


Infection Prevention and Control

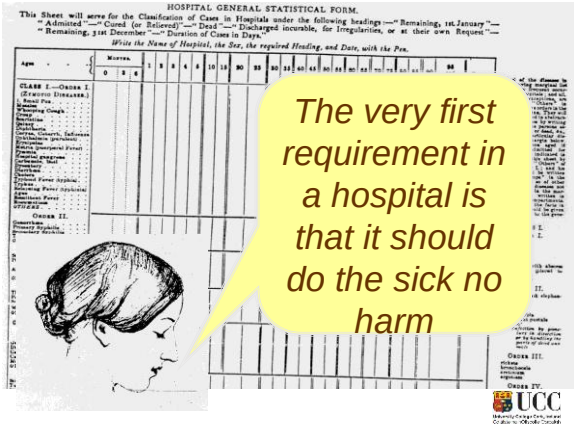
A Foundation Course

CARE BUNDLES AND MEDICAL DEVICES

Fiona Barry
Mercy University Hospital, Cork
2014

A TRADITION OF INDEPENDENT THINKING

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh



FACTORS THAT CAN INCREASE THE RISK OF INFECTION (BOWELL 1992)

GENERAL FACTORS
- AGE
- NUTRITION
- MOBILITY
- INCONTINENCE
- GENERAL HEALTH

LOCAL FACTORS
- OEDEMA
- ISCHAEMIA
- SKIN LEISONS
- FOREIGN BODIES

- **INVASIVE PROCEDURED**
- IV CANNULAS
- SURGERY
- INTUBATION
- CATHETERISATION

DRUGS
- CYTOXICS
- ANTIBIOTICS
- STEROIDS

DISEASES
- CARCINOMA
- LEUKAEMIA
- RENAL DISEASE
- LIVER DISEASE
- IMMUNODEFICIENCIES

UCC

HIQA Infection Control Standards 2009

- 12 standards

1. **Governance**
2. **Implementation of infection prevention and control**
3. **Infrastructure**
4. **HR**
5. **Communication**
6. **Hand hygiene**
7. **Prevention of cross infection**
8. **Invasive medical devices**
9. **Microbiology laboratories**
10. **Outbreak management**
11. **Surveillance**
12. **Antimicrobial resistance**

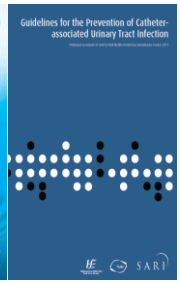
UCC

UCC

Innovations in Health Care

- 1497 100 of 160 crew die form scurvy
- 1601 Lancaster gave lemon juice to the crew of one ship on the way to India. 110 of 278 sailors died on the 3 other ships.
- 1747 (146 yrs later) random trial proved the efficacy of citrus fruits
- 48 yrs later adopted by the RN
- 1865 Board of Trade ruling
  - **Time of implementation 264 years**

UCC

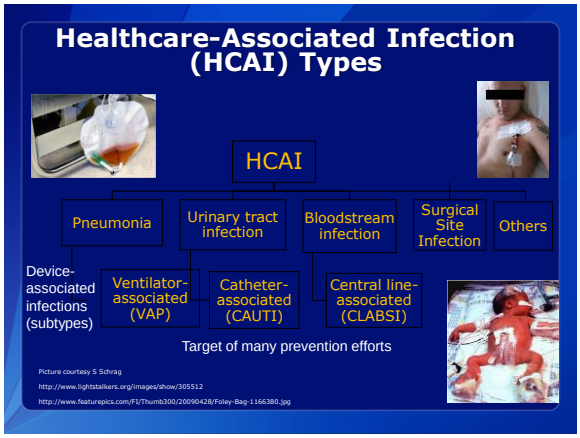


UCC

Aim

- Background
- Care Bundle definition
- Types of Care Bundles
- Care Bundles in practice – culture change

UCC



1st principle of infection prevention

at least 35-50% of all healthcare-associated infections are associated with only 5 patient care practices:

- **Use and care of urinary catheters**
- **Use and care of vascular access lines**
- Therapy and support of pulmonary functions
- Surveillance of surgical procedures
- Hand hygiene and standard precautions

Bundle Aim

- To eliminate the piecemeal application of guidelines that characterises the majority of clinical environments today
- To make it easier for clinicians to bring guidelines into practice

Background to Care Bundles

- Dr.Peter Pronovost is accredited with developing the first Care Bundle- insertion and management of CVC'S
- Intensivist in a hospital in Michigan
- Developed a checklist for insertion and management of CVC's to ensure that key interventions recommended by the CDC 2002 guidelines were implemented every time a CVC was inserted

