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

PPS Data Collector Training
April 2017

Antimicrobial Use & Case Studies
Presentation 4

Case Studies

• All cases are fictional
Antimicrobial Use

• Prescription of antibacterials and/or antifungals via systemic route
  
  **Systemic route:**
  
  – Parenteral: intravenous (IV) or intramuscular (IM)
  – Enteral: oral (PO), rectal (PR), per NG/NJ tube
  – Inhalation: nebulised

• This PPS is **NOT** collecting data on:
  
  – Antiviral, antihelminthic, antiprotozoal use
  – Treatment of tuberculosis
  – Topical antimicrobial use

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Antimicrobial Use

• Record all systemic antimicrobials prescribed at time of the survey:
  
  – Treatment of infection – CI, LI, HI
  – Medical prophylaxis – MP
  – Other indication – erythromycin for prokinetic use - O

• Record planned/intermittent antimicrobial use
  
  – Three times weekly medical prophylaxis
  – Haemodialysis patient receiving antimicrobial treatment at haemodialysis sessions – 3/week or alternate days
  – Patient with renal failure receiving alternate day treatment
Antimicrobial Use

• Record surgical antimicrobial prophylaxis prescribed between 8am on day before survey and 8am on day of survey – 24 hour period – SP
• Do not record surgical prophylaxis newly prescribed after 8am on day of survey
• This section on antimicrobial use aims to determine the prescriber’s reason for the antimicrobial, based on available information

Patient Form (Form C) – Section 5 Antimicrobial Use
Form C: Section 5

- Antimicrobials are coded by their generic name AND accompanying ATC5 code
- See Appendix A – Tables 4a & 4b listing generic names with ATC5 codes
  - Top 18 antimicrobials; Table 4a
  - A-Z list of all antimicrobials; Table 4b
  - Note, some agents have a different ATC5 code depending on route of administration:
    - Metronidazole enteral (e.g. PO/PR) = P01AB01
    - Metronidazole parenteral (IV) = J01XD01
    - Vancomycin enteral (CDI treatment only) versus parenteral (IV)

Appendix A – Table 4a

<table>
<thead>
<tr>
<th>Antimicrobial generic name</th>
<th>ATC5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin and enzyme inhibitor – co amoxiclav</td>
<td>J01CA02</td>
</tr>
<tr>
<td>Piperacillin and enzyme inhibitor – piperacillin-β-lactamase</td>
<td>J01CA05</td>
</tr>
<tr>
<td>Metronidazole (oral, rectal)</td>
<td>P01AB01</td>
</tr>
<tr>
<td>Metronidazole (parenteral/IV)</td>
<td>J01XD01</td>
</tr>
<tr>
<td>Flornoxacin</td>
<td>J01CM05</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>J01MA02</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>J01CC02</td>
</tr>
<tr>
<td>Clindamycin (oral)</td>
<td>J01CA02</td>
</tr>
<tr>
<td>Vancomycin parenteral (IV)</td>
<td>J01KQ01</td>
</tr>
<tr>
<td>Vancomycin enteral (oral) (Treatment of C. difficile infection only)</td>
<td>J01KQ02</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>J01GA03</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>J01M101</td>
</tr>
<tr>
<td>Meropenem</td>
<td>J01KA03</td>
</tr>
<tr>
<td>Ambicillin</td>
<td>J01G006</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>J01CA06</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>J01AZ02</td>
</tr>
<tr>
<td>Sulfamethoxazole and trimethoprim (co-trimoxazole)</td>
<td>J01EE01</td>
</tr>
<tr>
<td>Telithromycin</td>
<td>J01AX02</td>
</tr>
</tbody>
</table>
Form C: Section 5

- There is space to record up to five separate antimicrobial prescriptions
  - Antimicrobials 1 & 2 on page 2
  - Antimicrobials 3, 4, & 5 on extension sheet

