

Infection control in intensive care



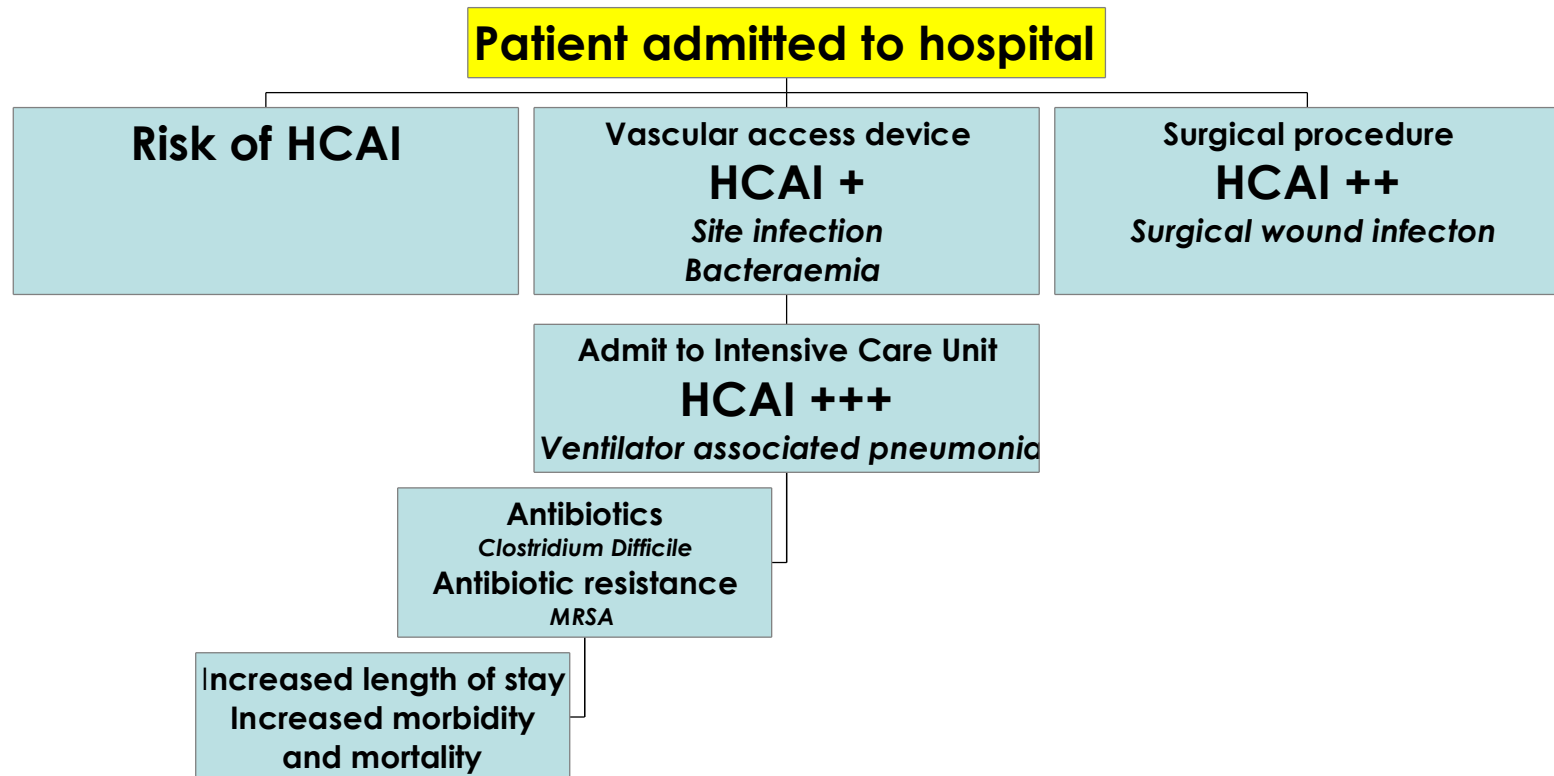
Sandra Fairley

Senior Nurse, Neurocritical Care

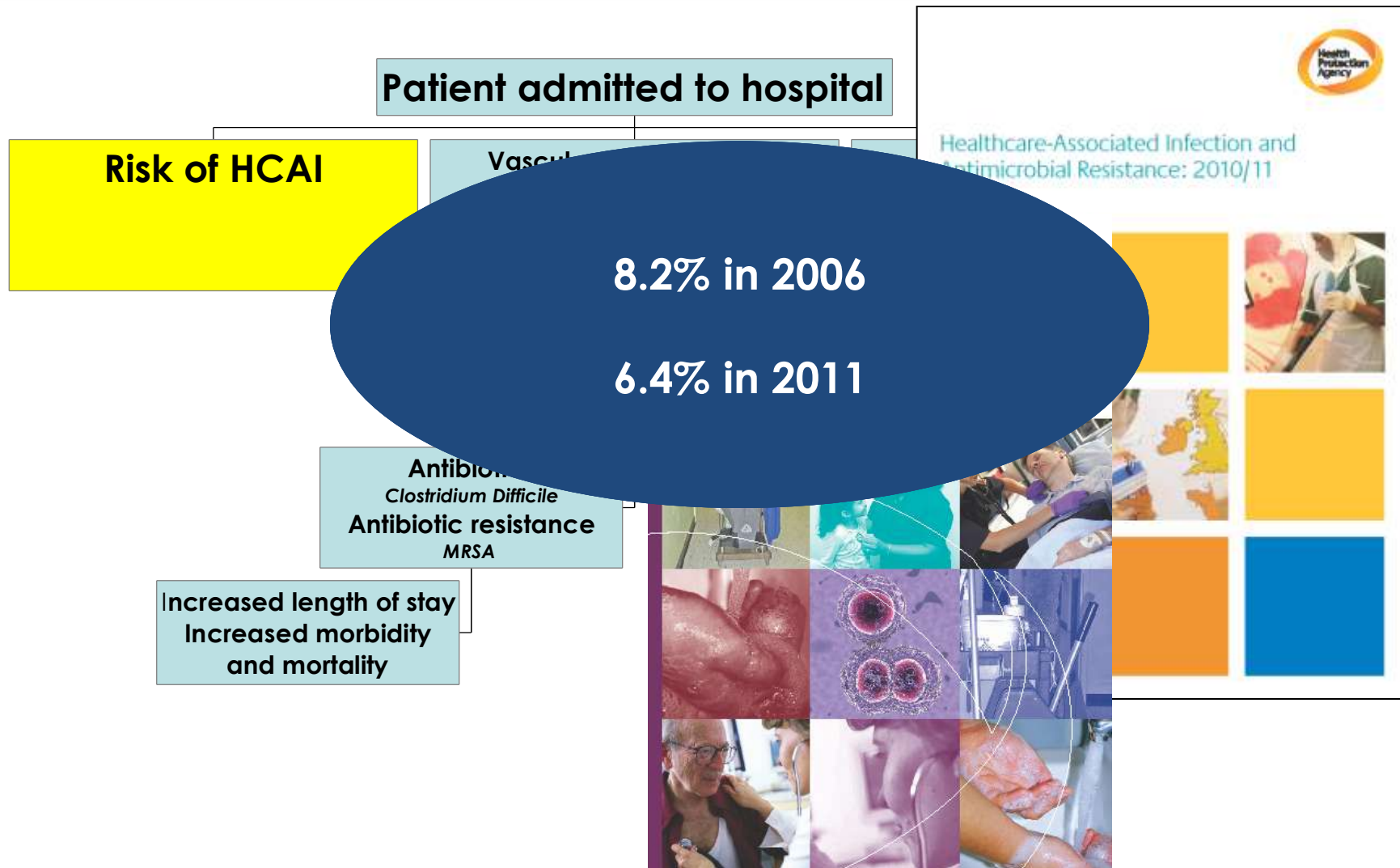
sandra.fairley@uclh.nhs.uk



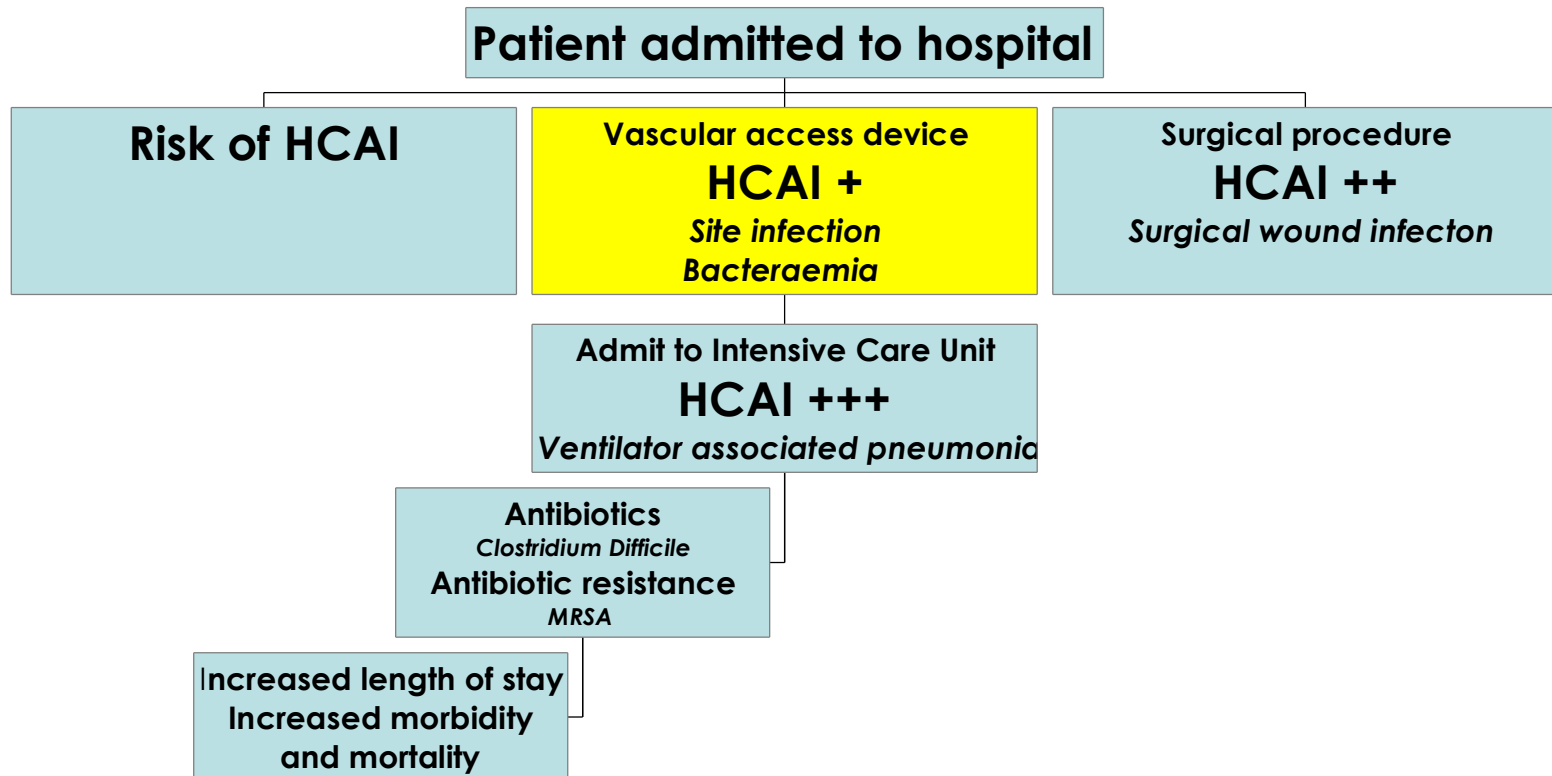
Risks to the patient of health care acquired infection (HCAI)



