Point Prevalence Survey of Hospital-Acquired Infections & Antimicrobial Use in Ireland

PPS Data Collector Training
April 2017

HAI Case Definitions & HAI Case Studies
Presentation 3

Case Studies

- All cases are fictional

Hospital-acquired infection

- Hospital-acquired infection and healthcare-associated infection are not the same
- This PPS is concerned with active infection acquired **DURING** or **AS A CONSEQUENCE OF** admission to an acute hospital
- Infections acquired in nursing homes or long term care facilities (HCAI) are not captured in this PPS
- Date of admission = Date patient arrived/presented at the hospital
  - **Date of admission = Day 1**
  - **Admitted to ward at 23:50 on 05/05/17 =**
  - **00:00 on 06/05/17 =**

Hospital-acquired infection

- Develops in this hospital during the current admission
- Develops in another acute hospital and patient transferred to this hospital with active HAI
- Develops in the community in a patient recently discharged from acute hospital and results in patient being readmitted to this hospital

Acute hospital = This hospital or another acute hospital

Hospital-acquired infection

- Infection arising Day 3 onwards
- If a patient is readmitted to hospital within two days of discharge from an acute hospital with an infection **OR** infection develops on Day 1 or Day 2 of this readmission, then the infection is hospital-acquired if the case definition for infection is met
- *C. difficile* infection (CDI) may develop up to 28 days following discharge from hospital
- Surgical site infection (SSI) related to non-implant surgery may develop up to 30 days following date of surgery
- SSI related to implant surgery may develop up to 90 days following date of surgery – **Note this change from 1 year in last PPS**

What is an active infection?

- Infection is **ACTIVE** when signs and symptoms of infection are present on the PPS date

OR

- There is documentation that signs and symptoms of infection were present in the past and the patient continues to receive **antimicrobial* therapy** for that infection on the survey date

***Antimicrobials = antibacterials & antifungals**
Antivirals, antihelminthics, antiprotozoals and treatment of TB are not included

When is an infection hospital-acquired?

Onset of HAI
All HAI types *Day 3 onwards*

AND

Case Definition
Meets the case definition on the day of survey
OR
Patient is receiving antimicrobials AND HAI has previously met the case definition between day 1 of antimicrobial treatment and survey day

How do I decide date of onset? Decision hierarchy

1. Date of onset = date of documentation of first symptoms or signs of infection **OR** if not documented, date of onset as discussed with treating clinician
2. If symptoms or signs not documented and the clinician is not available to discuss, if patient has recent relevant positive microbiology results, take date of onset as date of relevant positive microbiology results (e.g. Pneumonia with sputum culture positive)
3. If symptoms or signs not documented and patient does not have relevant positive microbiology results, take date of onset as date treatment started

Infection arising DAY 3 onwards is HAI

DATE OF ADMISSION TO THIS HOSPITAL (DAY 1)

TRANSFERRED TO THIS HOSPITAL FROM ANOTHER ACUTE HOSPITAL?
ADMITTED TO THIS HOSPITAL WITHIN 30 DAYS OF DISCHARGE FROM AN ACUTE HOSPITAL?
ADMITTED TO HOSPITAL WITHIN 90 DAYS OF DATE OF IMPLANT SURGERY?

NO

INFECTION ARISING DAY 3 ONWARDS = HAI

Infection arising DAY 3 onwards

- Donny Duck admitted via ED to St Francis ward on 08/05/17 (DAY 1)
- 10/05/17 (DAY 3) – Develops dysuria, fever 38^{0}C
- MSU & blood cultures taken and commenced empirically on IV co-amoxiclav for suspected UTI
- PPS team arrive on St Francis ward 11/05/17 (DAY 4)
- **ACTIVE ISSUE – CONTINUES ON TREATMENT**
- **HOSPITAL-ACQUIRED - ONSET DAY 3**
- **LIKELY INFECTION SITE – URINARY TRACT**
- **CHECK UTI SURVEILLANCE DEFINITION TO CONFIRM ALL REQUIRED CRITERIA PRESENT TO CALL THIS HAI**

Can a HAI arise on DAY 1 or DAY 2?

