

Good Practice Recommendations for antimicrobial management teams on hospital antimicrobial stewardship in NHS Scotland

Aim

Each NHS board, through its antimicrobial management team (AMT) is responsible for maintaining a local antimicrobial stewardship programme [1,2]. This document aims to provide NHS boards with recommendations on core components for local hospital antimicrobial stewardship and is applicable for both adult and paediatric practice.

Summary of Good Practice Recommendations

1	Hospital antimicrobial guidelines should be readily accessible to prescribers and subject to regular review by the AMT with a formal review at a minimum of every 3 years.
2	Hospital empirical antimicrobial treatment guidelines should give recommendations for commonly encountered infections, the avoidance of unnecessary antibiotic use, a guide to the assessment of infection severity and should take into account minimisation of potential unintended consequences of antimicrobial prescribing.
3	Hospital antimicrobial guidelines should give recommendations on review of empirical therapy including criteria and recommendations for intravenous to oral antibiotic switch and guidance on duration of therapy.
4	A surgical procedural antibiotic prophylaxis guideline should be in place for all specialities where interventional procedures are undertaken.
5	A protected or “alert” list, including World Health Organisation (WHO) reserve antimicrobials, which require microbiology or infectious diseases specialist approval and a system for managing approval and supply should be locally agreed.
6	A strategy to limit the prescribing of WHO Watch and Reserve antibiotics should be in place.
7	Compliance with antimicrobial guidelines should be monitored.
8	AMTs in conjunction with clinical specialty and governance teams should be alert to and monitor for unintended consequences of antimicrobial guidelines.
9	Antimicrobial guidelines should be supported by training for all staff that prescribe, administer and monitor antimicrobials.
10	AMTs should have robust systems in place to communicate with key clinical personnel regarding antimicrobial prescribing alerts such as issues with resistance or supply.

Detailed recommendations

1. **Hospital antimicrobial guidelines should be readily accessible to prescribers (eg via NHS board intranet, therapeutic handbook, posters in clinical areas and clinical applications, including the Scottish Antimicrobial Prescribing Group (SAPG) Antimicrobial Companion app [3]) and should refer to relevant SAPG guidance where available [4]. Local guidelines should be subject to regular review and formal update at a minimum every three years by the AMT (in collaboration with relevant clinical specialties). Guideline development and review should take into account the following:**
 - Local and national emerging antimicrobial resistance
 - Local and national surveillance of antimicrobial use
 - Local qualitative data on prescribing (eg point prevalence surveys)
 - Rates of *C. difficile*
 - Emergence and recognition of unintended consequences of guidance

2. **Hospital empirical antimicrobial guidelines should:**
 - i. **Give recommendations for commonly encountered infections in adults and children including:**
 - Respiratory tract infections including community acquired pneumonia, healthcare associated pneumonia, aspiration pneumonia, infective exacerbations of chronic obstructive pulmonary disease (COPD), tonsillitis and pertussis (children), suspected influenza and coronavirus disease (COVID-19) infection
 - Skin and soft tissue infections including rapidly progressive necrotising infections, animal bites and those related to injection drug use
 - Urinary tract infection including lower urinary tract infection (UTI), pyelonephritis and catheter related infections
 - Intra-abdominal infection including gastroenteritis, acute abdomen and subacute bacterial peritonitis
 - Bone and joint infection including septic arthritis, osteomyelitis and diabetic foot infection
 - Central nervous system infections including encephalitis and bacterial meningitis
 - Sepsis syndrome including sepsis of unknown source differentiating by age (neonate, child adult) and between community and healthcare associated sepsis [5]
 - Fever in the immunocompromised host or neutropenic sepsis
 - Suspected infective endocarditis
 - Specific healthcare associated infections: *S. aureus* bacteraemia (SABs), *C. difficile* [6] and candidaemia