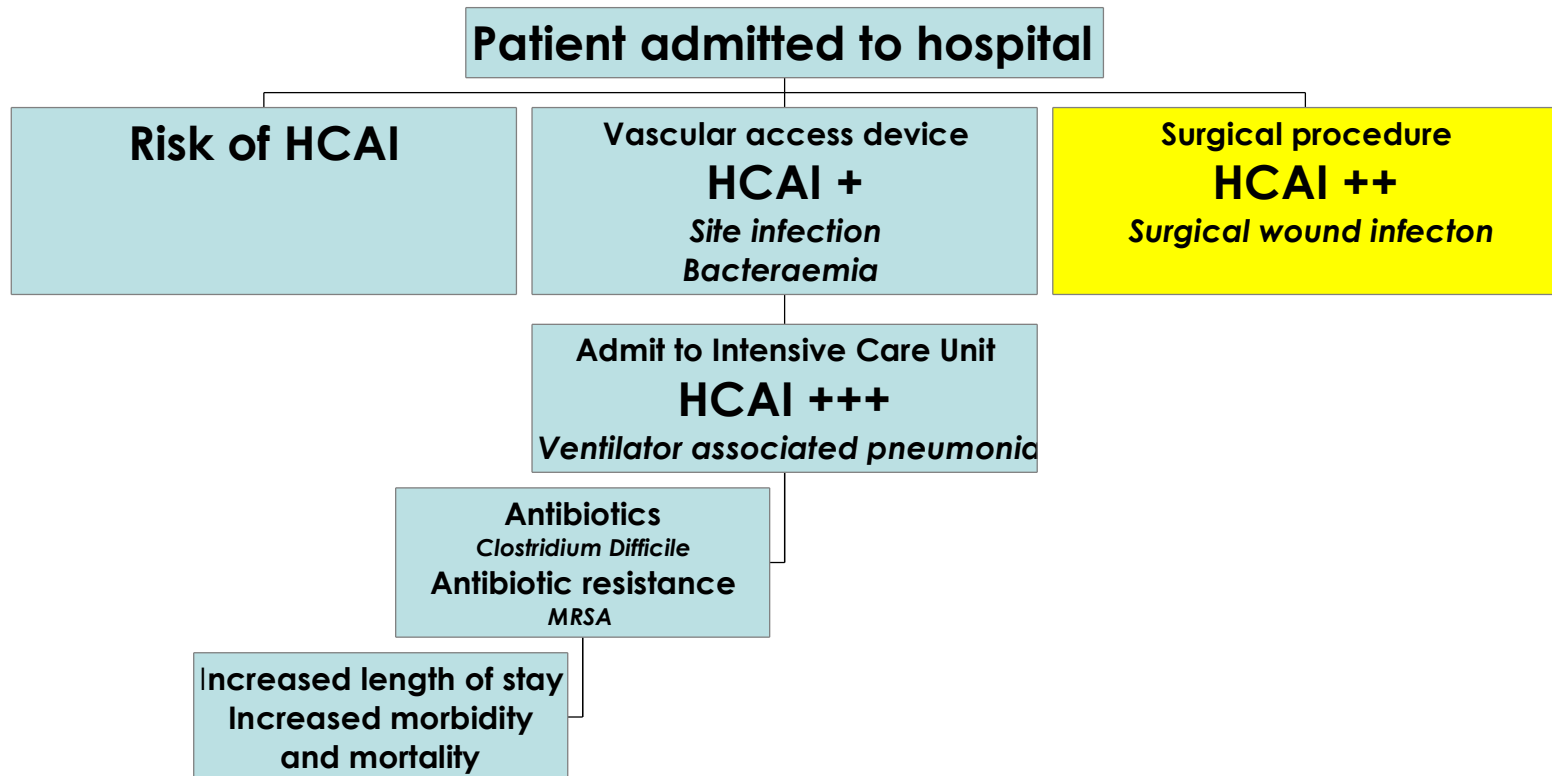
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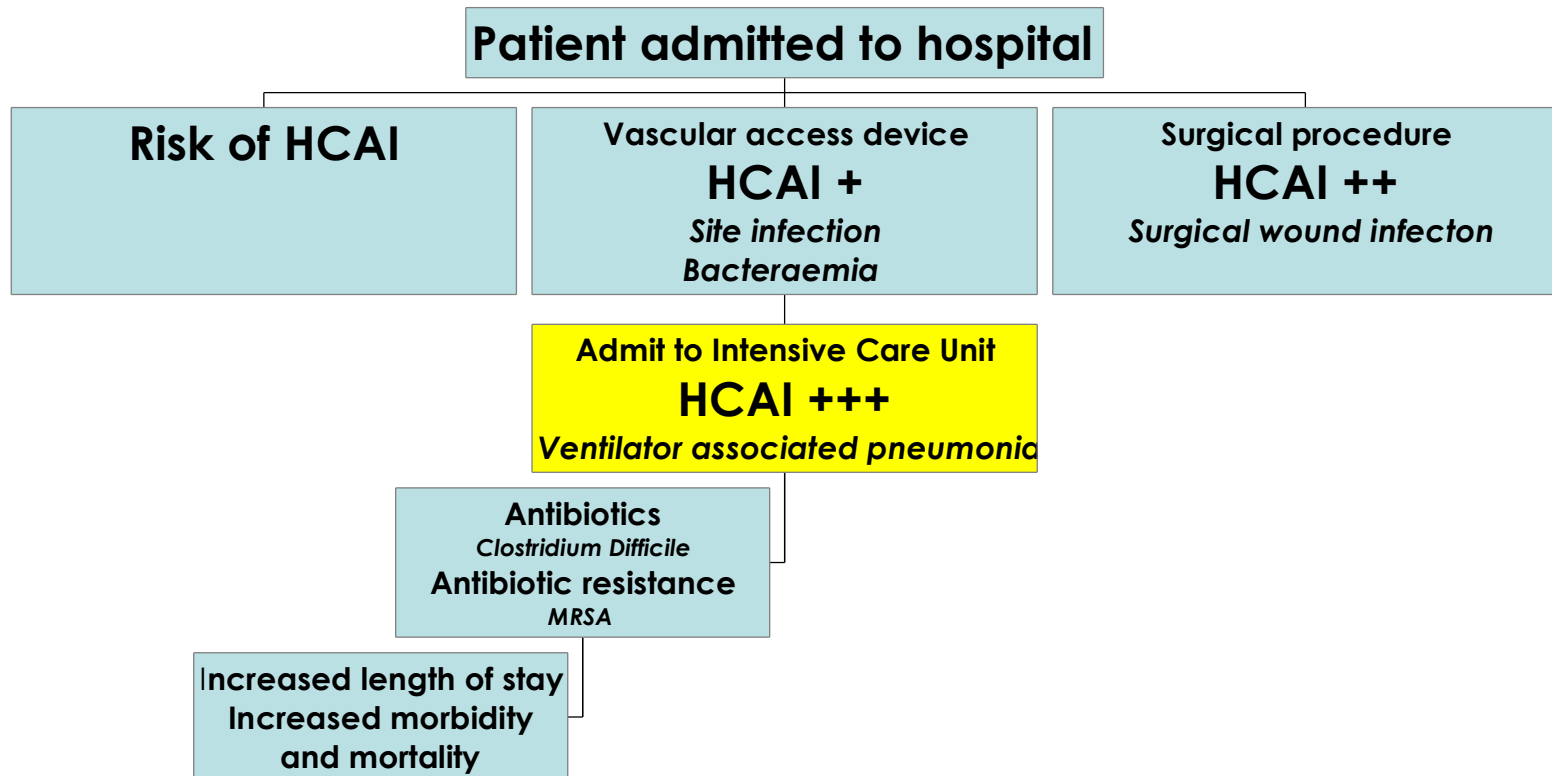
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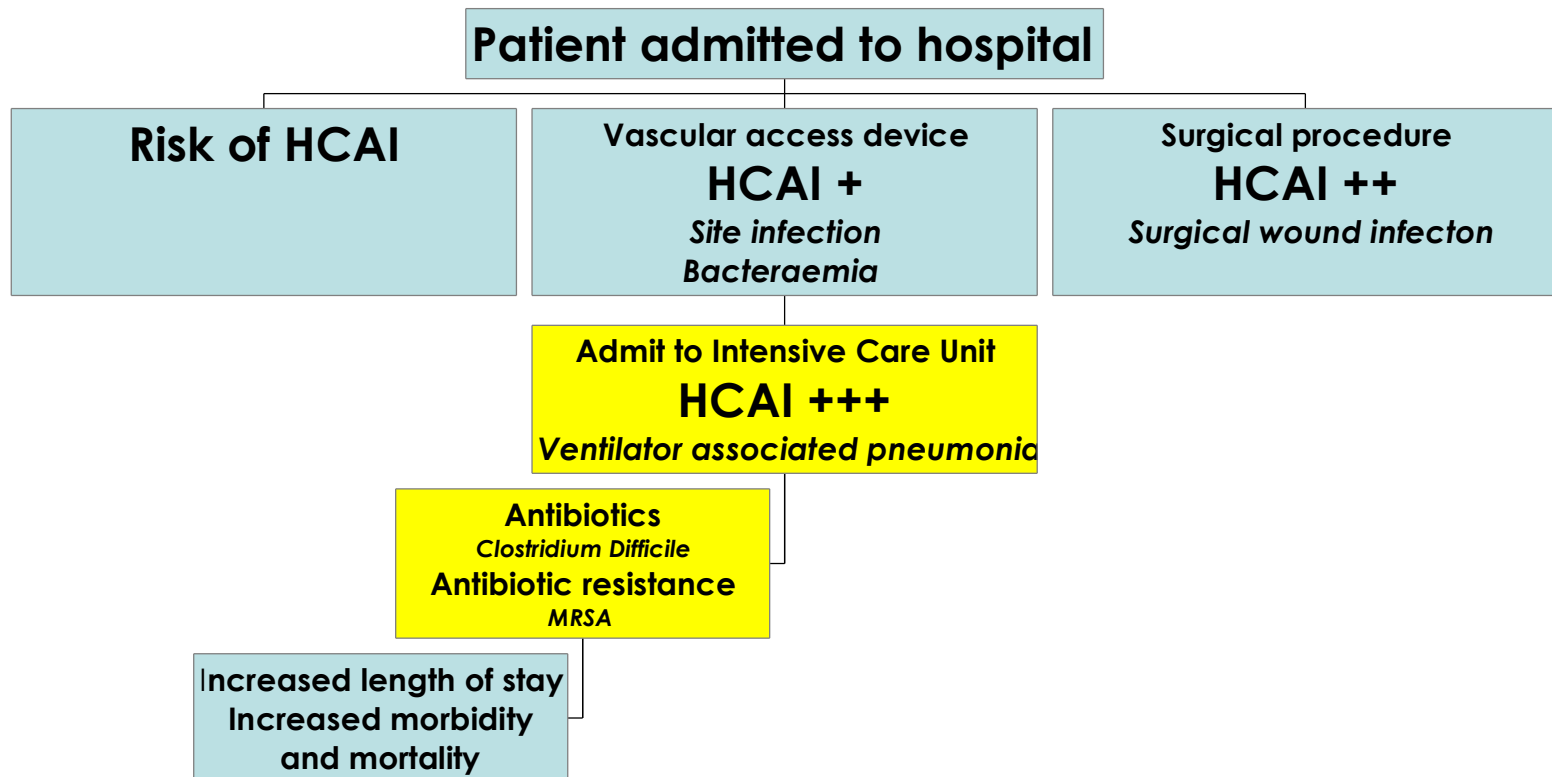
