive positive pressure ventilation (NIPPV) as appropriate whenever safe and feasible ^{91-93,96,99} | HIGH |
| Minimize sedation ^{105,106} • Avoid benzodiazepines in favor of other agents ¹⁰⁶ • Use a protocol to minimize sedation ¹¹⁰ • Implement a ventilator liberation protocol ¹¹³ | MODERATE |
| Maintain and improve physical conditioning ^{113,120-123} | MODERATE |
| Elevate the head of the bed to 30-45° ^{125,388-390} | LOW ^a |
| Provide oral care with toothbrushing but <i>without</i> chlorhexidine ^{126,127} | MODERATE |
| Provide early enteral vs. parenteral nutrition ¹³¹ | HIGH |
| Change the ventilator circuit only if visibly soiled or malfunctioning (or per manufacturers' instructions) ³⁹¹⁻³⁹⁴ | HIGH |

Preventing NV-Hospital Acquired Pneumonia

Recommendations to prevent NV-HAP

Little robust data exist on interventions to prevent NV-HAP. Most studies are nonrandomized, and many do not report the impact on objective outcomes such as length of stay, mortality, or antibiotic utilization. We classify potential prevention strategies into (1) practices supported by interventional studies suggesting lower NV-HAP rates, (2) practices with insufficient data of benefit or harm, and (3) practices that are not recommended, with evidence of futility or possible harm.

Preventing NV-Hospital Acquired Pneumonia

- May lower NV-HAP, little risk of harm:
 - Oral care: brush teeth
 - Dx and manage dysphagia
 - Early mobilization
 - Prevent viral infections
 - Bundles

Preventing VAP/nv-Hospital Acquired Pneumonia

- Prevention bundles:
 - 13 observational studies ~10% mortality decrease
 - 1 RCT no difference
 - No consensus on bundle components
 - Compliance all or none?

HOW?

- Problem statement
- Solutions
- Te Whatu Ora
- Clinical Governance
- Quality and risk
- Colleges
- Stakeholders
- Behavioural science

HOW?

- IPC can't do it (without huge investment)
- IPC: subject matter and methodology experts
- SSI: Surgeons, sub-specialties
- CLABSI: ANZ College Anaethetists, but CVCs used in many services
- PIVC: all clinical services
- VAP: ICUs
- nVAP: ignore?
- CAUTI: ignore? but 15% BSIs

US CDC 2021 HAI Report

- >38,000 facilities
- 2021: 1 in 31 patients in Acute US hospitals get HAI (incidence 3.2%)

Changes in SIRs among acute care hospitals from 2020 to 2021 include:

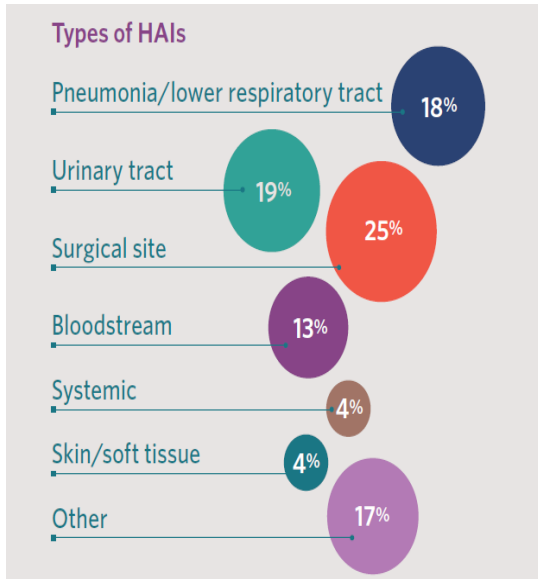
- 14% increase in methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia
- 12% increase in ventilator-associated events (VAE)
- 11% increase in surgical site infections (SSIs) following abdominal hysterectomy
- 7% increase in central line-associated bloodstream infections (CLABSI)
- 5% increase in catheter-associated urinary tract infections (CAUTI)
- 3% decrease in *C. difficile* infection

Original Article

The preventable proportion of healthcare-associated infections 2005-2016: Systematic review and meta-analysis

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| Device type | % all patients |
|-------------|----------------|
| Any | 66 |
| PVC | 53 |
| CVC | 10 |
| IDC | 18 |
| Ventilation | 1 |

