Evidence for Infection Prevention & Control – problems of design and implementation

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Epic3 Guidelines

• Standard Principles
  – Hospital Hygiene
  – Hand Hygiene
  – Use of PPE
  – Use and Disposal of Sharps
  – Asepsis

• Short-term Indwelling Urethral Catheters

• Intravascular Access Devices
  – Central venous
  – Peripheral vascular
Evidence Identification & Quality Appraisal

- Stakeholder scoping
- Protocol
- Search for Guidelines
- AGREE
- Search Peer Reviewed Studies
- Sift Select and Appraise
- Data Extraction

SIGN Methodology
Included study designs

- Primary research
  - RCT, Cluster RCT, non-randomised trial, prospective cohort, interrupted time series, controlled before and after studies.

- Secondary research
  - Systematic reviews and meta-analysis
Levels of Evidence (Studies)

1++ High quality meta-analyses, systematic reviews of RCTs or RCTs with a very low risk of bias

1+ Well conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias

2++ High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.

2++ Interrupted time series with a control group (i) there is a clearly defined point in time when the intervention occurred and (ii) at least three data points before and three after the intervention.

2+ Well-conducted case control or cohort studies: low risk of confounding or bias and a moderate probability that the relationship is causal. Controlled before after studies with two or more intervention and control sites.

4 Expert opinion, Legislation
Levels of Evidence (Studies)

1 - Meta-analyses, systematic reviews, or RCTs with a high risk of bias*

✗

2 - Case control or cohort studies: high risk of confounding or bias and a significant risk that the relationship is not causal. ITS without a parallel control group (i) there is a clearly defined point in time when the intervention occurred and (ii) at least three data points before and three after the intervention. Controlled before after studies with one intervention and one control site.

✗

3 - Non-analytic studies, e.g., uncontrolled before-after studies, case reports, case series

✗
SIGN – Recommendation Grades (2012)

A. At least one meta-analysis, systematic review, or randomized controlled trial (RCT) rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results.

B. A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+

C. A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++

D. Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+
Guideline Consultation & Accreditation

- Draft Guideline
- GDAG
- Consultation
- Revision
- Policy Research Programme Review
- Final Guidelines
- NICE Accreditation
Issues for the quality of evidence

- Study design – often ‘convenience’ designs, single centre, before and after studies without control or in single centres; interrupted time series with too few measures before and after interventions;
- Heterogeneity of study settings;
- Heterogeneity of interventions – not all CHG is the same 2% 4%; impregnated cloths, liquid (Hibiscrub);
- Confounding interventions e.g., other quality improvement measures/ bundles, types of catheter inserted, cutaneous antisepsis
Implementation studies

• Generally descriptive but often with inadequate description of the intervention and context;
• Baseline measurement is omitted (need more than one);
• Measurement is often focused on process not outcome;
• Multiple interventions rolled out at the same time.
Evidence translated?

- The Evidence
- The Guideline
- Change
- Desired Outcome
The problem

- Infection prevention and control is seen as an additional task
  - Not embedded in ‘the real task’ of patient care, seen by staff as a distraction or interruption. It slows down patient care.
  - Benefits not visible or immediate
  - Harms are distant and not associated with ‘individual’ ‘team’ or ‘system’ errors

- Staff develop work arounds or ‘shadow systems’ to achieve the ‘task’
Rationale for the use of clinical gloves

- Universal precautions (1987)
- Standard precautions (mid-1990s)
  - The evidence base is categorized as 4 (Expert opinion, Legislation)
Why does glove use matter?