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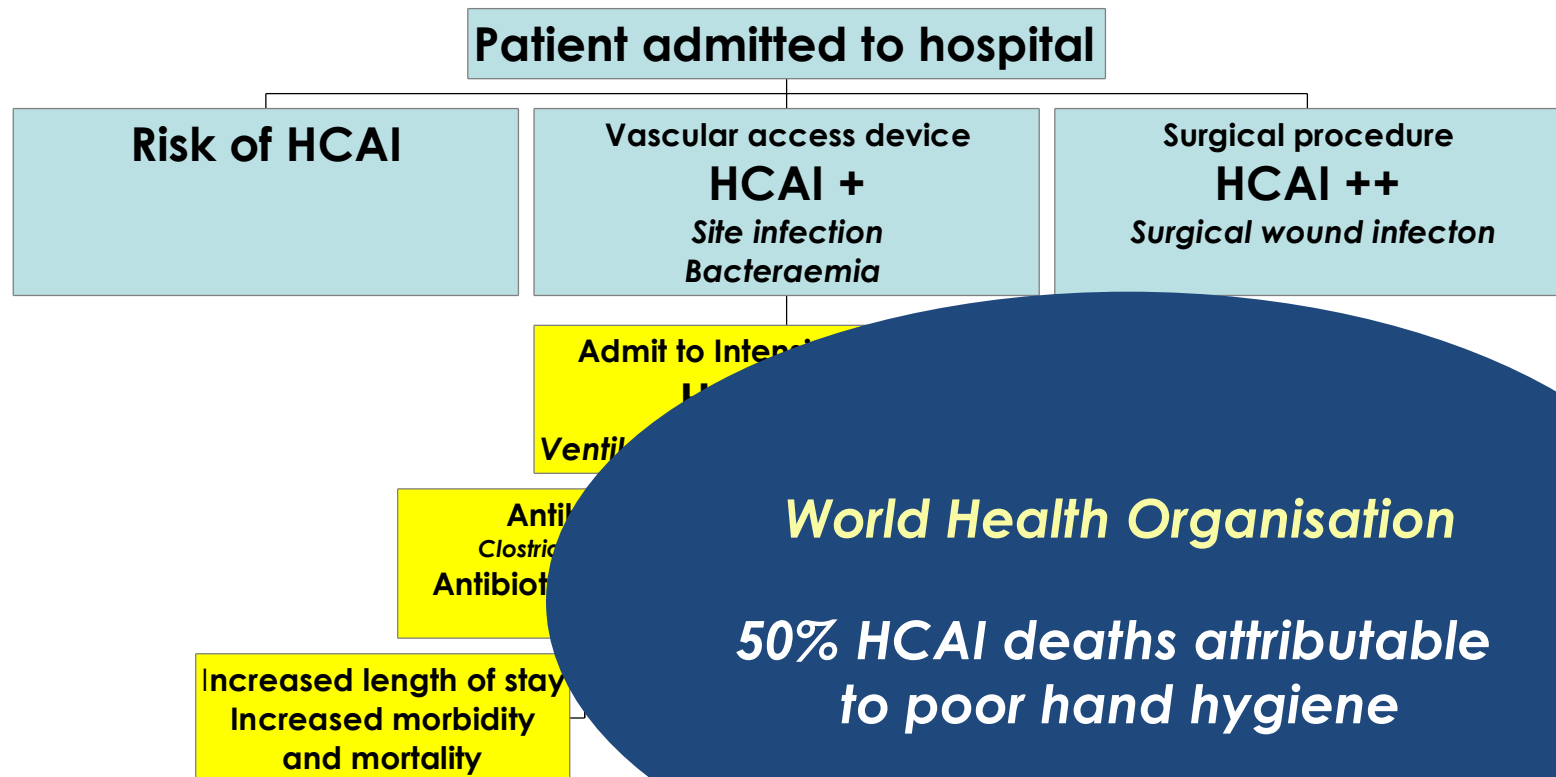
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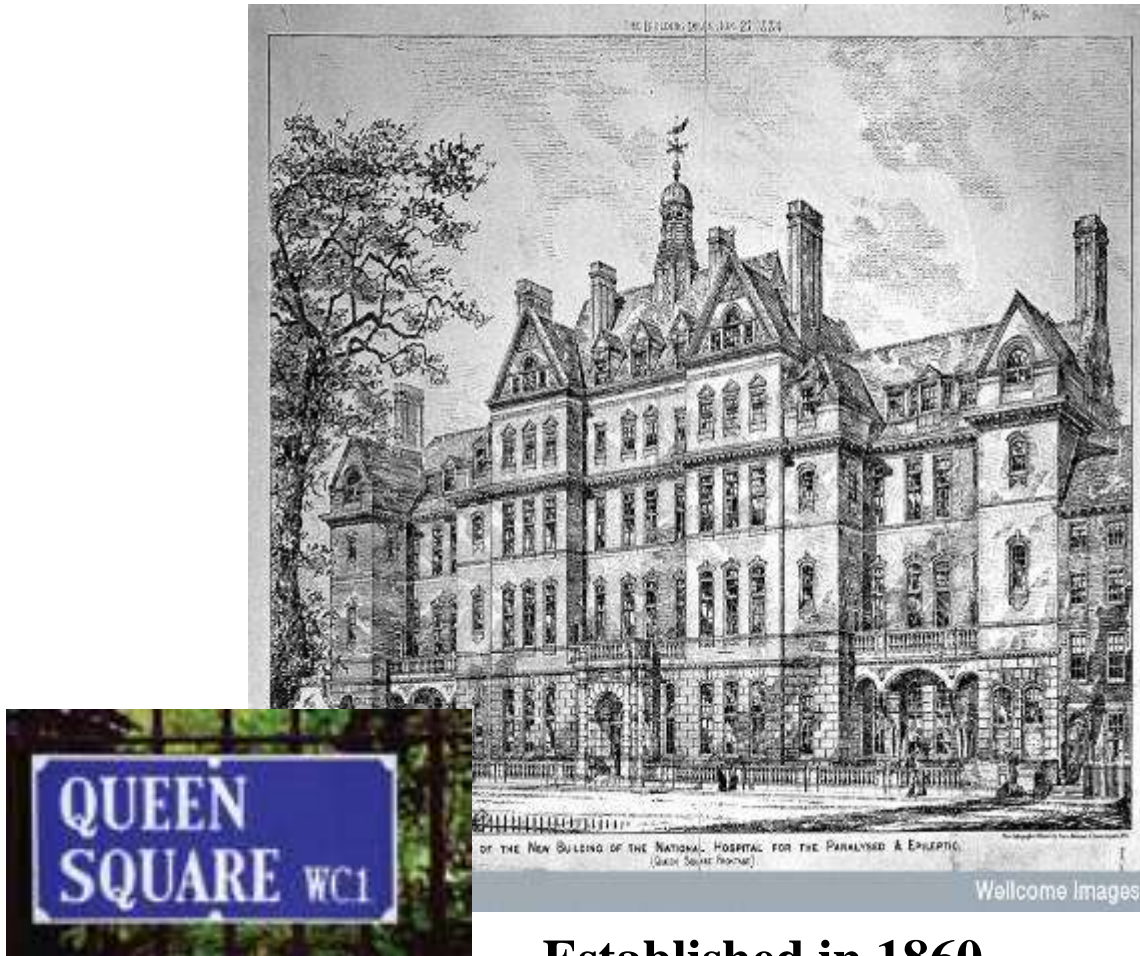