Yes, in certain circumstances

HAI arising on DAY 1 & DAY 2

Onset of HAI		Case Definition
Surgical Site Infection *day 1 or day 2* *An SSI is defined as any SSI type which occurs within 30 days of infection of the operation date. In the case of surgery involving an implant, deep or organ space SSI arising up to 90 days after surgery is also considered and the patient either has symptoms that meet the case definition and/or is on antimicrobial treatment for infection.*	**AND**	Meets the case definition on the day of survey
OR		OR
***Clostridium difficile* infection** *day 1 or day 2 AND patient discharged from hospital, acute or non-acute, in preceding 28 days*		Patient is receiving antimicrobials AND HAI has previously met the case definition between day 1 of antimicrobial treatment and survey day
OR		
Device associated infection *Relevant invasive device* in situ placed on day 1 or day 2, resulting in a HAI onset on day 1 or day 2* **Intubation, vascular catheter (PVC/CVC) or urinary catheter*		
OR		
Neonatal infection *Count any active infection arising after birth while infant remains in hospital*		

C. difficile infection arising DAY 1 & DAY 2

DATE OF ADMISSION TO THIS HOSPITAL = DAY 1

↓

TRANSFERRED TO THIS HOSPITAL FROM ANOTHER ACUTE HOSPITAL HAVING BEEN AN INPATIENT THERE ?
ADMITTED TO THIS HOSPITAL WITHIN 28 DAYS OF DISCHARGE FROM AN ACUTE HOSPITAL?

↓

YES

↓

INFECTION ARISING ON DAY 1 & DAY 2 MAY BE HOSPITAL ACQUIRED IF CDI CASE DEFINITION MET

SSI arising DAY 1 & DAY 2

DATE OF ADMISSION TO THIS HOSPITAL (DAY 1)

↓

TRANSFERRED TO THIS HOSPITAL FROM ANOTHER ACUTE HOSPITAL?
ADMITTED TO THIS HOSPITAL WITHIN 30 DAYS OF SURGERY?
ADMITTED TO HOSPITAL WITHIN 90 DAYS OF DATE OF IMPLANT SURGERY?

↓

YES

↓

INFECTION ARISING ON DAY 1 & DAY 2 MAY BE HOSPITAL ACQUIRED IF:

PATIENT ADMITTED TO THIS HOSPITAL WITHIN 30 DAYS OF DATE OF SURGERY PERFORMED IN AN ACUTE HOSPITAL & INFECTION MEETS SSI CASE DEFINITION

PATIENT ADMITTED TO THIS HOSPITAL WITHIN 90 DAYS OF DATE OF IMPLANT SURGERY & INFECTION MEETS SSI-D OR SSI-O CASE DEFINITION

HAI arising on DAY 1 or DAY 2

- Minnee Mouse was discharged home well from this hospital 05/05/17 following a laparotomy and small bowel resection performed 29/04/17
- Minnee represents to ED and is admitted to St Pat's ward on 17/05/17 (DAY 1) complaining of purulent drainage from lower end of laparotomy wound and on examination the infection extends down to the fascia
- Minnee is commenced on empiric IV cefuroxime and oral metronidazole, a wound swab is taken and she is admitted to general surgical ward
- PPS team arrive on St Pat's ward 18/5/17 (DAY 2)

HAI arising on DAY 1 & DAY 2

- Yogi Bears was transferred to ICU in this hospital 16/05/17 for management of acute kidney injury arising secondary to severe *Clostridium difficile* infection diagnosed in referring hospital 08/05/17
- On arrival, 16/05/17 (DAY 1) Yogi is prescribed oral vancomycin since 08/05/17
- PPS team arrive in ICU 17/05/17 (DAY 2)

Infection arising DAY 1 & DAY 2

DATE OF ADMISSION TO THIS HOSPITAL (DAY 1)

INFECTION ARISING ON DAY 1 & DAY 2 MAY BE HOSPITAL ACQUIRED IF:

YES

HAI is pneumonia and patient is intubated

HAI is C-CVC or CRI3-CVC and CVC *in situ*
OR
HAI is C-PVC or CRI3-PVC and PVC *in situ*

HAI is UTI and urethral catheter *in situ*

HAI arising on DAY 1 & DAY 2

- Lisa Sampson transferred to this ICU 08/05/17 (DAY 1) from ICU St Elsewhere for management of worsening acute cardiac failure secondary to viral myocarditis
- On arrival, she has been intubated since 04/05/17
- 09/05/17: Febrile to 39^0C, WCC 17^, purulent secretions and she is also tachypnoeic
- CXR reported to have bilateral diffuse infiltrates more evident in comparison to CXR prior to transfer
- PPS team visit ICU 09/05/17 (DAY 2)
- Lisa not currently prescribed antimicrobials

HAI arising on DAY 1 & DAY 2

- What if Lisa was first admitted to hospital 08/05/17 from community via ED to ICU?
- Intubated on 08/05/17 and transferred to this ICU 08/05/17
- 09/05/17 (DAY 2): febrile to 39^0C, WCC 17^, purulent secretions and tachypnoeic, with worsening CXR infiltrates – PPS team arrive on ICU

HAI arising on DAY 1 & DAY 2 NEONATAL

Onset of HAI		Case Definition
Neonatal infection *Count any active infection arising after birth while infant remains in hospital*	**AND**	Meets the case definition on the day of survey OR Patient is receiving antimicrobials AND HAI has previously met the case definition between day 1 of antimicrobial treatment and survey day