- DON'T USE TRADE NAMES

- **Generic** name + ATC5 code from Appendix A Table 4a/4b

- Route of administration
- Doses per day
- Strength of one dose
- Unit of measurement

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**Form C: Section 5**

<table>
<thead>
<tr>
<th>Doses per day of the current antimicrobial</th>
<th>Report dosage for current antimicrobial, as prescribed in the medication chart or anaesthetic sheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Number of doses per day</td>
</tr>
<tr>
<td></td>
<td>For antimicrobials administered on alternate day dosing regimen, record 0.5 for doses per day</td>
</tr>
<tr>
<td></td>
<td>For antimicrobials administered intermittently, as per therapeutic drug monitoring results (e.g., vancomycin in patients on dialysis), determine the number of doses per week (e.g., 2 doses = 2/7 = 0.29, 3 doses = 3/7 = 0.43)</td>
</tr>
<tr>
<td></td>
<td>For example: Intermittent vancomycin given twice per week = 0.29</td>
</tr>
</tbody>
</table>
Indication for antimicrobial use

- There are TEN options for indication:
  - **Treatment of infection:**
    - Community-acquired infection = CI
    - Long-term care facility/nursing home-acquired infection = LI
    - Hospital-acquired infection = HI
  - **Surgical prophylaxis:**
    - SP1 – Single dose prescribed one dose only
    - SP2 – >1 dose but <24 hours total
    - SP3 – Prescribed for >24 hours
- **Medical prophylaxis** – e.g. co-trimoxazole prophylaxis against pneumocystis pneumonia, penicillin administered during labour to woman known to be colonised with beta haemolytic streptococcus Group B a.k.a Group B Strep, azithromycin used for prevention of exacerbations of bronchiectasis = MP
- **Other indication** – e.g. Erythromycin used as pro-kinetic, = O
- **Unknown indication** = UI – indication not recorded in notes
- **Unknown** = UNK – Indication could not be verified as notes missing/unavailable
Diagnosis site code
See Appendix A – Table 5

- Diagnosis site = Prescriber’s opinion regarding likely site of infection
- Diagnosis site is ONLY recorded when the indication for antimicrobial use is treatment intention for infection (CI, LI, HI)
- If indication is prophylaxis (MP or SP) or ‘other’ reason – record NA – not applicable as diagnosis site code
- Diagnosis site code list differs from HAI case definition list:
  - Prescriber may be treating infection - CI or LI or HI
  - Prescriber is using clinical judgement
  - You are using HAI surveillance case definitions
- It is not the objective of the PPS to relate use of antimicrobials to HAI