Risks to the patient of health care acquired infection (HCAI)



Lessons from the past

Link between hand hygiene and infection



Established in 1860

Lessons from the past

**Embedded in religious and cultural habits
as measure of personal hygiene for centuries**

1847

Ignaz Semmelweis

Father of hand hygiene

Link between hand washing & spread of disease

1854

Florence Nightingale

*Pioneer of evidence based practice
with hand washing at its core*

1860-1870

Pasteur and Lister

Scientific proof of link

2000

Didier Pittier

*Improved hand hygiene compliance
with alcohol handrub*

2002

Healthcare Infection Control Practices Advisory Committee

Alcohol handrub standard of care

Hand washing reserved for particular situations

2005

World Health Organisation (WHO)

*First global hand hygiene
improvement strategy*

Lessons from the past

Embedded in religious and cultural habits
as measure of personal hygiene for centuries

1847

Ignaz Semmelweis

Father of hand hygiene

Link between hand washing & spread of disease

Asepsis theory rejected by the
medical community during his
lifetime

Later proven by the work of
Pasteur and others

World Health Organisation (WHO)

*First global hand hygiene
improvement strategy*



Lessons from the past

Embedded in religious and cultural habits
as measure of personal hygiene for centuries



1854

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Healthcare Infection
All
Hand wa