INFECTION ARISING AT ANY TIME FOLLOWING BIRTH WHILE NEONATE REMAINS IN HOSPITAL IS HAI PROVIDED IT MEETS CASE DEFINITION OF INFECTION

ALWAYS START WITH NEONATAL INFECTION CASE DEFINITIONS

Case Definitions of HAI

- HAI case definitions are in PPS protocol Appendix B
- Case definitions are surveillance definitions
- Surveillance definitions may differ from clinician's impression/judgement
- HAI case definitions MUST be strictly applied to ensure consistency in reporting
  - PN1 in Scotland = PN1 in Latvia = PN1 in Italy

HAI case definitions
No significant change since 2012

- **HELICS** – PN, SSI, BSI, CRI, UTI
- **ECDC** – CDI
- **KISS** – Specific neonatal case definitions
- **US CDC/NHSN** – Where no European case definitions available
- Your job is to decide if patient has active infection, if infection is hospital-acquired and if infection meets a HAI case definition

HAI case definitions

- Case definitions are **NOT** perfect
- There will be cases where you feel patient has HAI and case definition is not met
- There will be cases where the clinician has decided their patient has a HAI but the PPS case definition is not met
- There will be cases where information that becomes available tomorrow may mean a HAI case definition is met – Irrelevant: if you are doing the PPS today – never go back to get more information after the patient form is completed
- Case definitions **MUST** be strictly applied

PPS Ireland 2012

Table 4.16: Number, percentage and prevalence of HAI, by HAI type

Rank Order	HAI Infection Site	HAI		
		N	%	Prevalence (%)
1	Surgical site infections	91	18.2	1.0
2	Pneumonia	86	17.2	1.0
3	Urinary tract infections	75	15.0	0.8
4	Bloodstream infections	66	13.2	0.7
5	Gastrointestinal system infections	49	9.8	0.5
6	Systemic infections	38	7.6	0.4
7	Eye, ear, nose, throat or mouth infections	23	4.6	0.3
8	Bone and joint infections	19	3.8	0.2
9	Skin and soft tissue infections	16	3.1	0.2
10	Neonatal specific infections	14	2.8	2.7*
11	Reproductive tract infections	7	1.4	0.1
12	Lower respiratory tract infections	7	1.4	0.1
13	Catheter-related infections	5	1.0	0.1
14	Central nervous system infections	3	0.6	<0.1
15	Cardiovascular system infections	2	0.4	<0.1
	Total	501	100	

*Prevalence of neonatal specific infections in the 526 surveyed patients who were ≤4 weeks old.

PPS Ireland 2012 National Report

Pneumonia - PN

- **THREE PARTS** TO PNEUMONIA DEFINITION

- **RADIOLOGY**

  PLUS

- **PATIENT SYMPTOMS**

  PLUS

- **MICROBIOLOGY**
- **To meet PN case definition, need positive findings in each of the three parts**

PN – Appendix B P67
RADIOLOGY & PATIENT SYMPTOMS

1.1 PN: PNEUMONIA

Rx

Two or more serial chest X-rays or CT-scans of lungs with suggestive image of pneumonia for patients with underlying cardiac or pulmonary disease*. In patients without underlying cardiac or pulmonary disease, one definitive chest X-ray or CT-scan is sufficient.

and at least ONE of the following

Symptoms

- Fever > 38 °C with no other cause
- Leukopenia (<4000 WBC/mm^3) or leucocytosis (≥ 12 000 WBC/mm^3)

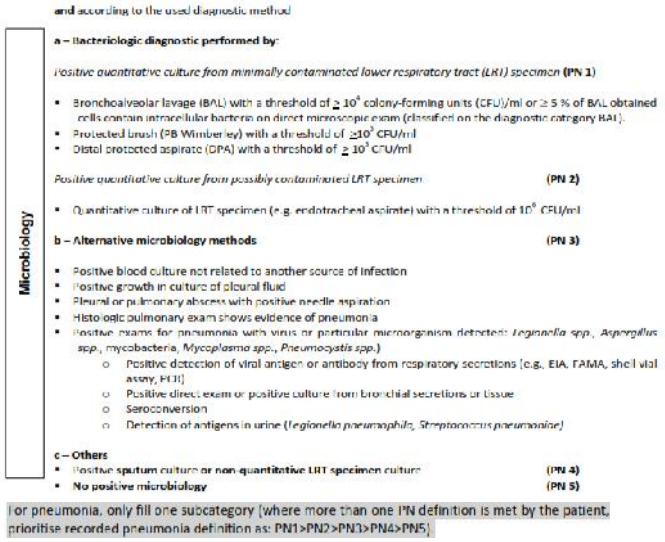
and at least ONE of the following
(or at least TWO if clinical pneumonia only = PN 4 and PN 5)