• Compromises hand hygiene
  – HH audit data misleading as does not account for gloves use
  – Gloves used in place of hand gel

• Costs
  – £302,813 in 2013/14 in one 500 bed acute NHS Trust

• Environmental damage
  – disposed of as clinical waste when mostly not contaminated with BBF!
If gloves are worn…

Must be changed between patients
Must be changed between procedures
Decontaminate hands after removal
Gloves worn inappropriately and associated with less hand hygiene

“The Dirty Hand in the Latex Glove”: A Study of Hand Hygiene Compliance When Gloves Are Worn

Christopher Fuller, MSc\(^1\) Joanne Savage, MSc\(^1\) Sarah Besser, MSc\(^2\) Andrew Hayward, MD\(^3\)
Barry Cookson, FRCPATH\(^2\) Ben Cooper, PhD\(^3\) Sheldon Stone, MD\(^3\)

**Background and Objective.** Wearing of gloves reduces transmission of organisms by healthcare workers’ hands but for hand hygiene. Results of previous studies have varied as to whether hand hygiene is worse when gloves are worn. In this study, we used small and used nonstandardized assessments of glove use and hand hygiene. We sought to observe whether glove use was appropriate and whether hand hygiene compliance differed when gloves were worn.

**Design.** Observational study.

**Participants and Setting.** Healthcare workers in 56 medical or care of the elderly wards and intensive care units across England and Wales.

**Methods.** We observed hand hygiene and glove usage (7,578 moments for hand hygiene) during 249 one-hour sessions. We recorded whether gloves were or were not worn for individual contacts.

- 7578 moments of HH
- Gloves worn for 26.7%
- 16.7% of moments when gloves were low risk
- HH after glove use 40%; no glove use 50% (p<0.01)

Fuller et al 2011, ICHE
Gloves become contaminated with pathogens

Misuse of gloves: the foundation for poor compliance with hand hygiene and potential for microbial transmission?

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- Observed 120 HCW
- 64% gloves not changed, after contact
- 18.3% potential microbial transmission
- 22 gloves sampled: 100% grew bacteria, 86% grew pathogens; 59% same m’org as patient.

Girou et al 2004, JHI
Moments of HH associated with cross-contamination

- Moment 1: 13%
- Moment 2: 27%
- Moment 3: 10%
- Moment 4: 16%
- Moment 5: 34%
‘Moments’ - breached

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</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

0 10 20 30 40 50 60
1
2
3
4
## Episodes of glove use

### IV drugs
- Prepare IV fluids in drug room
- Press button to open door
- Push door open
- Carry drug to bedside

### Central IV line flush and disconnection
1. Equipment trolley
2. Central line flush
3. IV monitor
4. Central line
5. IV infusion lines
6. Central line flush
7. IV pump
8. IV lines discarded into waste bin
9. Bed controls
10. IV pump

### Same gloves: more than one task
- NG feed flush
- Urine catheter
- ET suctioning
- Emptied catheter bag
- Gave patient mouth care
- Checked patients blood sugar
Main drivers of glove use – qualitative studies

- **Barrier – psychological**: Contentment, Disgust, Fear
- **Barrier - physical**: Policy, Time-saving, Availability, Attitudes, Conformity

**SOCIALISATION**
- **Professional**: Peers, Training, Experience, Habit
- **Organisational**: Stigma, Barrier to touch, Expectations, Preference (patents), Preference (staff)
- **Empathetic**: Emotion

**EMOTION**
What have we learnt?

• Multiple factors influence the decision to put on and take off gloves; evidence is not one of them!
• The emotional element of glove use behaviour might impact on the effectiveness of educational and other initiatives to improve appropriate glove use.
• Conflict between influencing factors may result in confusion among HCWs about what constitutes appropriate glove use.
• HCWs are influenced by their assumptions about patient expectations of glove use.
Explaining Matching Michigan: an ethnographic study of a patient safety program

