



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




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



Hospital code: [][][][] Ward code: [][][] Patient ID: [][][][][][][][][][]

5. Antimicrobial use ... If more than 2 antimicrobials use extension sheet Page 3

First Antimicrobial [_____]

Route: Parenteral Oral Rectal Inhalation

Doses per day: [][] / [][] Note: alternate day dosing - 0.5; 2 doses per week - 0.20; 3 doses per week - 0.43

Strength of 1 dose: [][][] Unit of measurement: grams mg Other

Indication for antimicrobial use: [_____]

Diagnosis site code: [_____]

Reason recorded in notes: No Yes Notes not available

Meets local policy: No Yes Not assessable Not known

Date started on current antimicrobial: [][] / [][] / [][][]

Does current antimicrobial (choice or route) for this infection episode represent a change from what was originally prescribed? No Yes

Reason for change: [_____]

If change, date antimicrobial started for infection/indication: [][] / [][] / [][][]



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 4a: The most commonly prescribed antimicrobials, in order of frequency

Antimicrobial generic name	ATC5
Amoxicillin and enzyme inhibitor – co amoxiclav	J01CR02
Piperacillin and enzyme inhibitor – piperacillin-tazobactam	J01CR03
Metronidazole (oral, rectal)	P01AB01
Metronidazole (parenteral/IV)	J01XD01
Flucloxacillin	J01CF05
Ciprofloxacin	J01MA02
Cefuroxime	J01DC02
Clarithromycin	J01FA09
Vancomycin parenteral (IV)	J01XA01
Vancomycin enteral (oral) [Treatment of <i>C. difficile</i> infection only]	A07AA09
Gentamicin	J01GB03
Benzyloxy penicillin	J01CF01
Meropenem	J01DH02
Amikacin	J01GB06
Amoxicillin	J01CA04
Azithromycin	J01FA10
Sulfamethoxazole and trimethoprim (co-trimoxazole)	J01EE01
Telcoplanin	J01XA02



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



Form C: Section 5



Doses per day of the current antimicrobial	<p>Report dosage for current antimicrobial, as prescribed in the medication chart or anaesthetic sheet:</p> <ul style="list-style-type: none"> • Number of doses per day <p>For antimicrobials administered on alternate day dosing regimen, record 0.5 for doses per day 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 = $3/7 = 0.43$) For example: Intermittent vancomycin given twice per week = 0.29</p>
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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



Indication for antimicrobial use



- **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



Code	Clinician's diagnosis of the site of infection for which the patient receives antimicrobial therapy
CNS	Central nervous system infection (e.g., meningitis, brain abscess)
EYE	Endophthalmitis
ENI	Infections of ear, nose, throat, larynx and mouth
BRON	Acute bronchitis or exacerbations of chronic bronchitis
PNEU	Pneumonia
CF	Cystic fibrosis infective exacerbation
CVS	Cardiovascular infection (e.g., endocarditis, vascular graft infection)
GI	Gastrointestinal infections (e.g., salmonellosis, <i>C. difficile</i> infection)
IA	Intra-abdominal infection, including hepatobiliary
SS/SSI	Surgical site infection involving skin or soft tissue, but not bone
SSTO	Skin soft tissue infection, includes cellulitis, wound infection and deep soft tissue infection, not involving bone AND not related to surgery
BJSI	Septic arthritis, osteomyelitis related to surgery at site of infection, includes prosthetic joint infection
BJO	Septic arthritis, osteomyelitis not related to surgery
LYS	Lystitis or symptomatic lower urinary tract infection
DYE	Dyselonephritis or symptomatic upper urinary tract infection
ASB	Asymptomatic bacteriuria – positive urine microbiology results in the absence of signs of urinary tract infection
OBGY	Obstetric or gynaecological infections, includes sexually transmitted infection (STI) in women
GUM	Prostatitis, epididymo-orchitis, includes sexually transmitted infection (STI) in men
BAC	Laboratory-confirmed clinically-significant positive blood cultures (bacteraemia or bloodstream infection)
CSEP	Clinical sepsis (suspected bloodstream infection without microbiology laboratory confirmation of positive blood cultures OR results are not yet available OR blood cultures have not been collected OR laboratory has confirmed that blood cultures are negative after five days incubation) Note CSEP excludes patients with febrile neutropenia and infection in immunocompromised hosts (see FN below)
FN	Febrile neutropenia or other form 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)
SIRS	Systemic inflammatory response with no clear anatomical site
UND	Completely undefined site for infection with no systemic inflammation
NA	Not applicable, indication for antimicrobial use is not for 'treatment intention of infection = CI, LI or HI'

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?