- New onset of purulent sputum, or change in character of sputum (colour, odour, quantity, consistency)
- Cough or dyspnoea or tachypnoea
- Suggestive auscultation (rales or bronchial breath sounds), rhonchi, wheezing
- Worsening gas exchange (e.g., O_2 desaturation or increased oxygen requirements or increased ventilation demand)

PN reporting instruction:
*For patients with underlying cardiac or pulmonary disease, one definitive CXR or CT scan for the current episode will suffice, provided it may be compared with a previous CXR or CT scan performed within the last 12 months

Rx = Radiology

PN – APPENDIX B P67 MICROBIOLOGY



and according to the used diagnostic method

Microbiology

a – Bacteriologic diagnostic performed by:

Positive quantitative culture from minimally contaminated lower respiratory tract (LRT) specimen **(PN 1)**

- Bronchoalveolar lavage (BAL) with a threshold of $\geq 10^4$ colony-forming units (CFU)/ml or ≥ 5 % of BAL obtained cells contain intracellular bacteria on direct microscopic exam (classified on the diagnostic category BAL).
- Protected brush (PB Wimberley) with a threshold of $\geq 10^3$ CFU/ml
- Distal protected aspirate (DPA) with a threshold of $\geq 10^3$ CFU/ml

Positive quantitative culture from possibly contaminated LRT specimen **(PN 2)**

- Quantitative culture of LRT specimen (e.g. endotracheal aspirate) with a threshold of 10^6 CFU/ml

b – Alternative microbiology methods **(PN 3)**

- Positive blood culture not related to another source of infection
- Positive growth in culture of pleural fluid
- Pleural or pulmonary abscess with positive needle aspiration
- Histologic pulmonary exam shows evidence of pneumonia
- Positive exams for pneumonia with virus or particular microorganism detected: *Legionella spp., Aspergillus spp.*, mycobacteria, *Mycoplasma spp., Pneumocystis spp.*)
  - Positive detection of viral antigen or antibody from respiratory secretions (e.g., EIA, FAMA, shell vial assay, PCR)
  - Positive direct exam or positive culture from bronchial secretions or tissue
  - Seroconversion
  - Detection of antigens in urine (*Legionella pneumophila, Streptococcus pneumoniae*)

c – Others

- Positive sputum culture or non-quantitative LRT specimen culture **(PN 4)**
- **No positive microbiology** **(PN 5)**

For pneumonia, only fill one subcategory (where more than one PN definition is met by the patient, prioritise recorded pneumonia definition as: PN1>PN2>PN3>PN4>PN5).

BACK TO LISA

- Lisa Sampson transferred to this ICU 08/05/17 (DAY 1) from ICU St Elsewhere for management of worsening acute cardiac failure secondary to viral myocarditis
- On arrival, she has been intubated since 04/05/17
- During early hours 09/05/17, noted to be **febrile to 39^{0}C**, **WCC 17^**, **purulent secretions** and she is also **tachypnoeic**
- **CXR demonstrates bilateral diffuse infiltrates which are more evident in comparison to CXR prior to transfer**
- PPS team visit ICU 09/05/17 (DAY 2)
- No microbiology results back on secretions sent in early hours

Lisa's Patient Form (Form C)
Section 4: HAI Data

Also review Practice Case 1

Surgical Site Infection - SSI

- Timing of HAI onset is **VERY** important for SSI category
  - **Non-implant surgery**: Any SSI type arising **up to 30 days postop** is HAI
  - **Implant surgery**: Deep or organ space SSI arising **up to 90 days postop** is HAI
- If you think patient has SSI – Record date of operation, whether implant inserted or not & date of infection onset
- Three categories of SSI:
  - **Superficial** – onset up to day 30 post any surgery
  - **Deep** – onset up to day 30 post non-implant surgery and day 90 post implant surgery
  - **Organ space** – onset up to day 30 post non-implant surgery and day 90 post implant surgery

SSI-S – APPENDIX B P72

1.5 SSI: SURGICAL SITE INFECTION

Superficial incisional (SSI-S)

Infection occurs within 30 days after the operation **and** infection involves only skin and subcutaneous tissue of the incision **and** at least **ONE** of the following is present:

1. Purulent drainage with or without laboratory confirmation, from the superficial incision
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision
3. At least **ONE** of the following signs or symptoms of infection: pain or tenderness, localised swelling, redness, or heat **and** superficial incision is deliberately opened by surgeon, **unless** incision is culture-negative
4. Clinical diagnosis of superficial incisional SSI made by consultant clinician

SSI-D – APPENDIX B P72

Deep incisional (SSI-D)

Infection occurs within 30 days after the operation if no implant is left in place or within 90 days if implant is in place **and** the infection appears to be related to the operation **and** infection involves deep soft tissue (e.g., fascia, muscle) of the incision **and** at least **ONE** of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least **ONE** of the following signs or symptoms: fever (>38° C), localised pain or tenderness, unless incision is culture-negative
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation or by histopathologic or radiologic examination
4. Diagnosis of deep incisional SSI made by consultant clinician