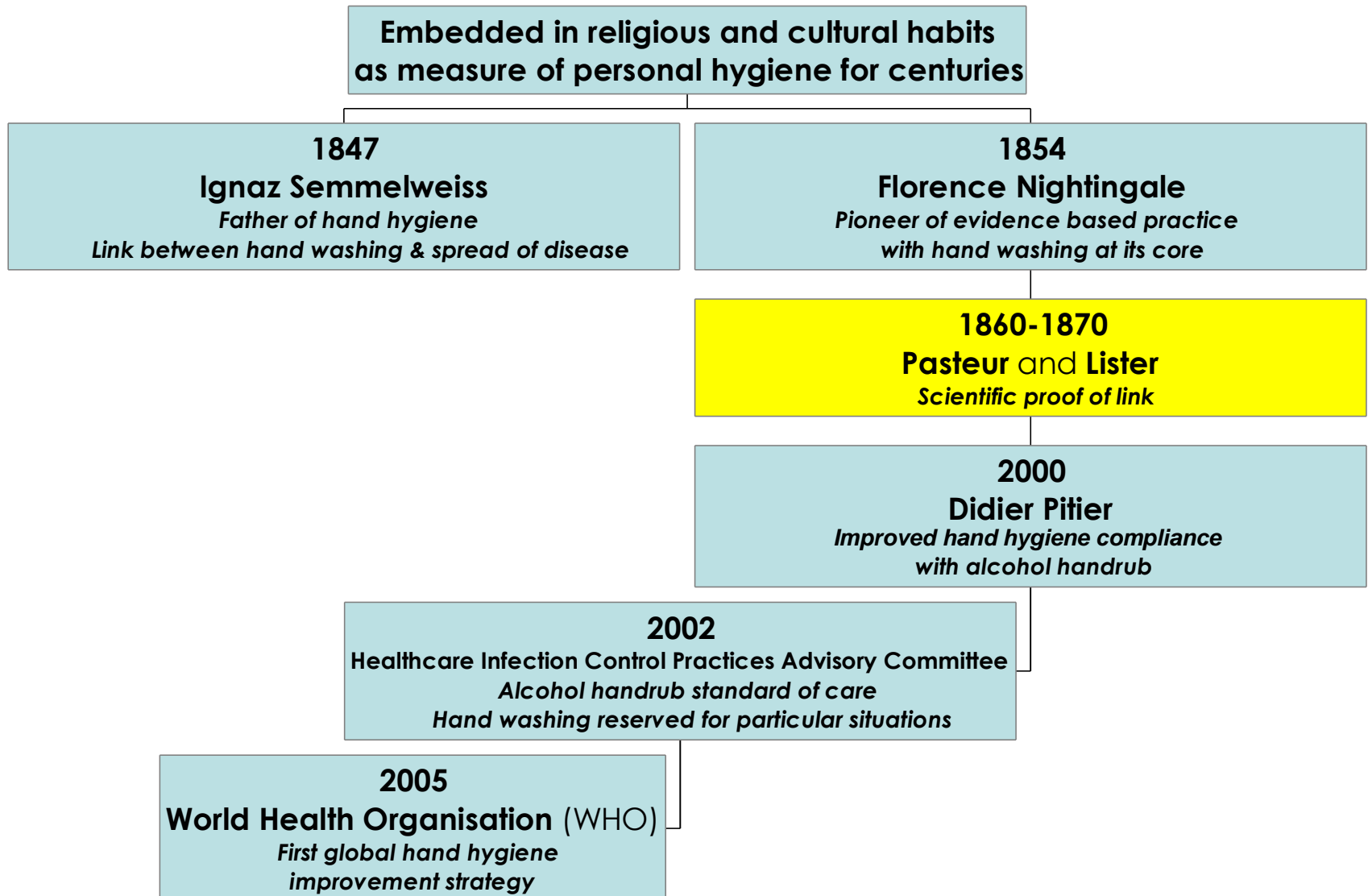
2005

World Health Organisation (WHO)
*First global hand hygiene
improvement strategy*

*‘Every nurse ought to be careful to wash
her hands frequently during the day’*

*‘She must ever be on guard against
want of cleanliness ...’*

Lessons from the past



Lessons from the past

Embedded in religious and cultural habits
Hand hygiene for centuries

**Hand hygiene compliance
improved with alcohol hand rub**

**This should be the standard of care
with hand washing reserved for
particular situations**

1854

Florence Nightingale
*Importance of evidence based practice
with hand washing at its core*

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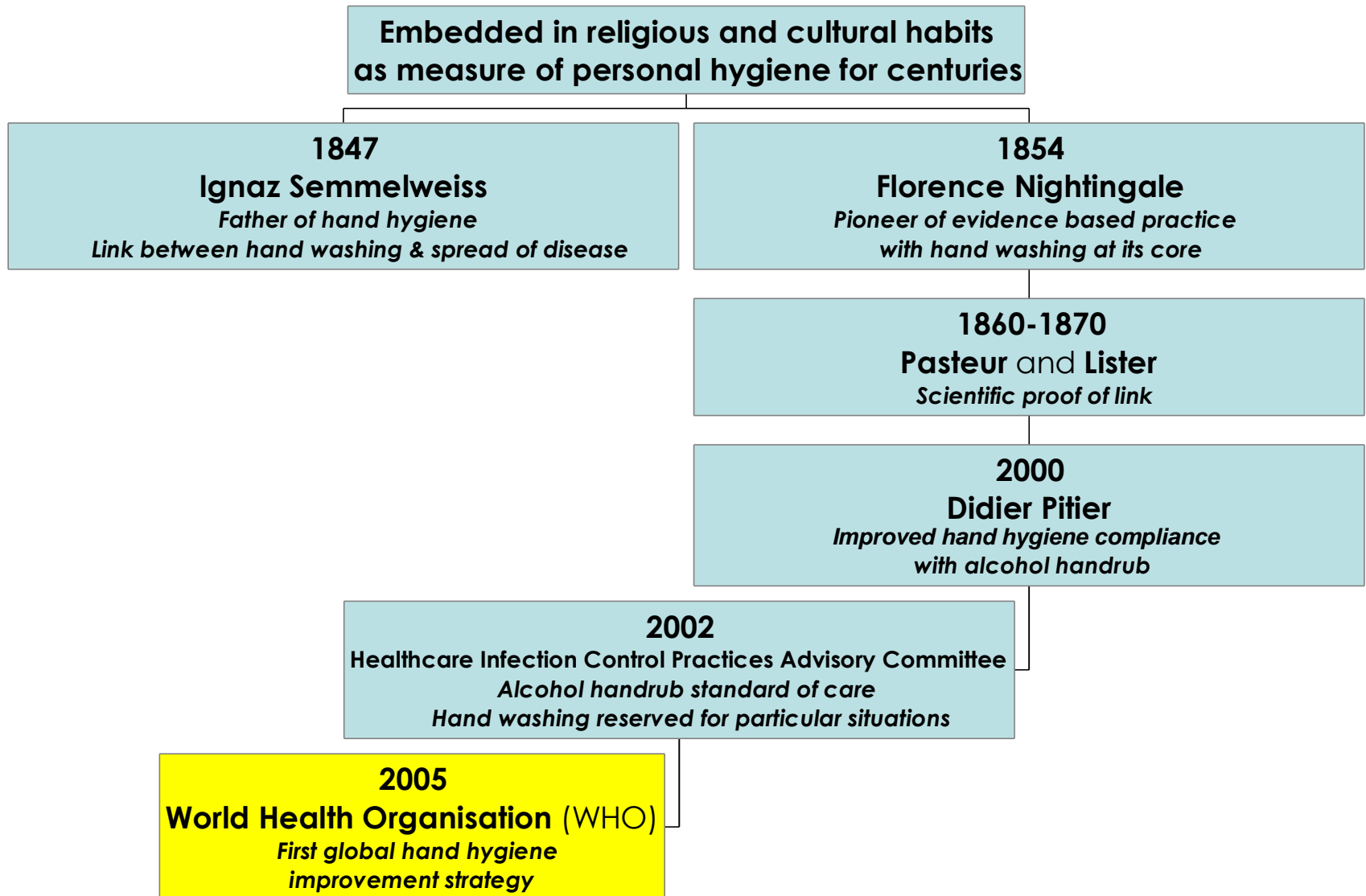
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Lessons from the past