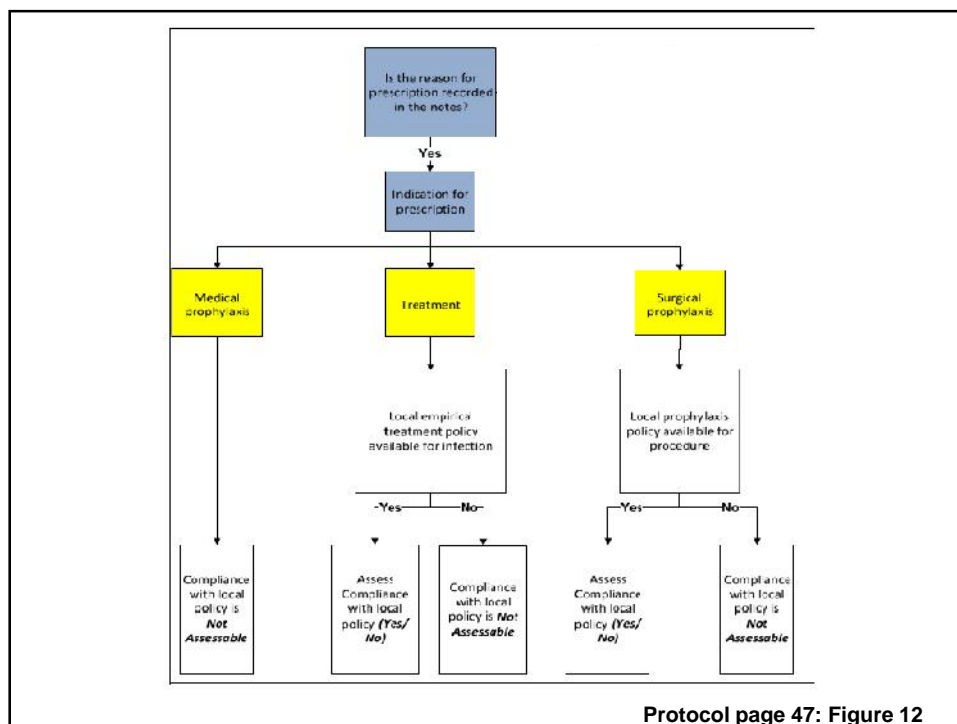
- Prescription meets local prescribing recommendation for:
 - Empirical treatment of infection
 - Surgical antimicrobial prophylaxis
- Prescription has been rationalised based on latest microbiology results
- Prescription of a restricted antimicrobial based on advice and approval of infection specialist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



Determining duration & alteration of treatment



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

*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



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 permcath



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




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



BSI Case Study – Form C: Section 5



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5. Antimicrobial use ... if more than 2 antimicrobials use extension sheet Page 3

First Antimicrobial: Piperacillin/Tazobactam 3012K85

Route: Parenteral Oral Rectal Inhalation

Doses per day: 3.0 Note: alternate day dosing = 0.5; 7 doses per week = 0.29; 3 doses per week = 0.43

Strength of 1 dose: 4.5 Unit of measurement: grams mg Other

Indication for antimicrobial use: HI

Diagnosis site code: CSEP

Reason recorded in notes: No Yes Notes not available

Meets local policy: No Yes Not assessable Not known


Date started on current antimicrobial: 11 / 03 / 17

Does current antimicrobial (choice or route) for this infection episode represent a change from what was originally prescribed? No Yes


Reason for change: _____

If change, date antimicrobial started for infection/indication: / /

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)



BSI Case Study – Form C: Section 5



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5. Antimicrobial use ... if more than 2 antimicrobials use extension sheet Page 3

First Antimicrobial: Clarithromycin 301FA09

Route: Parenteral Oral Rectal Inhalation

Doses per day: 2.0 Note: alternate day dosing = 0.5; 2 doses per week = 0.29; 3 doses per week = 0.43

Strength of 1 dose: 500 Unit of measurement: grams mg Other

Indication for antimicrobial use: CI

Diagnosis site code: PNEU

Reason recorded in notes: No Yes Notes not available

Meets local policy: No Yes Not assessable Not known

Date started on current antimicrobial: 03 / 03 / 17

Does current antimicrobial (choice or route) for this infection episode represent a change from what was originally prescribed? No Yes

Reason for change: _____

If change, date antimicrobial started for infection/indication: / /



BSI Case Study – Form C: Section 5



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5. Antimicrobial use ... if more than 2 antimicrobials use extension sheet Page 3

First Antimicrobial

Route Parenteral Oral Rectal Inhalation

Doses per day Note: alternate day dosing = 0.5; 2 doses per week = 0.25; 3 doses per week = 0.43

Strength of 1 dose Unit of measurement grams mg Other

Indication for antimicrobial use

Diagnosis site code

Reason recorded in notes No Yes Notes not available

Meets local policy No Yes Not assessable Not known

Date started on current antimicrobial / /

Does current antimicrobial (choice or route) for this infection episode represent a change from what was originally prescribed? No Yes

Reason for change

If change, date antimicrobial started for infection/indication / /

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?



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