SSI-O – APPENDIX B P72

Organ/Space (SSI-O)

Infection occurs within 30 days after the operation if no implant is left in place or within 90 days if implant is in place **and** the infection appears to be related to the operation **and** infection involves any part of the anatomy (e.g., organs and spaces) other than the incision which was opened or manipulated during an operation and at least **ONE** of the following:

1. Purulent drainage from a drain that is placed through a stab wound into the organ/space
2. Organisms isolated from an aseptically-obtained microbiological culture of fluid or tissue in the organ/space
3. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
4. Diagnosis of organ/space SSI made by consultant clinician

BACK TO MINNEE...

- Minnee Mouse was discharged home well from this hospital 05/05/17 following a laparotomy and small bowel resection performed 29/04/17
- Twenty days post-op: Minnee represents to ED and is admitted to St Pat's ward on 17/05/17 (DAY 1) complaining of purulent drainage from lower end of laparotomy wound and on examination the infection extends down to the fascia
- Minnee is commenced on empiric IV cefuroxime and oral metronidazole, a wound swab is taken and she is admitted to general surgical ward
- PPS team arrive on St Pat's ward 18/05/17 (DAY 2)
- Wound swab result is pending

Minnee's Patient Form (Form C) Section 4 – HAI data

Also review Practice Case 2

Urinary Tract Infection - UTI

- There are two types of UTI:
- Microbiologically-confirmed UTI & patient has symptoms of UTI: At least **one** symptom and positive urine culture

OR

- Not microbiologically-confirmed & patient has symptoms of UTI: At least **two** symptoms and one other diagnostic criteria

UTI
Appendix B P69

1.3 UTI: URINARY TRACT INFECTION

UTI-A: microbiologically confirmed symptomatic UTI

Patient has at least **ONE** of the following signs of symptoms with no other recognised cause: fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness **and** patient has a positive urine microbiology culture report. That is, ≥ 10^5 microorganisms per ml of urine with no more than two species of microorganisms detected in the same urine sample.

UTI-B: not microbiologically confirmed symptomatic UTI

Patient has at least **TWO** of the following with no other recognised cause: fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness **and** at least **ONE** of the following:

a. Positive dipstick for leukocyte esterase and/or nitrite
b. Pyuria – White blood cells (WBC) or pus cells seen on urine specimen microscopy with ≥10 WBC/ml or ≥ 3 WBC/high-power field of unspun urine
c. Organisms seen on Gram stain of unspun urine
d. At least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or *Staphylococcus saprophyticus*) with ≥ 10^2 colonies/ml urine in non-voided specimens
e. ≤10^5 colonies/ml of a single uropathogen (Gram-negative bacteria or *S. saprophyticus*) in a patient being treated with effective antimicrobial agent for a urinary infection
f. Clinician clinical diagnosis of a urinary tract infection
g. Clinician institutes appropriate therapy for a urinary infection

UTI reporting instruction:
For urinary tract infection, only fill in one subcategory (where more than one UTI definition is met by the patient, prioritise urinary tract infection as UTI-A>UTI-B).

Back to Donny...

- Donny Duck admitted via ED to St Francis ward on 08/05/17 (DAY 1)
- 10/05/17 (DAY 3) – Develops dysuria, fever 38^0C
- MSU & blood cultures taken and commenced empirically on IV co-amoxiclav for suspected UTI
- PPS team arrive on St Francis ward 11/05/17 (DAY 4)
- Donny's MSU result is pending

Donny's Patient Form (Form C) Section 4: HAI data

Also review Practice Case 3: HAI 1

Bloodstream Infection (BSI)

- To have BSI, patient **MUST** have positive blood cultures
- Significant pathogen – **ONE** positive blood culture
- Organism normally regarded as skin contaminant – **TWO** positive blood cultures **AND** at least one of: Fever >38^{0}C, chills or hypotension

Bloodstream Infection (BSI)

- If BSI case definition met, next decide what the source/origin of the BSI was:
  - Primary BSI of unknown source/origin following review of available information
  - Primary BSI due to infected vascular catheter
  - BSI secondary to infection elsewhere
- BSI source unknown because no information available or information missing

BSI – Protocol P73

1.6 BSI: BLOODSTREAM INFECTION

BSI: Laboratory-confirmed bloodstream infection

- **ONE** positive blood culture for a recognised pathogen (e.g., *Staphylococcus aureus, Escherichia coli, Candida albicans* etc.) [If any doubt regarding what constitutes a recognised pathogen, please discuss with microbiologist]

or

- Patient has at least **ONE** of the following signs or symptoms: fever (>38°C), chills or hypotension
  and
  TWO positive blood cultures for a common skin contaminant** (the same organism must have been isolated from two separate blood culture samples, usually taken within a **48 hour period**)