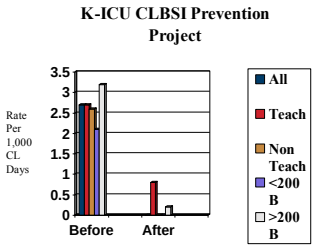
Keystone Project

- Michigan Hospital Association
- 127 intensive care units (ICUs) in Michigan and five other states.
- **68 ICUs totally eliminated CVC-BSIs.**
- For 6 months, they eliminated VAP.
- **Estimates that they saved >1,578 lives, reduced 81,000 hospital days, and saved $165 million.**
- Hospitals in Rhode Island, New Jersey and Maryland are replicating the Keystone Project locally and others will follow.

Pronovost P. et al NEJM 2006;355:2725-32

Keystone ICU Project: The Results

- 66% reduction in Central Line Bloodstream Infections (CLBSI)
- Interventions:
  - Hand hygiene
  - Max. barrier prec. during insertion
  - CHG antiseptic on insertion site
  - Avoid femoral CLs
  - Remove CL when not needed
- Pronovost P. et al. NEJM 2006;355:2725-32.



MMWR
Morbidity and Mortality Weekly Report
Recommendations and Reports August 9, 2002 / Vol. 51 / No. RR-10

Guidelines for the Prevention of Intravascular Catheter-Related Infections

Prepared by
Naomi P. O'Grady, M.D.[1]
Mary Alexander[2]
E. Patchen Dellinger, M.D.[3]
Julie L. Gerberding, M.D., M.P.H.[4]
Stephen O. Heard, M.D.[5]
Dennis G. Maki, M.D.[6]
Henry Masur, M.D.[7]
Rita D. McCormick, M.D.[7]
Leonard A. Mermel, D.O.[8]
Michele L. Pearson, M.D.[9]
Issam I. Raad, M.D.[10]
Adrienne Randolph, M.D., M.Sc.[11]
Robert A. Weinstein, M.D.[12]

Epidemiology and Prevention of Bloodstream Infections

An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

Bundle:

- **Hand hygiene**
- **MSB**
- **Skin antisepsis with chlorhexidine**
- **Avoiding femoral access**
- **Remove of needless CVC**

Pronovost. *New Engl J Med* 2006;355:2725

HUG Hôpitaux Universitaires de Genève

Care bundles

- A care bundle is a collection of interventions (usually 3-5) that are evidence based
- All clinical staff know that these interventions are best practice but frequently their application in routine care is inconsistent
- A care bundle is a means to ensure that the application of **all** interventions is consistent for **all** patients at **all** times thereby improving outcomes

UCC

What is a bundle???

A bundle is a selected set of elements of care distilled from evidence-based practice guidelines that, when implemented as a group, have an effect on outcomes beyond implementing the individual elements alone

May 07

Institute for Healthcare Improvement, 2006

UCC

Care bundles explained

- A global standard of care management
- A defined as a group of interventions related to a disease process that when implemented together result in better outcomes than when implemented individually
- Bundle components can easily be measured as completed or not completed: 'all-or-none' compliance

UCC

What else is a bundle?

- Methodology to spread the use of generally accepted science
- Provide a "pressure" for teamwork
- Simple, memorable checklist
- Audit tool
- All aspects should be done to get the maximum benefit

UCC

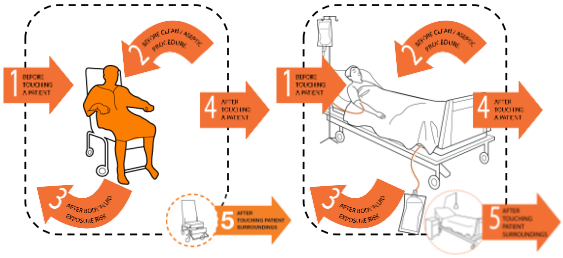
Health Protection Surveillance Centre
Lárionad Faire um Chosaint Sláinte

Types of Care Bundles

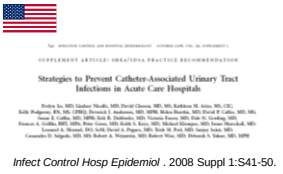
- WHO Surgery Safety Checklist
- Urinary Catheter Care Bundle
  - Insertion and Management
- Clostridium difficile care bundle
- Ventilator assisted Pneumonia care bundle
- Palliative care bundle
- Pressure area care bundle
- Sepsis care bundle
- PVC care Bundle