Mary Dixon Wood,1,2 Myles Leland,1,3 Corinna Tannen1 and Julian Brach3,4

Abstract: Background: Innovative interventions in healthcare often display two disconcerting effects. The first is a failure to sustain the secular trend. The second is the decline effect wherein an initially promising intervention appears not to deliver equally successful results when attempts are made to replicate it in new settings. The Michigan patient safety program (PSIP) was implemented in over 100 Michigan intensive care units (ICUs) in England. In the context of these apparent effects, this study investigated factors that contributed to the consistency of the Michigan PSIP. Methods: We conducted in-depth, semi-structured interviews with 27 staff who administered program training events and we analyzed relevant documents. Results: One Matching Michigan unit transformed its practices and culture in response to the program. The boost in unit-level efforts, and 11 made little change. Matching Michigan’s impact may have been limited by features of program design and execution. It was not an exact replica of the original project. Over time inner contexts constantly modified the program effects. The outer context included previous efforts to tackle central line infections superimposed upon national infection control policies that were perceived by some as top-down and punitive. This undermined engagement in the program and made it difficult to persuade participants that the program was necessary. Individual ICU factors and local context were also highly consequential in the experience of quality improvement. The extent to which they were able to drive high-quality data collection and feedback systems, and the success of local leaders in developing consensus and coalition all influenced the program’s impact on local practices. Conclusions: Improved implementation of proactive good practice may occur through many different routes, of which program participation is only one. The intervention of programme may mean that other routes are also through different pathways. When designing and delivering interventions to improve quality and safety, risks of decline effects and difficulties in achieving an improved uptake of program mechanisms and contexts of implementation. Keywords: Patient safety, improvement programs, Context, Ethnography, Healthcare-acquired Infections.
A Multicenter Qualitative Study on Preventing Hospital-Acquired Urinary Tract Infection in US Hospitals


OBJECTIVE: Although urinary tract infections (UTI) are the most common hospital-acquired infection, there is little information about why hospital staff do not use a range of available preventive practices. We thus conducted a multicenter study to understand better how US hospitals approach the prevention of hospital-acquired UTIs.

METHODS: This research is part of a larger study employing both quantitative and qualitative methods. The qualitative phase consisted of 58 semi-structured paired interviews with key personnel at 16 profoundly sampled US hospitals and 24 in-person interviews at 3 of those 16 hospitals, to identify recurrent and recurring themes that characterize how low UTI hospitals have addressed hospital-acquired UTIs.

RESULTS: Our recurrent themes emerged from our study data. First, although preventing hospital-acquired UTIs was a low priority for most hospitals, there was substantial recognition of the value of early noticing of a urinary catheter for patients. Second, those hospitals that made UTI prevention a high priority also focused on eliminating complications and had contested admission, or a "champion," who facilitated prevention activities. Third, hospital-specific pilot studies were important in deciding whether or not to use devices such as chlorhexidine dressing or catheter. Finally, formal committees, such as a pharmacy meeting, facilitated prevention activities.

CONCLUSIONS: Citizen and policy makers can use our findings to develop initiatives that, for example, use a champion to promote the removal of unnecessary urinary catheters or explicit external factors, such as strict patient safety policies.

Infectious diseases caused during hospitalization are common, costly, and associated with significant morbidity. Urinary tract infections (UTIs) are the most common hospital-acquired infection, accounting for about 48% of all nosocomial infections. Many hospital-acquired UTIs are caused by the use of a urinary catheter, a commonly used device among hospitalized patients. Hospital-acquired UTIs can be prevented by using indwelling catheters only when necessary, implementing reminder systems to get urine samples as soon as possible, using antimicrobial-impregnated catheters in high-risk patients, and considering alternatives to Foley catheters (such as suprapubic catheters).

While numerous reviews have been published evaluating UTI preventive practices and recommending which methods to use," the use of these practices varies considerably across the United States. What accounts for this variation? We conducted a multicenter study that employed both quantitative and qualitative methods to answer this question. In the qualitative phase of the study, we identified recurrent and recurring themes that characterize how low UTI hospitals have addressed hospital-acquired UTIs. We used qualitative methods because they are oriented toward understanding, rather than measuring, phenomena. Because data collection is open-ended, research participants are free to express themselves in their own words—qualitative studies involve a process of discovery. Through detailed, in-depth analysis of the resulting data, we can find out what makes hospital UTI environments different, and find out what makes hospital UTI environments different.

METHODS: Study Design and Sample

As part of a larger 3-phase sequential study employing both quantitative and qualitative methods, we first collected and analyzed quantitative data on a national sample of hospitals to report what hospitals are doing to prevent hospital-acquired infections, including UTI. Details of this study are explained elsewhere. Finally, the quantitative phase of the study involved a national sample of hospitals.