**Skin contaminants = coagulase-negative staphylococci, *Micrococcus sp., Propionibacterium acnes, Bacillus spp., Corynebacterium spp.*

BSI Protocol P73

Primary BSI:
Catheter-related BSI: Primary BSI due to infection of either a peripheral vascular catheter (PVC) or central vascular catheter (CVC)
When the same microorganism was cultured from both the blood and the vascular catheter, this is microbiologically confirmed catheter-related BSI (CRI3): CRI3-PVC or CRI3-CVC. See CRI definitions below for further information (See **Appendix D** for algorithm for diagnosis of catheter related-infection).
When the patient has positive blood cultures (one or more sets with a significant pathogen or at least two sets with organism regarded as a skin contaminant) without microbiological confirmation of the same organism from the vascular catheter tip or exit site swab and the patient's symptoms improve within 48 hours after removal of the catheter, this is clinically-diagnosed catheter-related BSI without microbiological confirmation linking the blood culture to the vascular catheter (C-PVC or C-CVC).
Unknown origin (UO): Primary BSI of unknown origin. Not related to vascular catheter infection and not meeting definition of secondary BSI below. Decision to classify as BSI-UO has been verified during the PPS, as no identifiable source was found for that BSI on review of all available information)

Secondary BSI:
BSI arising secondary to an infection elsewhere in the body.
When the same micro-organism was cultured from both the blood and another infection site or strong clinical evidence exists that the patient's BSI developed secondary to another infection site, invasive diagnostic procedure or foreign body.
Pulmonary infection resulting in BSI **(S-PUL)**
Urinary tract infection resulting in BSI **(S-UTI)**
Digestive tract infection resulting in BSI **(S-DIG)**
Surgical site infection resulting in BSI **(S-SSI)**
Skin and soft tissue infection resulting in BSI **(S-SST)**
Other infection not covered by those categories above resulting in BSI **(S-OTH)**
Note: Secondary BSI is reported as a separate HAI, in addition to the primary infection, if the primary infection matches the relevant HAI case definition.

BSI Source Unknown (UNK): No information available about the BSI source or information missing.

BSI Case Study

- Mollee Maloney, 82 year-old, ED admission to St Pat's ward on 05/05/17 with community-acquired pneumonia and acute kidney injury
- Empirically treated with IV co-amoxiclav & PO clarithromycin
- 10/05/17 (Day 6) – febrile, hypotension
- Elevated CRP, WCC 22 (^from 15 09/05/17)
- Repeat CXR – no new changes
- Blood cultures and MSU taken, empiric vancomycin added 1gm bd IV

BSI Case Study

- 11/05/17 (Day 7) – Ongoing pyrexia, co-amoxiclav changed to IV piperacillin-tazobactam 4.5gm tds
- Transferred to medical HDU 11/05/17
- 11/05/17 pm – Yeasts seen in blood cultures
- Caspofungin 70mg IV stat dose given – for further once daily dosing of 50mg
- No CVC, no intra-abdominal concerns, renal ultrasound normal, MSU: WCC 0 and no growth
- 13/05/17 – Microbiology laboratory confirm *Candida parapsilosis* from blood cultures
- 14/05/17 – PPS team arrive on medical HDU

Mollee's Patient Form C
Section 4: HAI Data

Mollee's ward (Medical HDU) must be assigned a ward specialty on Ward List A1 & A2
How would you code the ward specialty for Mollee's ward on 14/05/17?

Appendix A - Tables

Table 1: Ward Specialty Code List

Ward specialty codes	Categories (ward specialty)
SURGERY – SUR	Choose for majority of acute surgical wards or high dependency units (HDU) to which patients with a variety of surgical conditions are generally admitted
MEDICINE – MED	Choose for the majority of acute medical wards or HDU to which patients with a variety of medical conditions are generally admitted
INTENSIVE CARE – ICU	Intensive care unit for adult patients Remember NICU is coded as NEONATAL and PICU is coded as PAEDIATRICS High dependency unit (HDU) is not coded as ICU – Choose SUR or MED instead
GYNAECOLOGY/OBSTETRICS – GO	Choose if >80% of patients on the ward belong to the GYNAECOLOGY/OBSTETRICS specialties
PAEDIATRICS – PED	Paediatrics including Paediatric ICU (PICU)
NEONATAL - NEO	Neonatology including Neonatal ICU (NICU)
GERIATRICS/CARE OF THE ELDERLY – GER	Geriatrics or medicine for the elderly – Choose if >80% of patients on the ward belong to the GERIATRICS/CARE OF THE ELDERLY specialty
PSYCHIATRY – PSY	Choose if >80% of patients on the ward belong to the PSY specialty
REHABILITATION –RHB	Choose if >80% of patients on the ward belong to the RHB specialty
OTHER	Choose if <80% of patients on the ward belong to a single specialty, but there are mixed medical and surgical patients admitted to the ward Choose for admitted patients who remain in the ED or who are accommodated on a Day ward as admitted patients
MIXED WARD	Mixed – Choose if <80% of patients on the ward belong to a single specialty but there are only two specialties of patients admitted to the ward (e.g., haematology & oncology)