UCC

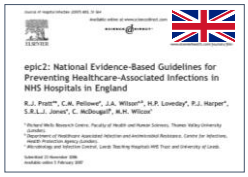
The 5 Moments apply to any setting where health care involving direct contact with patients takes place



Sax H, Allegranzi B, Uçkay I, Larson E, Boyce J, Pittet D. *J Hosp Infect* 2007;67:9-21


Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals

Infect Control Hosp Epidemiol . 2008 Suppl 1:S41-50.


epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

J Hosp Infect. 2007 65 Suppl 1:S1-64


European and Asian guidelines on management and prevention of catheter-associated urinary tract infections

Int J Antimicrob Agents 2008 Suppl 1:S68-78.

AIM OF CAUTI MAINTEANCE BUNDLE

- The CAUTI maintenance bundle is to optimise the care of patients who require urinary catheterisation during acute care - and to ensure that urinary catheters are removed as soon as clinically indicated.

Catheter Associated Urinary Tract Infection

- Catheter Associated Urinary Tract Infection (CAUTI) is the second leading cause of device-related bacteraemia. They increase the risk of UTI by:
- enabling organisms to gain entry to the bladder - via external surface or opened connection
- reducing the bodys defence of flushing out organisms during mictuition
- facilitating biofilm formation
- The organisms causing CAUTI, can be endogenous - from the patient's own gut flora, or cross-transmitted through poor infection control practices.

Health Protection Surveillance Centre
Lárionad Faire um Chosaint Sláinte

Urinary Catheter Care Bundle

- **Insertion**
  - Insert only for specific reasons
    - Urinary output in critical ill
    - Bladder outlet obstruction or neurogenic bladder dysfunction
    - Prevent contamination of sacral wounds
    - Terminal care
  - Competent HCW to insert
  - Aseptic technique
  - Closed system with bag below bladder

UCC

Urinary Catheter Care Bundle

- **Management**
  - Review need for catheter daily
  - Empty when ¾ full and use clean container for each patient
  - Secure catheter to leg/abdomen
  - Urine samples from sampling port only
  - Hand hygiene & PPE before and after any catheter care

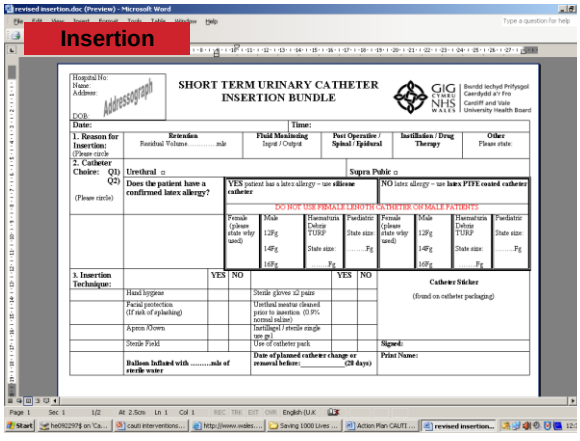
UCC

Health Protection Surveillance Centre
Lárionad Faire um Chosaint Sláinte

Urinary Catheter Care Bundle

- SARI Guidelines on Prevention of Catheter Related Urinary Tract Infections published 2011
- Care Bundle ARE published with the guidelines

UCC



DAY	DATE	Is the catheter still needed?		Drainage bag positioned below the bladder & off the floor		Gloves worn - manipulate catheter preceded & followed by hand hygiene		Urethral Meatal hygiene performed		Catheter circuit not broken (except for good clinical reason)		Overnight link system discarded (Lrg bags only)		SIGN & Designation
		YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
2														
3														
4														
5														
6														
7														
		Catheter drainage bag changed? YES / NO												
28														
IF THE CATHETER IS STILL REQUIRED – CHANGE THE CATHETER, DRAINAGE BAG & COMMENCE NEW DOCUMENTATION														
Date catheter removed / /														

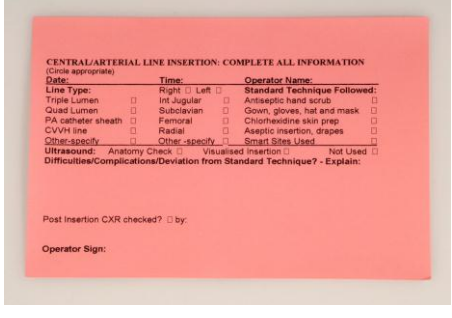
Prevention of infection- intravascular devices