Table 5: Prescriber’s Diagnosis Site Code List for Antimicrobial Use

<table>
<thead>
<tr>
<th>Code</th>
<th>Diagnosis site for which the patient receives antimicrobial therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNE</td>
<td>Central nervous system infections (e.g., meningitis, brain abscess)</td>
</tr>
<tr>
<td>CV</td>
<td>Cardiovascular infections (e.g., endocarditis, coronary artery disease)</td>
</tr>
<tr>
<td>LM</td>
<td>Lower limb infections (e.g., osteomyelitis, diabetic foot infection)</td>
</tr>
<tr>
<td>GI</td>
<td>Gastrointestinal infections (e.g., enterocolitis, C. difficile infection)</td>
</tr>
<tr>
<td>SI</td>
<td>Soft tissue infection involving skin or soft tissue, but not bone</td>
</tr>
<tr>
<td>SIOT</td>
<td>Site of soft tissue infection, includes cellulitis, wound infection and deep soft tissue infection, not involving bone and not related to surgery</td>
</tr>
<tr>
<td>BRSI</td>
<td>Bacterial rhinocerebral sinusitis related to surgery at site of infection, includes prosthetic joint infection</td>
</tr>
<tr>
<td>NAD</td>
<td>Non-applicable, antimicrobials not related to surgery</td>
</tr>
<tr>
<td>LVS</td>
<td>Larynx or symptomatic lower urinary tract infection</td>
</tr>
<tr>
<td>PVE</td>
<td>Perivaginalia or symptomatic upper urinary tract infection</td>
</tr>
<tr>
<td>AB</td>
<td>Antibiotics, bacteriuria – positive urine microbiology results in the absence of signs of urinary tract infection</td>
</tr>
<tr>
<td>OSYS</td>
<td>Osteomyelitis or sepsis – positive urine microbiology results in the absence of signs of urinary tract infection</td>
</tr>
<tr>
<td>GUM</td>
<td>Genitourinary, epididymo-orchitis, includes sexually transmitted infection (STI) in men</td>
</tr>
<tr>
<td>LAB</td>
<td>Laboratory-confirmed clinically-significant positive blood cultures (bacteremia or bloodstream infection)</td>
</tr>
<tr>
<td>CSEP</td>
<td>Clinical suspected bloodstream infection without microbiology laboratory confirmation of positive blood cultures (blood cultures have not been collected or laboratory has confirmed that blood cultures are negative after five days incubation)</td>
</tr>
<tr>
<td>FNI</td>
<td>Fungal meningitis or other forms of manifestation of infection without an obvious site in an immunocompromised host (e.g. patient with HIV infection, patient receiving chemotherapy or other immunosuppressive therapy)</td>
</tr>
<tr>
<td>UND</td>
<td>Unidentified site for infection with no systemic inflammation</td>
</tr>
<tr>
<td>NA</td>
<td>Not applicable, indication for antimicrobial use is not for treatment intention of infection - CI, LI, HI</td>
</tr>
</tbody>
</table>

New additions since 2012
Form C: Section 5

• ‘Reason recorded in notes’:
  • Check the notes/medication chart/op note to see if prescriber recorded reason for prescription at the time of prescribing: ‘Yes’ or ‘No’
  • Quality prescribing indicator
  • ‘Notes not available’ option should only be used if notes/medication chart unavailable for review
  • Beware rewritten treatment prescriptions – may need to go back to original start date

Meets local policy

• Answers are: ‘No’, ‘Yes’, ‘Not assessable’ or ‘Not known’
  • ‘Not known’ only selected if patient’s notes are not available for review
  • Assess compliance with local policy based on choice of agent only – dose, frequency, duration, route are not factors in assessing compliance
Meets local policy – YES or NO?

- Prescription meets local prescribing recommendation for:
  - Empirical treatment of infection
  - Surgical antimicrobial prophylaxis
- Prescription has been rationalised based on latest microbiology results
- Prescription of a restricted antimicrobial based on advice and approval of infection specialist (microbiologist or ID physician)

Meets local policy – Not assessable

- If there is no local policy for that clinical scenario or surgical procedure: prescription is not assessable
- MP and O prescriptions should be recorded as not assessable
- Prescription can only be assessed if the reason for prescription can be determined from review of patient’s notes and/or discussion with staff caring for the patient – If reason cannot be determined: prescription is not assessable
- If patient has an antimicrobial allergy preventing compliance with local policy: prescription is not assessable

- However, if the prescription is for a restricted list antimicrobial and is prescribed on advice of an infection specialist, record it as meeting local policy
Determining duration & alteration of treatment

- Date started on current antimicrobial = Record only if indication for antimicrobial is for treatment of infection (CI, HI, LI)

- Make sure medication chart has not been rewritten – if yes, will need to check previous medication chart to confirm start date – BEWARE REWRITTEN PRESCRIPTIONS WITH DATE OF RENEWAL MISTAKENLY RECORDED INSTEAD OF ACTUAL START DATE (e.g., space to record admin ran out, dose altered)

- For treatment antimicrobials already prescribed prior to transfer or admission to this hospital, where exact start date is not clear from transfer documentation, use admission date to this hospital for ‘date started on current antimicrobial’ – You are not expected to contact referral centre to determine start date
Determining duration & alteration of treatment