ABSTRACT

Catheter-associated urinary tract infection (UTI) is a common device-associated infec-
tion in hospitals. Catheter-associated UTIs—apparently catheter use, acute infection, and proper maintenance—and some diagnostic factors, such as cortisol and behavioral changes in hospital units, are important in preventing catheter-associated UTIs.

METHODS: The National Comprehensive Unit-based Safety Program, funded by the Agency for Healthcare Research and Quality, aimed to reduce catheter-associated UTIs in intensive care units (ICUs) and acute care units (ACUs). This program was designed to disseminate information to sponsor organizations and hospitals, data collection, and guidelines, on device use, and the optimization of catheter-associated UTIs. Data on catheter use and catheter-associated UTI rates were collected from three phases (aerobic, 6 months; intermediate, 6 months; and sustainability, 6 months). Multinomial logistic models were used to assess changes in catheter use and catheter-associated UTI rates.

RESULTS: Data were obtained from 169 units (53.7%) were non-ICUs and 48.3% were ICUs in 683 hospitals in 32 states, the District of Columbia, and Puerto Rico. The unadjusted catheter-associated UTI rate decreased overall from >2.23 to 1.54 infections per 1000 catheter-days in non-ICUs and from 2.23 to 1.54 infections per 1000 catheter-days in ICUs. After adjusting for age, sex, hospital-type, and other factors, both catheter-associated UTI rate decreased significantly (p <0.05) for both catheter using and non-catheter using units. Catheter use and catheter-associated UTI rates were large reductions in ICUs. Tests for heterogeneity (ICU vs. non-ICU) are significant for a catheter use and non-catheter-associated UTI rates (p <0.05). Catheterization-associated UTI rates were large reductions in ICUs. Tests for heterogeneity (ICU vs. non-ICU) are significant for a catheter use and non-catheter-associated UTI rates (p <0.05). Catheterization-associated UTI rates were large reductions in ICUs. Tests for heterogeneity (ICU vs. non-ICU) are significant for a catheter use and non-catheter-associated UTI rates (p <0.05). Catheterization-associated UTI rates were large reductions in ICUs. Tests for heterogeneity (ICU vs. non-ICU) are significant for a catheter use and non-catheter-associated UTI rates (p <0.05).
Operating-theatre staff at ten UK hospitals were interviewed about the barriers to implementing the World Health Organization surgical checklist. The biggest problems were:

- Staff resisted or failed to complete the checklist. 
  
  "When the surgeons weren’t on board you were told to ‘Oh shut up and let’s get on with it.’"

- The checklist was inappropriate or illogical.
  
  "It’s a bit bizarre and there’s a sense of, I’m not actually progressing the patient care with this question."

- The checklist was thought to waste time.
  
  "Yet more delay! Oh gosh, we’re going to get less work done for the patients."

An easy method that promised to save lives in hospitals worldwide may not be so simple after all.

BY EMILY ANTHES

Humans are allergic to change. They love to say, 'We've always done it this way.' I try to fight that. That's why I have a clock on my wall that runs counter-clockwise.

— Grace Hopper —
ABSTRACT

Background
Peripheral intravenous device (IV) complications were traditionally thought to be reduced by limiting dwell time. Current recommendations are to replace IVs by 96 hours with the exception of children and patients with poor veins. Recent evidence suggests routine replacement is unnecessary, at least 7 days are inserted by a trained IV team. The aim of this study was to compare the impact of peripheral IV routine with removal on clinical indications on IV complications in a general hospital without an IV team.