Also review Practice Cases 1 (HAI 2) & 3 (HAI 2)

Catheter-Related Infection (CRI)

- Infection related to a vascular catheter
  - Central vascular catheter (CVC)
  - Peripheral vascular catheter (PVC)
- Three categories of CRI
- **CRI1** = Infected exit site with significant growth from the catheter tip (>15 CFU/mL)
- **CRI2** = Systemically unwell patient who improves following removal of catheter and significant growth from the catheter tip (>15 CFU/mL)

Catheter-Related Infection (CRI)

- **CRI3** – Patient has positive blood cultures (**ONE** set if significant pathogen and **TWO** sets if common skin contaminant)

AND there is microbiological evidence linking the blood culture to the catheter:

Positive catheter tip culture (>15 CFU/m L) **and/or** positive exit site swab culture

or Differential time to positivity (DTP) criteria met

Catheter-Related Infection (CRI)

- **Differential time to positivity (DTP)** – Patient with CVC has signs or symptoms of infection
- Simultaneous blood cultures taken from CVC and from a peripheral vein – CVC left *in situ*
- If blood culture taken from CVC flags positive at least two hours earlier than blood culture from peripheral vein with same bug = positive DTP
- CVC blood culture positive first = more bacteria in CVC => CVC likely source of infection

CRI PVC Appendix B P74

CRI1-PVC: Local PVC-related infection (no positive blood culture)

- Semi-quantitative PVC tip culture with >15 colony-forming units (CFU) or quantitative PVC tip culture with ≥ 10^3 CFU/ml of a microorganism isolated from the PVC tip **and**
- There is evidence of pus/inflammation at the PVC insertion site

CRI2-PVC: General PVC-related infection (no positive blood culture)

- Semi-quantitative PVC tip culture with >15 colony-forming units (CFU) or quantitative PVC tip culture with ≥ 10^3 CFU/ml of a microorganism isolated from the PVC tip **and**
- The patient's clinical signs of systemic infection improve within 48 hours after PVC removal

CRI3-PVC: Microbiologically confirmed PVC-related bloodstream infection

- When the same microorganism was cultured from both the blood **and** the vascular catheter (PVC tip or PVC exit site swab), this is microbiologically confirmed catheter-related BSI (CRI3).
- The same microorganism isolated from a positive blood culture taken 48 hours before or after removal of the PVC (at least **ONE** positive blood culture for a recognised pathogen and at least **TWO** positive blood cultures for common skin contaminants) and also from a positive culture of either:
- Semi-quantitative PVC tip culture with >15 colony-forming units (CFU) or quantitative PVC tip culture with > 10^3 CFU/ml of the same microorganism isolated from the PVC tip **or**
- Positive culture from pus swab of the PVC exit site with the same microorganism isolated from the swab

CRI-CVC Appendix B P74

CRI1-CVC: Local CVC-related infection (no positive blood culture)

- Semi-quantitative CVC tip culture with >15 colony-forming units (CFU) or quantitative CVC tip culture with ≥ 10^3 CFU/ml of a microorganism isolated from the CVC tip **and**
- There is evidence of pus/inflammation at the CVC insertion site or tunnel

CRI2-CVC: General CVC-related infection (no positive blood culture)

- Semi-quantitative CVC tip culture with >15 colony-forming units (CFU) or quantitative CVC tip culture with ≥ 10^3 CFU/ml of a microorganism isolated from the CVC tip **and**
- The patient's clinical signs of systemic infection improve within 48 hours after CVC removal

CRI3-CVC: microbiologically confirmed CVC-related bloodstream infection (positive blood culture)

- When the same microorganism was cultured from both the blood **and** the vascular catheter (CVC tip or CVC exit site swab), this is microbiologically confirmed catheter-related BSI (CRI3)
- The same microorganism isolated from a positive blood culture taken 48 hours before or after removal of the CVC (at least ONE positive blood culture for a recognised pathogen and at least TWO positive blood cultures for common skin contaminants) **and** also from a positive culture of either:
- Semi-quantitative CVC tip culture with >15 colony-forming units (CFU) or quantitative CVC tip culture with ≥ 10^3 CFU/ml of the same microorganism isolated from the CVC tip **or**
- Positive culture from pus swab of the CVC exit site with the same micro-organism isolated from the swab **or**
- Criterion of differential time to positivity (DTP) of blood cultures achieved: When a patient with a CVC *in situ* develops symptoms or signs of infection, it is recommended that simultaneous blood cultures should be taken both from the CVC and from a peripheral vein. If the set of blood culture bottles taken from the CVC flag with positive bacterial growth two hours or more before/earlier than the set of blood culture bottles taken from the peripheral vein, this suggests that the CVC is the source of the patient's BSI. Positive DTP criterion can only be applied to CVC and peripheral blood culture sets taken at the same time.