- Does current antimicrobial (choice or route) for this infection episode (CI, LI, HI) represent a change from what was originally prescribed (for this infection episode)?
  - Need to review medication chart
  - Make sure medication chart has not been rewritten – if yes, will need to check previous medication chart to determine sequence of events
- If ‘yes’, need to decide what the reason for change was?
- If ‘yes’, need to determine the original start date of treatment for this infection episode (CI, LI, HI) - If there has been >1 change in treatment choice/route select the original start date at start of this current infection episode

<table>
<thead>
<tr>
<th>REASON FOR CHANGE OF TREATMENT ANTIMICROBIAL CHOICE OR ROUTE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCALATION</td>
<td>E</td>
</tr>
<tr>
<td>DEESCALATION</td>
<td>D</td>
</tr>
<tr>
<td>SWITCH IV TO PO</td>
<td>S</td>
</tr>
<tr>
<td>ADVERSE EFFECTS</td>
<td>A</td>
</tr>
<tr>
<td>OTHER OR UNDETERMINED</td>
<td>OU</td>
</tr>
<tr>
<td>CAN'T DETERMINE REASON OR REASON NOT COVERED BY ABOVE OPTIONS E, D, S, A*</td>
<td></td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>NOTES NOT AVAILABLE</td>
</tr>
</tbody>
</table>

*To facilitate OPAT: meropenem to ertapenem, cefotaxime to ceftriaxone, vancomycin to teicoplanin

Concern about potential interaction – methotrexate and penicillins, rifampicin and warfarin
Determining duration & alteration of treatment

1. Final dose of PO co-amoxiclav for CAP at 8pm 24/05/17. Febrile and desaturations, with new CXR infiltrate at 6am 25/05/17. First dose of IV pip/tazo started 7am 25/05/17 for suspected HAP

2. POD 2 laparoscopic appendicectomy for perforated appendicitis – Continued IV cefuroxime and switched from IV to PO metronidazole

3. Febrile neutropenia unresponsive to empiric pip/tazo and gentamicin on day 3, with addition of vancomycin

4. Empiric pip/tazo for VAP switched to flucloxacillin on day 4 upon receipt of BAL C&S >10^5 MSSA. PPS day 5

Form C: Section 5 – Case Studies
Case A

- Bradley Pitt, 62 year-old male, previously healthy
- Admitted to ENT ward this hospital 25/04/17 under care of maxillofacial surgeon
- Resection mandibular tumour and bilateral neck dissection since admission
- PPS date 21/05/17
- Prescribed metronidazole 400mg TDS via nasogastric tube since 18/05/17
- Notes reviewed: On 18/05 NCHD wrote ‘Diarrhoea since yesterday, send stool, start metronidazole’
- 19/05/17 – *Clostridium difficile* toxin detected in faeces
- Metronidazole is empiric treatment for CDI in hospital policy

Case A – Form C: Section 5
Case B

• Grace Monroe, 56 year-old lady – weight 80kg
• Admitted to this hospital via ED from home 28/04/17
• CABG and mitral valve repair performed in another hospital 06/04/17
• Presents with chest pain, sternal wound oozing pus and painful venous graft wound on lower leg
• Commenced on IV vancomycin 1gm BD and gentamicin 1mg/kg TDS 28/04/17
• Therapeutic vancomycin level achieved, gentamicin cut back from TDS to BD 05/05/17 due to high level

Case B

• PPS date 08/05/17
• Notes reviewed: 28/04 - ‘Discussed with microbiology, cover for possible endocarditis and wound infection’
• Blood cultures and wound swab – sterile
• TOE 01/05 – suspicious vegetation on mitral valve
• Continues on therapy as prescribed
• Local guideline for endocarditis advises to always discuss with microbiologist
Case B - Form C: Section 5