Present day issues



2012

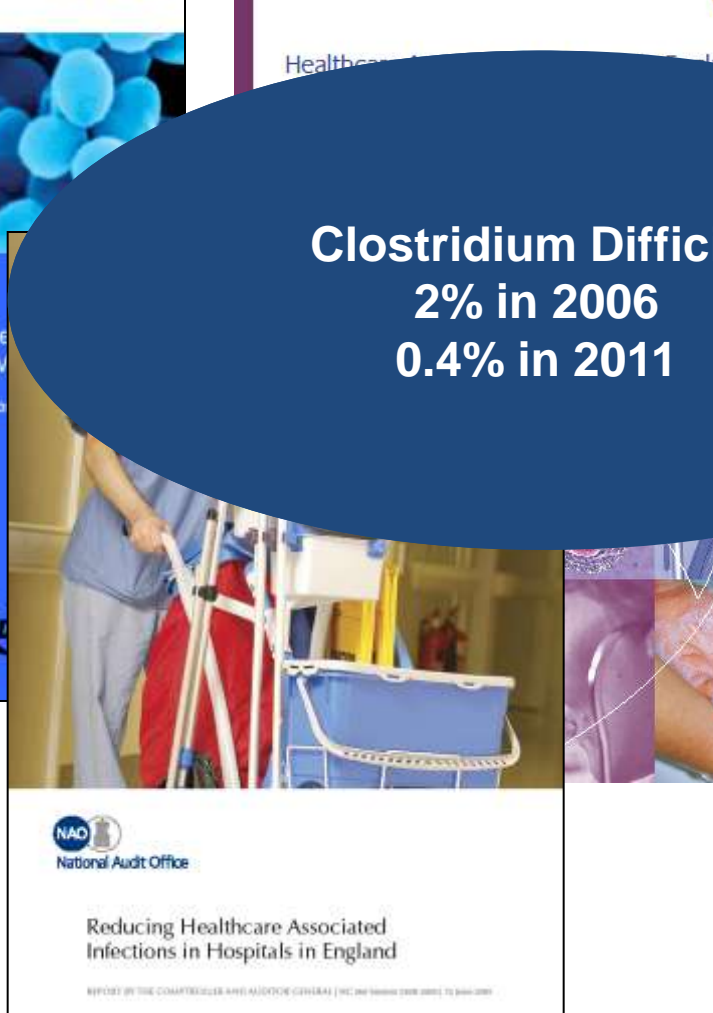
Present day issues

- Hand hygiene compliance
 - *MRSA*
 - *Clostridium Difficile*
- Surgical site infection
- Intravenous line infection
- Ventilator-associated pneumonia
- Antibiotic resistance

Introduction of surveillance and targets



Clostridium Difficile
2% in 2006
0.4% in 2011



The Health and Social Care Act 2008

Code of Practice on the prevention and control of infections and related guidance

Hand hygiene

Most basic thing we can do –
but the easiest thing to get wrong!



Mandatory
Monthly hand hygiene
Strict dress code

Bare below the elbow

No jewellery

Plain wedding band allowed

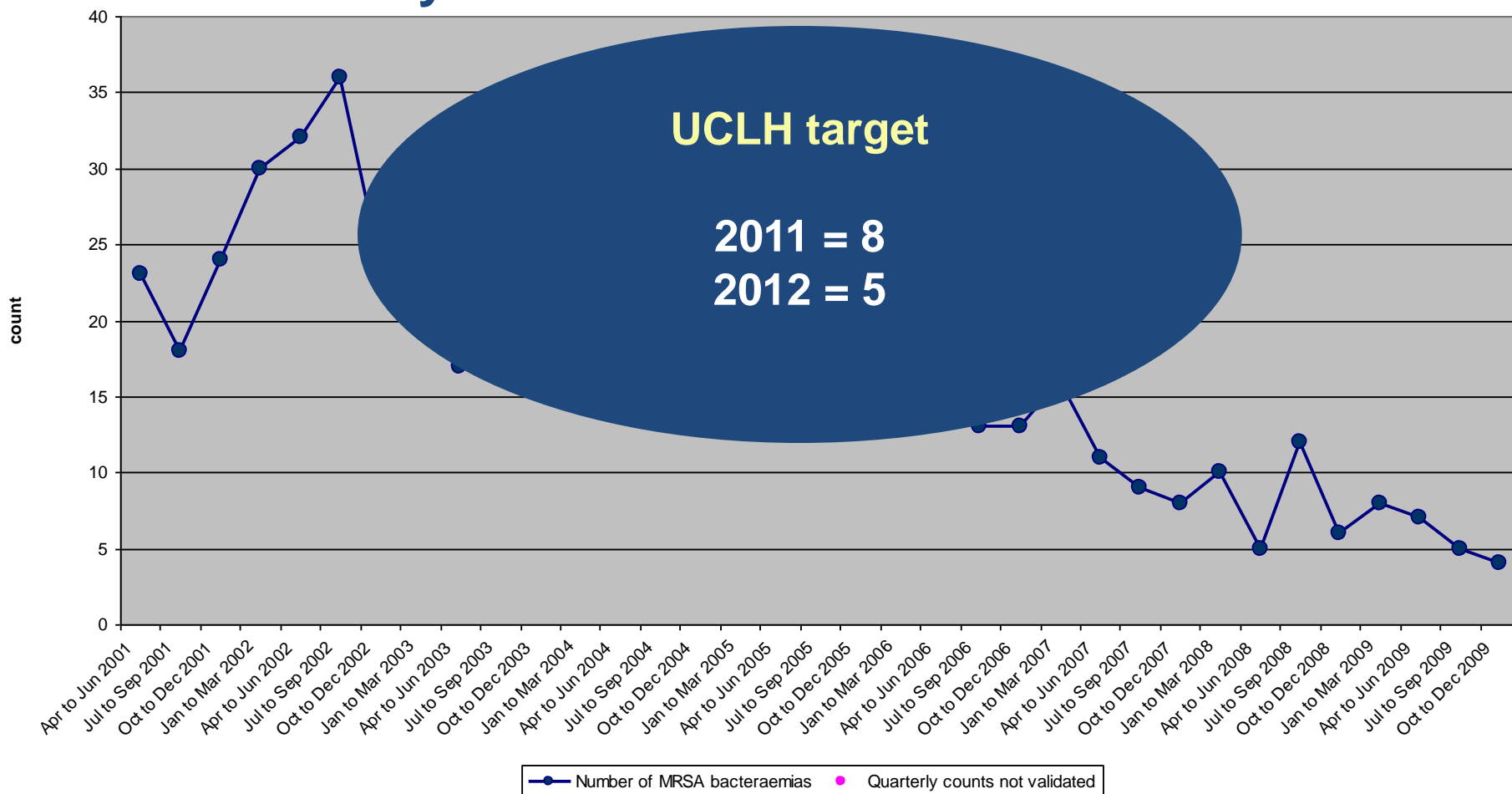
No wrist watch

No nail varnish

MRSA



Quarterly MRSA bacteraemia 2001 to 2009



MRSA



Elective admissions

All patients screened in pre-admission clinic or on admission to hospital - **MRSA Rapid Test (MRAP)**

If MRSA positive

- Prescribed 5 day course of antiseptic skincare
 - *Chlorhexidine body wash and shampoo*
 - *Antibiotic nasal ointment - mupirocin*
 - *Chlorhexidine body powder*
- Planned surgery takes place on day 5
- Chlorhexidine skin prep at operation site
- Teicoplanin 800mg IV + gentamicin 1.5mg/kg intra-op

Drug Chlorhexidine Gluconate 4% (Hibiscrub®)			
New this admission:		Yes	No
Route topical	Dose and Frequency Wash the entire body daily	Date started	Stop date For 5 days
Signature		Bleep	Pharmacy
Additional instructions			
Drug Chlorhexidine Gluconate 4% (Hibiscrub®)			
New this admission:		Yes	No
Route topical	Dose and Frequency Shampoo hair once on days 1, 3 and 5	Date started	Stop date For 5 days
Signature		Bleep	Pharmacy
Additional instructions			
Drug Mupirocin Nasal Ointment 2% (Bactroban nasal®)			
New this admission:		Yes	No
Route topical	Dose and Frequency Apply to inside of both nostrils three times each day	Date started	Stop date For 5 days
Signature		Bleep	Pharmacy
Additional instructions			

MRSA

Emergency admissions with unknown MRSA status

- Take MRSA screen
 - *MRSA Rapid Test (MRAP)*
- Pre-op apply mupirocin to inside of nose
- Chlorhexidine skin prep at operation site
- Add Teicoplanin 400mg IV to conventional surgical prophylaxis intra-op
- Continue MRSA suppression post-op until screen reported

Drug Chlorhexidine Gluconate 4% (Hibiscrub®)			
New this admission:		Yes	No
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Clostridium Difficile




NHS

Saving Lives: reducing infection, delivering clean and safe care

High Impact Intervention No 7

Care bundle to reduce the risk from *Clostridium difficile*



Aim
to reduce the risk of

Goal
to

Restrict use of proton pump inhibitors

Five main factors to be considered in the context of the 'bundle' applied, would contribute to the risk of infection: 1. Antibiotic use, 2. Environmental decontamination, 3. Hand hygiene, 4. Patient equipment, 5. Staff education.