CRI Case Study

- Homer Sampson, 60 year-old male
- Admitted to this hospital via ED 01/05/2017 and directly transferred to ICU with severe pancreatitis
- Temporary non-tunnelled CVC inserted 01/05/2017 (**DAY 1**)
- 07/05/17 (**DAY 7**): Pyrexial >38.5^{0}C, blood cultures taken from CVC and peripheral vein
- CVC exit site noted to be red, CVC removed and tip sent to microbiology
- Commenced empirically on IV vancomycin 1.5 gm bd

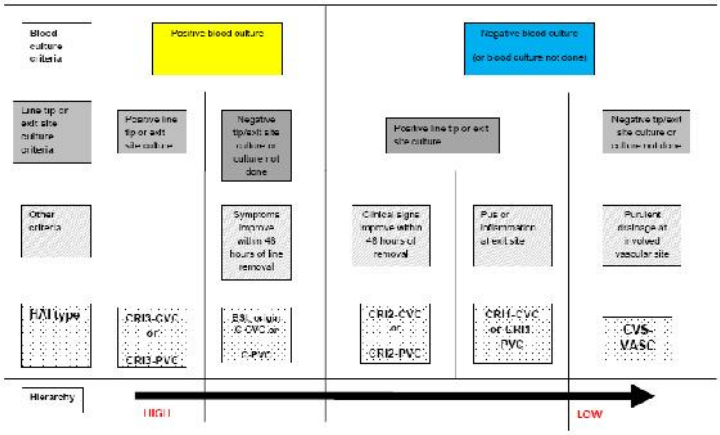
CRI Case Study

- 09/05/17: Blood cultures (peripheral and central) remain sterile to date
- CVC tip culture: *Staphylococcus aureus* isolated in significant quantity >100 CFU/mL Sensitive to flucloxacillin (MSSA)
- Patient has improved and vancomycin rationalised to flucloxacillin 2gm qds IV
- PPS team arrive on ICU 11/05/17

Homer's Patient Form (Form C)
Section 4: HAI data

Algorithm – Appendix D

Appendix D: Algorithm for diagnosis of catheter-related infection



Clostridium difficile infection (CDI)

- The timing of CDI onset is important:
- If CDI onset is on DAY 1 or DAY 2, then CDI can be a HAI if the patient was discharged from hospital within 28 days of admission date or transferred from another hospital
- Otherwise, CDI occurring DAY 3 onwards = HAI
- Majority of CDI is diagnosed based on patient having diarrhoea **AND** a positive laboratory test for *Clostridium difficile*
- Less commonly, CDI is diagnosed on endoscopy or histology of colectomy specimen

CDI Appendix B P78

1.9 GI: GASTROINTESTINAL SYSTEM INFECTION

GI-CDI: *Clostridium difficile* infection

Clostridium difficile infection must meet at least **ONE** of the following criteria:

1. Diarrhoeal stools or toxic megacolon **and** a positive laboratory assay for *C. difficile* toxin A and/or toxin B in stools **or** toxin-producing *C. difficile* detected in stool via culture, PCR or other means
2. Pseudomembranous colitis revealed by lower gastro-intestinal endoscopy
3. Colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea) on a specimen obtained during endoscopy, colectomy or post mortem

NOTE: If clinical signs of *Clostridium difficile* infection appear within 28 days after hospital discharge period, GI-CDI must be defined as hospital-acquired infection (HAI)

GI-CDI reporting instruction:

If you report CDI as a HAI, don't forget to also report *C. difficile* as the causative microorganism using MO-code CLODIF. The only circumstance where CLODIF would not be reported would be if the patient's CDI was diagnosed only on the basis of findings of pseudomembranous colitis at endoscopy or colectomy without a positive microbiological result for *C. difficile* toxin.

Back to Yogi Bears……

- Yogi Bears was transferred to ICU in this hospital 16/05/17 for management of acute kidney injury arising secondary to severe *Clostridium difficile* infection diagnosed in referring hospital 08/05/17
- On arrival, 16/05/17 (DAY 1) Yogi is prescribed oral vancomycin since 08/05/17
- PPS team arrive in ICU 17/05/17 (DAY 2)
- **ACTIVE CDI, ACQUIRED IN OTHER ACUTE HOSPITAL**

Yogi Bears Patient Form C Section 4 HAI

Also review Practice Case 3: HAI 3

Any Questions?

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