1.ONLY PUT IN WHEN NEEDED
2.HAND HYGIENE
3.ASEPTIC TECNIQUE
4.EDUCATION-PATIENTS AND STAFF
5.INSERTION
6.MANAGEMENT
7.CARE BUNDLES

What are intravascular devices

- **Peripheral IV devices** are cannulae inserted into a small peripheral vein for therapeutic purposes such as administration of medications, fluids and/or blood products.
- **Peripherally Inserted Central Catheter** devices (PICC or 'long-line') are inserted into basilic, cephalic, or brachial veins and enter the superior vena cava or into a large vein. A chest XRAY is taken to ensure that it is positioned correctly. They are used to deliver medications, fluids, intravenous nutrition, and/or blood products.
- **Central Venous Access Devices (CVAD)** are catheters that provide vascular access and that terminate in one of the great vessels of the thorax or abdomen. They are used to deliver medications, fluids, intravenous nutrition, and/or blood products. In addition, they may be sued for some diagnostic purposes (e.g.: blood sampling, central venous pressures)

Care bundle checklist for insertion of CVC



CENTRAL/ARTERIAL LINE INSERTION: COMPLETE ALL INFORMATION
(Circle appropriate)

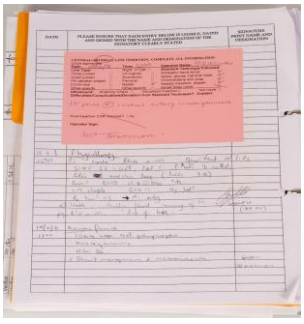
Date:	Time:	Operator Name:
Line Type:	Right ☐ Left ☐	Standard Technique Followed:
Triple Lumen ☐	Int Jugular ☐	Antiseptic hand scrub ☐
Quad Lumen ☐	Subclavian ☐	Gown, gloves, hat and mask ☐
PA catheter sheath ☐	Femoral ☐	Chlorhexidine skin prep ☐
CVVH line ☐	Radial ☐	Aseptic insertion, drapes ☐
Other-specify ☐	Other -specify ☐	Smart Sites Used ☐

Ultrasound: Anatomy Check ☐ Visualised Insertion ☐ Not Used ☐
Difficulties/Complications/Deviation from Standard Technique? - Explain:

Post Insertion CXR checked? ☐ by:

Operator Sign:

Insertion checklist in the notes



Do Central Lines Cause Bloodstream Infections?

Central venous catheters (CVCs) disrupt the integrity of the skin, making infection with bacteria and/or fungi possible.

Infection may spread to the bloodstream and hemodynamic changes and organ dysfunction (severe sepsis) may ensue.

Approximately 90% of the catheter-related bloodstream infections (BSIs) occur with CVCs.

Maki DG. Infections due to infusion therapy. In: *Hospital Infections*, Third Edition, Bennett JV, Brachman PS (eds), Little, Brown, Boston 1992.

Health Protection Surveillance Centre
Lárionad Faire um Chosaint Stáinte

Why?

- Rate of bacteraemia associated with CVC is increasing year on year
- HIQA Infection Control Standards 2008

  Standard 8

  Device related infections are reduced or prevented

  - Criteria 8.1

  "the implementation of a structured set of processes that have been proven to improve outcomes, (e.g. bundles) for the prevention of invasive medical devices related infections"

Health Protection Surveillance Centre
Lárionad Faire um Chosaint Sláinte

5. Hand Hygiene

PVC in situ	PVC in Use	No Inflammation/ Extra-vasiation	Dressing intact	PVC < 72 hrs or as per local decision	Hand hygiene
Yes	Yes	Yes	yes	yes	yes

PVC in situ	PVC in Use	No Inflammation/ Extra-vasiation	Dressing intact	PVC < 72 hrs	Hand hygiene
Yes	Yes	Yes	Yes	No – remove catheter	no

UCC

Incidence density
Events per 1000 device-days

Central venous catheter (CVC)
2.7/1000 catheter-days

PICCs
2.1/1000 catheter-days

Tunneled CVCs
1.6/1000 catheter-days

Peripheral venous catheters
0.5/1000 catheter-days

Implantable port systems
0.1/1000 catheter-days

Risk for CLABSI

Maki. *Mayo Clin Proc* 2006;81:1159

HUG Hôpitaux Universitaires de Genève

Prevention of CVC-BSI

Insertion → **Maintenance** → **Removal**

UCC

CLC Bundle.....insertion

- Hand hygiene
  - Decontaminate hands before and after each patient contact
  - Use correct hand hygiene procedure
- Maximal barrier precautions
  - PPE
    - Single use gloves
    - Eye/face protection
  - Aseptic technique
    - Sterile gown, gloves, mask and full body drape
- Chlorhexidine skin antisepsis (2% Chlorhexidine Gluconate in 70% Isopropyl Alcohol)
- Catheter
  - Optimal catheter site selection, with sub clavian vein as the preferred site for non-tunnelled catheters
  - Single lumen unless indicated otherwise