In 2003, the DH document *Winning ways* recommended that hospitals should apply 'rigorously and consistently the measures known to be effective in reducing the risks of healthcare associated infection'. This was followed in 2004 by the DH action plan which established an NHS-wide programme for standards of hygiene.

DH Department of Health

- Isolate only in presence of diarrhoea and until no diarrhoea for at least 48 hours
- Use soap and water for hands – not alcohol gel
- Environmental cleaning with Chlorine Dioxide

Antibiotics

1st line:

- Metronidazole 400mg PO tds for 10 - 14 days
- If poor response after one week change to Vancomycin 125mg PO qds for 10 - 14 days

1st line in severe cases:

- Vancomycin 125mg PO qds for 10 - 14 days

Surgical site infection



**National Hospital rates
April – June 2012**

Spinal surgery: 2%
(national average 2.1%)

Cranial surgery : 1.7%
(national average 1.9%)



fections in

Issue date: October 2008

Surgical site infection

Prevention and treatment of surgical site infection



NICE clinical guideline 74
Developed by the National Collaborating Centre for Women's and Children's Health

- **Skin prep = Chlorhexidine with Tint**
 - 2% chlorhexidine gluconate in 70% isopropyl alcohol with tint
 - 2-3 fold decrease in wound infection rates when compared to aqueous povidone iodine*
- **Intra-op**
 - **Surgical prophylaxis**
 - Single dose antibiotic adequate for most surgical procedures*
- **Post-op**
 - **Wound dressing and suture removal protocols**

- Improved design of vascular access devices
 - *Closed system*
 - *Needle free*
- Protocols
 - *Insertion*
 - *Duration*
- Line dressings
 - *Chlorhexidine impregnated*

Visual Infusion Phlebitis (VIP) Score

Early detection of IV site infection

Insertion details

Who inserted the line and when

Daily observation of insertion site using VIP Score

Cannula removal details

VIP score

Valid and reliable measure for determining when to remove a peripheral intravenous line

Patient Name:
Date of Birth:
Either arm contraindicated for cannulation? R/L
Reason for contraindication:

Hospital Number:
Sex: M/F

Cannula No	1	2	3	4								
Insertion of Cannula												
Date of insertion (Day 0)												
Inserted by (Name & Designation)												
Insertion site (e.g. Right / Left arm)												
Size/colour of cannula												
Dressing/ Review sticker insitu	Y / N	Y / N	Y / N	Y / N								
Ongoing care												
	Date	Day	Night	Date	Day	Night	Date	Day	Night	Date	Day	Night
Visual Infusion Phlebitis Score (VIP Score)	DAY 0											
	DAY 1											
	DAY 2											
	DAY 3											
	Remove cannula after 72 hrs. unless poor venous access. Re-site cannula ONLY if still indicated.											
	DAY 4											
DAY 5												
Removal of cannula												
Date of removal												
Print name & designation												

Visual Infusion Phlebitis Score (VIP Score) (developed by Andrew Jackson, 1997)

I.V. site appears healthy	0	No signs of phlebitis • Observe cannula
One of the following is evident: • Slight pain near I.V. site or slight redness near I.V. site	1	Possible first signs of phlebitis • Observe cannula
Two of the following is evident: • Pain near I.V. site • Erythema • Swelling	2	Early stage of phlebitis • Re-site cannula
Three of the following are evident: • Pain along path of cannula • Erythema • Induration	3	Medium stage of phlebitis • Re-site cannula • Consider treatment
All of the following are evident and extensive: • Pain along the path of the cannula • Erythema • Swelling • Palpable venous cord	4	Advanced stage of phlebitis (or start of thrombophlebitis) • Re-site cannula • Consider treatment
All of the following are evident and extensive: • Pain along the path of the cannula • Erythema • Swelling • Palpable venous cord • Pyrexia	5	Advanced stage of Thrombophlebitis • Initiate treatment • Re-site cannula

Visual Infusion Ph (VIP Sco	DAY 3											
	Remove cannula after 72 hrs. unless poor venous access. Re-site cannula ONLY if still indicated.											
	DAY 4											
	DAY 5											
Removal of cannula												
Date of removal												
Print name & designation												

Visual Infusion Phlebitis Score (VIP Score)
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I.V. site appears healthy	0	No signs of phlebitis • Observe cannula
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Two of the following is evident: • Pain near I.V. site • Erythema • Swelling	2	Early stage of phlebitis • Resite cannula
All of the following are evident: • Pain along path of cannula • Erythema • Induration	3	Medium stage of phlebitis • Resite cannula • Consider treatment
All of the following are evident and extensive: • Pain along the path of the cannula • Erythema • Swelling • Palpable venous cord	4	Advanced stage of phlebitis (or start of thrombophlebitis) • Resite cannula • Consider treatment
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Ventilator-associated pneumonia

Internationally accepted evidence-based guidelines to prevent VAP

- **Elevation of head of bed to 30°-45°**
 - Reduce risk of VAP
- **Tubing management**
 - Replace when visibly soiled and according to manufacturer's instructions
 - Prevent condensate entering airway
- **Suctioning of respiratory secretions**
 - Wear examination gloves and decontaminate hands before and after suction procedure
- **Oral hygiene**
 - Chlorhexidine mouth wash QDS
- **Sedation holding**
 - Reduce duration of mechanical ventilation and risk of VAP
- **Gastric ulcer and DVT prophylaxis**
 - Prevent complications of critical care

Action deadlines for the Safety Alert Broadcast System (SABS)

Category: ACTION
for action by: clinical leads for critical care units in acute and foundation trusts

Deadline (action 1.1 underway):
27 September 2008

Deadline (action 1.1 complete):
27 November 2008

Issue date: August 2008
Alert reference:

NHS

National Institute for Health and Clinical Excellence

National Patient Safety Agency

Aim
to prevent the development of ventilator-associated pneumonia (VAP)

Context
The Health Act 2006 Code of practice states that NHS organisations must audit key policies and procedures for infection prevention. The high impact intervention helps trusts achieve this aim by providing a focus on elements of the care process and a method for measuring the implementation of policies and procedures.

Respiratory infections are the fourth-largest contributor to hospital-acquired infection in the UK, and 16% of these are ventilation-related.¹

VAP is a significant cause of morbidity and mortality in critically ill and postoperative patients receiving mechanical ventilation. In the European prevalence of infection in intensive care study² VAP was the most frequent infection, accounting for 45% of all infections in intensive care units (ICUs) in Europe. The incidence of VAP can vary from 5% to 68% in mechanically ventilated patients.³ VAP is associated with increased duration of ventilation, ICU stay, hospital stay, and cost. An American study estimated the additional cost of VAP to be in the region of \$11,000 per patient.⁴

Evidence-based guidelines for the prevention of VAP have been developed in North America by the Centers for Disease Control⁵ the American Thoracic Society⁶ and the Canadian Critical Care Society⁷ The Department of Health discussed evidence ways indicates that proper management of the ventilator tubing has a role in preventing VAP.⁸

A ventilator 'care bundle' of four elements: head of bed elevation, sedation holding, deep vein thrombosis prophylaxis and gastric ulcer prophylaxis – has been defined⁹ and used in clinical practice in England.¹⁰ Many publications refer to these elements, among others, and the continuing challenge is how to put these evidence based therapies into practice consistently.¹¹ A 'how-to' guide for intensive care multidisciplinary teams¹² described steps for improving the quality of critical care, and the high impact intervention and good practice assistance to clinical teams, enabling them to implement good practice infection prevention and control.