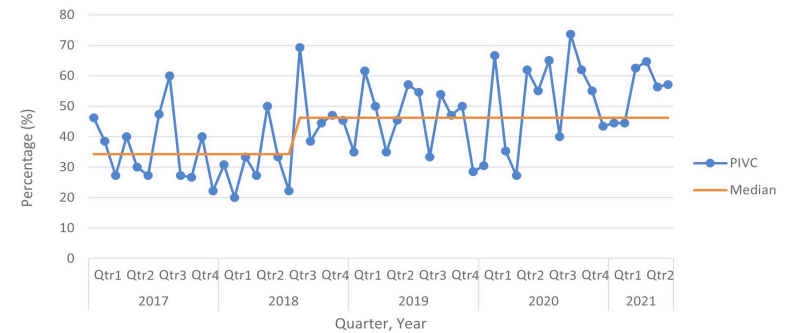


SHEA/IDSA/APIC Practice Recommendation

Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update

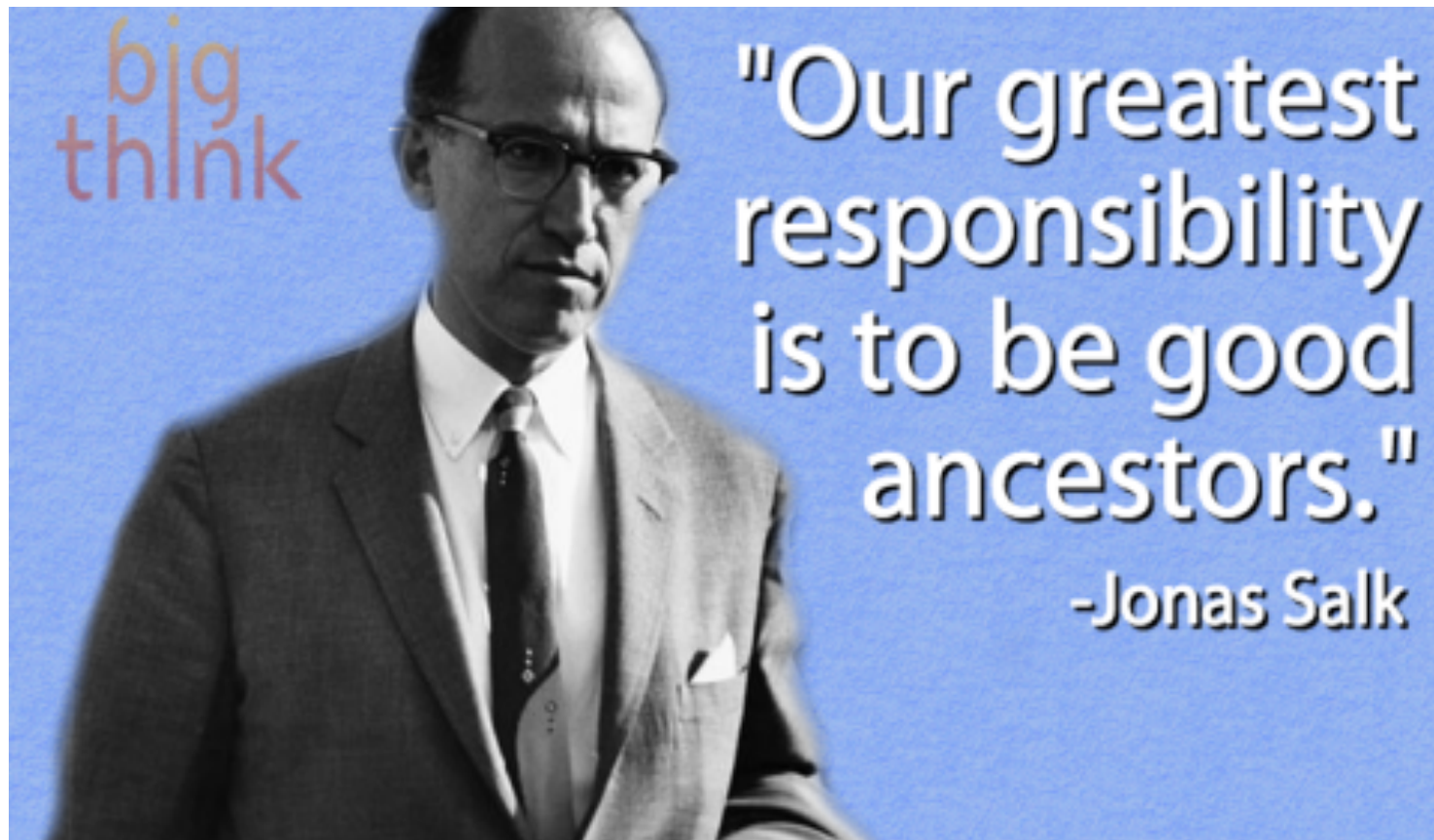
Niccolò Buetti MD, MSc, PhD^{1,2,4}, Jonas Marschall MD, MSc^{3,4,6}, Marci Drees MD, MS^{5,6}, Mohamad G. Fakih MD, MPH⁷, Lynn Hadaway MEd, RN, NPd-BC, CRNI⁸, Lisa L. Maragakis MD, MPH⁹, Elizabeth Monsees PhD, MBA, RN, CIC^{10,11}, Shannon Novosad MD MPH¹¹, Naomi P. O'Grady MD¹², Mark E. Rupp MD¹⁴, Joshua Wolf MBBS, PhD, FRACP^{15,16}, Deborah Yokoe MD, MPH¹⁷ and Leonard A. Mermel DO, ScM^{18,19}

SHEA/IDSA/APIC Practice Recommendation: Strategies to prevent healthcare-associated infections through hand hygiene: 2022 Update



Summary

- ~7% patients have HAI
- ~4% of admissions develop HAI
- SSI/UTI/BSI/pneumonia = 74% all HAI
- Evidence based preventive strategies exist
 - But <50% HAIs are device or surgery related
- More SHEA/IDSA/APIC strategies in 2023
- National approach needed based on:
 - Frequency/preventability
 - Cost-effectiveness



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