 - ii. **Include or take into account core principles of antimicrobial stewardship:**
 - Highlight the importance of prudent prescribing with limitation of antibiotics to those where there are clear symptoms or suspicion of bacterial infection
 - Highlight those circumstances where antibiotics are not or are unlikely to be beneficial such as self limiting bacterial or viral infections (eg COVID-19) and infections where the source has not been removed or controlled
 - Restriction of selected antibiotics with increased capacity for promoting *C. difficile* infection. Examples include cephalosporins, quinolones, clindamycin, co-amoxiclav, piperacillin/tazobactam and carbapenems [7], note - restricted antimicrobials may differ in neonates and children and this should be accounted for in local protected antimicrobial policies
 - Promotion of use of WHO Access antibiotics and limitation of 'Watch and Reserve' antibiotics in order to preserve their future utility and minimise resistance (see section 5)

- Guidance on safe use of gentamicin and vancomycin including dosage, clinical, biochemical and therapeutic drug monitoring requirements and duration of treatment. Note that calculators for gentamicin and vancomycin for adults are available on the SAPG Antimicrobial Companion app [3]

iii. Guide optimal pre-treatment clinical assessment of infection

- Promote early identification and prompt management of sepsis based on careful clinical assessment of severity and likelihood of bacterial infection [5]
- Include details of severity of infection assessments where applicable eg community acquired pneumonia (confusion, urea, respiratory rate, blood pressure - CURB-65) and *C. difficile* infection
- Promote and optimise relevant microbiological sampling (particularly blood cultures) and use of non-culture investigations prior to initiating therapy
- Promote review of previous microbiological investigations (when available) before commencing therapy (eg methicillin resistant staphylococcus aureus (MRSA) status, recent extended spectrum beta lactamase (ESBL) infection, multidrug resistant organism carriage, recurrent pseudomonal exacerbations in bronchiectasis or cystic fibrosis)

iv. Guide optimal selection and duration of antimicrobial therapy

- Ensure suitably potent antimicrobials (including spectrum of activity and dose) are chosen to reduce the risk of treatment failure
- Recommended route, dose, schedule and duration of antimicrobial administration
- Promote clarification of penicillin allergy and penicillin allergy de-labelling and provide alternative treatment options for each indication where penicillin allergy is suspected [8]
- Highlight important antimicrobial–drug interactions (eg multiple drug interactions with clarithromycin, reduction of doxycycline and quinolone absorption by cations such as iron and calcium, and those that prolong QT interval)
- Minimise duration of antibiotic therapy to the shortest possible based on the available evidence [9]

v. Promote good documentation of infection diagnosis and management plan at the time of antibiotic initiation. Include documentation of duration for oral antibiotics on the written or electronic prescription and a review and stop date of IV antimicrobials

3. Hospital antimicrobial guidelines should give recommendations on review of empirical therapy including:

- Emphasising the importance of clinical review of the patient and the diagnosis
- Review of microbiological results to inform rationalisation of antibiotic therapy
- Daily review of intravenous therapy to optimise timely intravenous to oral switch therapy (IVOST)
- Criteria for IVOST and details of oral switch options (where applicable) for key clinical indications
- Specification of total duration of therapy (IV and oral) for each indication
- Support for early hospital discharge in suitable patients either through timely IVOST or, in selected patient groups through outpatient parenteral antibiotic therapy (OPAT) programmes [10]
- Where OPAT programmes exist, AMTs to ensure that they are governed in accordance with national good practice recommendations [11]
- Clear documentation of clinical decisions pertaining to review and discontinuation of antimicrobial therapy

4. **Surgical and procedural antibiotic prophylaxis guideline must be in place for all specialities where interventional procedures are undertaken.**
 - Examples of specialities include: all surgical specialities and others who undertake endoscopy or implant cardiac devices and those who perform interventional radiology

5. **A protected or 'alert' list of WHO Reserve antimicrobials requiring Infection specialist approval must be locally agreed and implemented:**
 - Include all newly licensed antimicrobials following advice from the Scottish Medicines Consortium (SMC)
 - A local authorisation process should be in place to limit unauthorised supply or dispensing of protected or alert antimicrobials
 - Use of protected or alert agents should be monitored and subject to review by the AMT

6. **A strategy to limit the use of WHO Watch and Reserve antimicrobials should be in place.**
 - Specifically, carbapenems should only be prescribed on the recommendation of an infection specialist or as a part of a specialist infections policy authorised by the AMT
 - Alternatives to carbapenems should be available to support this strategy eg aztreonam, temocillin, fosfomycin, tigecycline