Case C

- Angela Jolly, 84 year-old female
- Admitted via ED from nursing home to this hospital 16/04/17
- Reviewed by PPS team 15/05/17
- Prescribed PO co-amoxiclav 625mg TDS since 15/05/17
- Notes reviewed: 13/5 ‘febrile, suprapubic pain, note MSU 10/5 Proteus mirabilis – sensitive to augmentin. Suspect UTI – Start augmentin IV’
- Hospital does not have a policy for empiric treatment of hospital-acquired infection
Case C – Form C: Section 5

Thomas Cruise, 76 year old male
Transferred from elective orthopaedic hospital to CCU this hospital 08/03/17 having had left THR 25/02/17 – pneumonia, sepsis with acute kidney injury and acute coronary syndrome
Slow improvement and rehabilitation
Transferred out to orthopaedic ward 31/03/17
Haemodialysis dependent three times weekly via permcat

Case D

Thomas Cruise, 76 year old male
Transferred from elective orthopaedic hospital to CCU this hospital 08/03/17 having had left THR 25/02/17 – pneumonia, sepsis with acute kidney injury and acute coronary syndrome
Slow improvement and rehabilitation
Transferred out to orthopaedic ward 31/03/17
Haemodialysis dependent three times weekly via permcat
Case D

- MRSA detected on nasal swab 04/05/17
- Commenced mupirocin nasal ointment 05/05/17
- Deteriorated acutely 05/05/17; dyspnoea, productive cough and new CXR infiltrate
- Commenced empiric IV piperacillin/tazobactam 4.5gm BD and vancomycin 1gm stat 05/05 for suspected HAP, as documented by medical registrar on-call following discussion with consultant microbiologist. Review date of 12/05 on chart
- Vancomycin dosed as per levels in haemodialysis – last given 1gm on 07/05
- Local HAP empiric treatment guideline is IV pip/tazo
- PPS team arrive on ward 08/05/12

Case D – Form C: Section 5
Case E

- Georgina O’Clooney, 66 year-old lady
- Admitted via ED 02/05/17 directly to ICU
- Haematology outpatient – aplastic anaemia
- Presented with febrile neutropenia, bilateral pulmonary infiltrates on CXR, hypoxia and hypotension – commenced on empiric IV piperacillin/tazobactam, IV vancomycin and IV clarithromycin
- Local febrile neutropenia guideline recommends pip/tazo & gentamicin, with addition of clarithromycin if pneumonia evident
- Intubated, CVC inserted, urethral catheter inserted
- PPS team arrive to ICU 08/05/17

Case E – PPS 08/05/17

- Daily microbiology ICU round notes reviewed – no positive microbiology to date
- Severe community acquired pneumonia – not responding to initial empiric therapy
- Prescribed – Meropenem 1gm TDS IV (D2), linezolid 600mg BD via NG tube (D3), clarithromycin 500mg BD via NG tube (D6), co-trimoxazole 960mg via NG tube alternate days since January & oseltamivir 150mg bd via NG tube (D4)
Case E – Form C: Section 5

For practice: Return to 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 500mg bd, documented & as per guidelines, with response
• 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 – hospital acquired sepsis ?source & needs investigation, as per notes
- Local guidelines advise contact microbiologist to discuss empiric treatment of HAI
- Transferred to medical HDU 11/05/17
- 11/05/17 pm – Yeasts seen in blood cultures – discussed with ICU team by microbiologist on-call
- Caspofungin 70mg IV stat dose given – for further once daily dosing of 50mg as per notes

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**BSI Case Study**

- 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 – continues on pip/tazo IV, clarithromycin NG and caspofungin IV
The clinical scenario here is a patient who initially responded to CAP treatment, but who then deteriorated with a likely hospital-acquired sepsis – source not evident at time of prescription – CSEP. While co-amoxiclav switched to pip/tazo – this is not escalation for the same episode (CI PNEU), rather new treatment for a different episode (HI CSEP).
For caspofungin, remember the first dose is a loading dose, so it might be prescribed on the stat section, with the maintenance dose prescribed from day 2 onwards in the regular prescription section.

Any Questions?

pps2017@hpsc.ie