Methods: A randomised, controlled trial was conducted in a regional teaching hospital. After ethics approval, 152 patients (96 IVs) were randomised to have IVs replaced on clinical indication (IVPIR patient) or routine change every 3 days (IVPIR patient). IVs were inserted and managed by the general hospital medical and nursing staff. There was no IV team. The primary endpoint was a composite of IV-related complications: phlebitis, infiltration, occlusion, accidental removal, local infection, and device-related bloodstream infection. IVPIR

Results:
IVPIR complication rates were 66.8% per 1 000 device years (clinically indicated) and 66.8% per 1 000 device years (routine replacement) (P = 0.86; 95% CI 0.74-1.0). Time to first IVPIR per patient did not differ between groups (KM with log rank, P = 0.58). There were no IV-related bloodstream infections in either group. IV therapy duration did not differ between groups (P = 0.27), but more (P = 0.001) IVs were placed in the routine replacement group (141 IVs had the clinical indication group mean, 1.5) with high proportion of patients with higher hospital costs per patient (P < 0.001).

Conclusions: IVPIR on clinical indication would allow one to five patients to have a single cannula per course of IV treatment, as opposed to one in five patients managed with routine routine overall complication rates appear similar. Clinically indicated IVPIR would achieve savings in equipment, staff time and patient discomfort. There is growing evidence to support the extended use of peripheral IVs with removal only on clinical indications.

Registration number: Australian New Zealand Clinical Trials Registry (ANZCTR) number ACTRN12600000413556.

ABSTRACT

Background
Peripheral intravenous device (IV) insertion is the most commonly performed invasive procedure in hospitalised patients with an estimated 150 million peripheral intravenous devices placed each year in the United States [1]. IVs are vital for delivery of hydration, medication and nutrition but are not without complications. Serious adverse outcomes are fortunately rare, with IV-related bloodstream infection reported in a recent meta-analysis of 136 studies to occur in 0.18% of devices and 0.05-0.15% of insertion days (2). IV treatment is more frequently intermittent by phlebitis, pain, tenderness or palpation, erythema, warmth, redness, inflammation or palpable cord (3). The cumulative risk of IV-related bloodstream infections is about 0.02% in moderate-risk units (4). Risk factors include prolonged dwell time, type of central catheters, and patient risk factors (5). This review updates a previous Cochrane systematic review that included studies up to May 2010 to consider any new evidence since then (6). The main objective of this review is to examine the body of clinical trial evidence comparing clinically indicated versus routine replacement of peripheral IVs.

Objectives
To assess the effectiveness and safety of clinically indicated versus routine replacement of peripheral IVs.

Search methods
We searched the Cochrane Vascular Trials Register (The Cochrane Library, Issue 9, 2010) and CENTRAL (The Cochrane Library, Issue 3, 2010) for studies published in English, French and Spanish. We updated the Cochrane Vascular Trials Register with records identified in CENTRAL and The Cochrane Library, Issue 11, 2010. We searched CENTRAL, Embase, MEDLINE, CINAHL, LILACS, and the web sites of all national and international societies. We scanned the reference lists of all eligible studies for further eligible studies.

Selection criteria
Randomised controlled trials that compared routine removal of peripheral IVs with removal only when clinically indicated in hospitalised or community dwelling patients receiving continuous or intermittent infusions were eligible for inclusion.

Data collection and analysis
Two reviewers independently assessed trial quality and extracted data.

Main results
Seven trials with a total of 4586 patients were included in the review. The quality of these studies was high for most outcomes and was disappointing for the outcomes catheter-related bloodstream infection (CRBI). The CRBI results were not considered conclusive, and therefore a level of uncertainty around the effect estimate. CRBI was assessed in four trials (4586 patients). There were no statistically significant differences in CRBI between the treatment groups (Risk ratio 1.04, 95% CI 0.78 to 1.41, P = 0.76). There were no significant differences in any other adverse events in the primary outcomes. There was no evidence that routine replacement of peripheral IVs is harmful. There was suggestive evidence that the routine removal of peripheral IVs may reduce complications (Risk ratio 0.73, 95% CI 0.58 to 0.93, P = 0.02).

CONCLUSION
Routine replacement of peripheral IVs in hospitalised patients reduces complications without compromising patient safety.

ClinicalTrials.gov number: NCT00388498.
Evidence translated?

Evidence

Educate

Enable

Engage

Context
Thank you for listening

The Epic3 Team