Central Line Insertion Checklist -Adults

Operator:_____**Date:**_____
RN Assisting:_____ **Room/Location:**_____
Safety Pause:
☐ Correct Patient ☐ Correct Procedure
☐ Correct Site ☐ Verbal agreement from all members of the team.

In order to eliminate central line associated blood stream infections, we will be following the Central Line Insertion Procedure Checklist based on CDC Guidelines.

Prior to the Procedure:
1. **Hand Hygiene** done with Chlorhexidine Gluconate (CHG) 2% surgical hand scrub and water or waterless alcohol based gel before patient contact **and** before donning sterile gloves.
YES
2. **Cleanse Site** with 2% CHG with sponge 1.5mL.
YES
3. **Disinfect Site** with a back and forth friction scrub, utilizing 2% CHG wand 10.5mL for 30 seconds and allow to dry completely before catheter insertion.
YES
4. **Maximum Barriers** Did the operator wear:
YES Cap/Bouffant
YES Mask
YES Sterile Gown
YES Sterile Gloves
YES Patient draped with full body sterile sheet.

During the procedure:
5. YES Operator(s) maintained the sterile field.
6. YES Personnel assisting wore a cap, mask and donned gloves appropriately.

After the procedure:
6. **Sterile dressing** applied immediately by the operator.
YES

QUALITY IMPROVEMENT
THIS FORM IS **NOT** PART OF THE PATIENT'S PERMANENT RECORD.
Please return the form to your Nurse Manager. If a step has was not followed, please note and the Nurse Manager will follow up with the physician.

Can we prevent them all?

As many as 65%–70% of cases of CABSI 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. CABSI has the highest number of preventable deaths, followed by VAP.....

Our findings suggest that 100% prevention of HAIs may not be attainable with current evidence-based prevention strategies; however, comprehensive implementation of such strategies could prevent hundreds of thousands of HAIs and save tens of thousands of lives and billions of dollars.

Umsheid CA, et al. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infect Control Hosp Epidemiol* 2011; 32:101-14.

How to implement

Very little information available on this issue
Dependent on the culture of the organisation

The following ideas may help

1. Find a colleague who is interested also!
2. Find out all the info on the subject you can
3. Liase with other colleagues in other organisations for good ideas
4. Leader-nominate/high visibility
5. Buy in-staff/other disciplines
6. Education
7. Communication channels
8. Time-implement/wont get it perfect
9. Review current policy/guidelines
10. MOTIVATION AND ENERGY
11. Surveillance and feedback to relevant personnel

Incremental Cost of New Interventions

Item	Description	Incremental cost per item	# items used in 10 days	Total Cost
Maximal sterile barrier kit	Sterile gown, gloves, mask, large drape, dressing components	$7.00	2	$14.00
Dressing kit	Transparent dressing, 2% CHG antiseptic, tincture of benzoin, tape	$2.00	1	$2.00
Skin antiseptic	70% alcohol-2% CHG in 3ml applicator	$0.70	2	$1.40
Antiseptic patch	Chlorhexidine-impregnated patch	$5.00	2	$10.00
Antimicrobial catheter	Silver-platinum catheter	$10.00	2	$20.00
Total incremental cost per patient :				$47.40

Prevention of complications-devices

- **Don't put them in-unless clinically indicated**
- **Look after them properly**
- **Get them out ASAP**

THANK YOU/ANY QUESTIONS?

References

- Centres for Disease Control and Prevention (2002). Guidelines for the prevention of intravascular catheter-related infections. *MMWR Mortality and Morbidity Weekly Report* 2002, vol 51, (No RR10), pp 1-26.
- Centres for Disease Control and Prevention (2011). Guidelines for the prevention of intravascular catheter-related infections. O Grady et al
- Health Information Quality Authority (2009). National Standards for the Prevention and Control of Healthcare Associated Infections.
- Health Protection Surveillance Centre. (2009). SARI Prevention of Intra- Vascular related Catheter Infections in Ireland.
- Umsheid CA, et al. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infect Control Hosp Epidemiol* 2011; 32:101-14.