NICE provides clinical guidance to improve NHS care

Department of Health

Prudent antibiotic prescribing



Waiting for objective data to diagnose infection before treatment with antimicrobial drugs for suspected ITU acquired infections does not worsen mortality and might be associated with better outcomes and use of antimicrobial drugs

The Lancet Infectious Diseases October 2012

SIGN

Scottish Intercollegiate Guidelines Network

University College London Hospitals NHS Foundation Trust

Articles

Aggressive versus conservative initiation of antimicrobial treatment in critically ill surgical patients with suspected intensive care-unit-acquired infection: a quasi-experimental, before and after observational cohort study

Swenson, Rosemarie Metzger, Tanya R Folar, Amari D Palitani, Lin M Riccio, Kimberley A Popowsky

Critically ill patients can either be started as soon as infection is suspected or delayed until objective evidence of infection has been obtained. We postulated that delaying antimicrobial treatment of patients with suspected intensive care unit (ICU) until objective evidence of infection had been obtained

was associated with better outcomes and use of antimicrobial drugs. We conducted a before and after observational cohort study of patients aged 18 years or older at the University of Virginia (Charlottesville, VA, USA). From Sept 1, 2008, to Aug 31, 2010, patients suspected of having an infection on the basis of clinical grounds were prospectively followed up until treatment started. From Sept 1, 2009, to Aug 31, 2010, a conservative approach to treatment started only after objective findings confirmed an infection. Our primary outcome was mortality. Analyses were by intention to treat.

For the first and second years were 762 and 721, respectively, with 101 patients with suspected infection during the aggressive year and 100 patients during the conservative year. Compared with the aggressive approach, the conservative approach was associated with lower all-cause mortality (13/100 [13%] vs 24/100 [24%]; $p=0.0095$), more initially appropriate therapy (158/214 [74%] vs 144/231 [62%]; $p=0.0095$), and a shorter median duration of therapy (12.5 days [SD 10.7] vs 17.7 [28.1]; $p=0.0080$). After adjusting for age, sex, trauma, acute physiology and chronic health evaluation (APACHE) II score, and site of infection, the odds ratio for risk of mortality in the aggressive therapy group compared with the conservative therapy group was 2.5 (95% CI 1.5–4.0).

Interpretation Waiting for objective data to diagnose infection before treatment with antimicrobial drugs for suspected ICU-acquired infections does not worsen mortality and might be associated with better outcomes and use of antimicrobial drugs.

Funding National Institutes of Health.

Introduction

Until recently, the use of antimicrobial drugs was thought by physicians to be relatively risk free, which resulted in a tendency to give these drugs at the smallest suspicion of infection. However, excessive antimicrobial use is now known to be associated with resistance and other associated effects. Consequently, the decision to start treatment in a possibly (but not certainly) infected critically ill patient is made based on a balance between three considerations: the certainty of the diagnosis,^{1,2} the risk of delaying treatment,^{3,4} and the environmental damage caused by the use of antimicrobial drugs,^{5,6} including the selection of resistant organisms.

Two possibilities for the timing of the start of antimicrobial treatment in critically ill patients exist:^{7,8} starting treatment immediately after obtaining cultures, knowing that many uninfected patients will receive unnecessary treatment; or withholding antimicrobial

treatment until an infection is confirmed by objective data, knowing that some patients might have potentially harmful delays in treatment. There is no standardised approach to the timing of the start of antimicrobial therapy. We postulated that delaying the administration of broad-spectrum antimicrobial drugs until the initial return of objective evidence of infection would not significantly worsen mortality and would be potentially beneficial in terms of reduction of antimicrobial use and the induction of resistance.

Methods Study design

Patients aged 18 years or older who were admitted to the University of Virginia (Charlottesville, VA, USA) surgical intensive care unit (SICU) were prospectively followed up until discharge from Sept 1, 2008, to Aug 31, 2010. Patients not on a surgical service and patients with

Issue date: July 2008

Respiratory tract infections – antibiotic prescribing

Prescribing of antibiotics for self-limiting respiratory tract infections in adults and children in primary care

UCL
HOSPITALS

UCL Hospitals is an NHS Foundation Trust and includes The Heart Hospital, Hospital for Tropical Medicine and Neurosurgery, The Royal London Hospital and University College Hospital (incorporating the former Guy's and St Thomas' Hospitals).

NICE clinical guideline 69
Developed by the Centre for Clinical Practice at NICE

Prudent antibiotic prescribing



ICU Antimicrobial Guidelines

Clinical Guideline - DR

Local

Author(s)

Dr R Hurley
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Dr N Shetty
Dr C Curtis,
Dr S Morris-Jones
Ms P Panesar, Lead

Owner/Sponsor

Critical Care Delivery Group

ANTIMICROBIALS

prescribed on advice of Microbiology, except for the

University College London Hospitals **NHS**

NHS Foundation Trust

ANTIMICROBIAL POCKET GUIDE (ADULTS)

guidelines are available on the Intranet
by (InForm) <http://uclhweb/pharmacy/>

For further advice contact

Microbiology SpR ext 79515
Antibiotic Pharmacist bleep 1293
Infectious Diseases SpR 07908 250 924

Out of hours contact switchboard for on-call Medical
Microbiologist and/or on-call Pharmacist

are based on normal renal function
dosing in renal impairment please contact
your ward pharmacist

duced by: Antimicrobial Usage Committee
approved: July 2012 (ver 4)
Review: June 2013

contact your ward pharmacist
jeet.panesar@uclh.nhs.uk

All prescriptions must have
a **STOP** or **REVIEW** date

Regular Prescriptions

Drug
FLUCLOXACILLIN

Dose
1g

Route
IV

Valid Period

Pharm

6

8

12

Date→

3/4

4/4

5/4

6/4

R/V

Regular Prescriptions

Drug
TRIMETHOPRIM

Dose
200mg

Route
po

Valid Period
3/7

Pharm

Special Instructions
UTI

Stop Date & Initial
6/4/08 A.D.

Signature
A Doctor

Date
3/4/08

Regular Prescriptions			Date→				
Drug	Dose		6	8	12	14	18
TRIMETHOPRIM	200mg						
Route	Valid Period	Pharm	6	8	12	14	18
po	3/7						
Special Instructions			22				
UTI			other				
Signature							
A Doctor							
Date							
3/4/08							

Informing patients and their relatives

University College London Hospitals **NHS**
NHS Foundation Trust

Controlling hospital infections at UCLH

University College London Hospitals **NHS**
NHS Foundation Trust

Antibiotics Information for patients and visitors

Arabic

إذا كنت بحاجة إلى الحصول على هذه المعلومات في بيئة أخرى، على سبيل المثال، طباعة كبيرة أو تسجيل صوتي، أو كنت بحاجة إلى خدمات الترجمة بالإنجليزية على الرقم الموضح أعلاه.

Bengali

এই তথ্যগুলি আপনি এই ভাষায় পড়তে পারেন। আপনি যদি আরও তথ্য চান, যেমন বড় আকারে প্রিন্ট করা বা অডিও রেকর্ডিং, তবে উপরে উল্লিখিত নাম্বারে আমাদের সাথে যোগাযোগ করুন।

Cantonese

University College London Hospitals **NHS**
NHS Foundation Trust

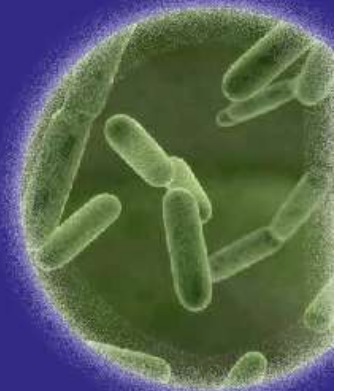
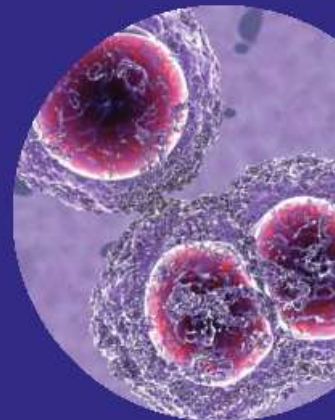
MRSA Information for patients and visitors

University College London Hospitals **NHS**
NHS Foundation Trust

Clostridium difficile Information for patients and visitors

University College London Hospitals **NHS**
NHS Foundation Trust

Preventing Surgical wound infections



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UCL
HOSPITALS

UCL
HOSPITALS

Thoughts for the future

The basics will continue to be key to
infection control in the ITU

Hand hygiene

General cleaning of the environment

Isolating infected patients

We know they work!

Thank you