7. **Compliance with antimicrobial guidelines should be monitored:**
 - As a minimum there should be a system in place to record compliance with prescribing indicators agreed by SAPG. Where data is collected by non-AMT members, validation by the AMT should be undertaken on a regular basis eg six monthly
 - Local surveillance of hospital use of antimicrobials following SAPG guidance should be undertaken [9]

8. **AMTs in conjunction with clinical specialty and governance teams should be alert to and monitor for unintended consequences of antimicrobial guidelines and antimicrobial supply issues.**
 - It is recommended that unintended consequences of antibiotics are considered through communication with and collaboration between the AMT and other clinical specialists and hospital governance bodies including infection prevention and control teams (IPCTs) and Area Drug and Therapeutics Committee (ADTC)
 - Examples of known potential unintended consequences include renal and oto-toxicity related to aminoglycosides, surgical site infections related to inadequate surgical antibiotic prophylaxis
 - AMTs should be aware of and consider contingency plans (antimicrobial substitution) for acute shortages of key antimicrobials
 - Consider early warning system or signals where appropriate

9. **Antimicrobial guidelines should be supported by training for all staff that prescribe, administer and monitor antimicrobials.**

10. **AMTs should have robust systems in place to communicate with key clinical personnel regarding antimicrobial prescribing alerts**
 - AMTs should discuss and review proposed actions where compliance with guidelines is suboptimal or where trends in usage suggest there is a change in prescribing habits or unintended consequences of guidance has been identified or there are acute shortages of key antimicrobials
 - There should be clear lines of communication between the AMT, health board, medical, pharmacy and nursing management and ADTC to facilitate rapid communication of actions for prescribers and other healthcare professionals when required

References

1. Scottish Government (2014) Scottish Management of Antimicrobial Resistance Action Plan [ScotMARAP] 2014-2018. Scottish Government, Edinburgh. Online: <http://www.gov.scot/Resource/0045/00456736.pdf> [accessed 5/7/22]
2. HM Government (2019) Tackling antimicrobial resistance 2019–2024 The UK’s five-year national action plan. HM Government, Global and Public Health Group, Emergency Preparedness and Health Protection Policy Directorate. Online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/784894/UK_AMR_5_year_national_action_plan.pdf [accessed 5/7/22]
3. Scottish Antimicrobial Prescribing Group (2016) Antimicrobial Companion app. Online: <https://www.antimicrobialcompanion.scot/> [accessed 5/7/22]
4. Scottish Antimicrobial Prescribing Group (2021) SAPG guidance and quality improvement (QI) tools. Online: <https://www.sapg.scot/guidance-qi-tools/> [accessed 5/7/22]
5. Academy of Medical Royal Colleges (2022) Statement on the initial antimicrobial treatment of sepsis. Online: https://www.aomrc.org.uk/wp-content/uploads/2022/05/Statement_on_the_initial_antimicrobial_treatment_of_sepsis_0522.pdf [accessed 5/7/22]
6. Health Protection Scotland (2017) Guidance on Prevention and Control of Clostridium difficile Infection (CDI) in Health and Social Care Settings in Scotland. Health Protection Scotland. Online: <https://www.hps.scot.nhs.uk/haic/sshap/resourcedetail.aspx?id=184> [accessed 5/7/22]
7. Slimings C, Riley TV. (2014) Antibiotics and hospital-acquired Clostridium difficile infection: update of systematic review and meta-analysis. Journal of Antimicrobial Chemotherapy. Apr 1; 69(4):881-91. <https://doi.org/10.1093/jac/dkt477>
8. Scottish Antimicrobial Prescribing Group (2021) Guidance: penicillin allergy de-labelling. Online: <https://www.sapg.scot/guidance-qi-tools/quality-improvement-tools/penicillin-allergy-de-labelling/> [accessed 5/7/22]
9. Spellberg B, Rice LB. Duration of Antibiotic Therapy: Shorter Is Better. Ann Intern Med. Aug 6; 171(3):210-211. <https://doi.org/10.7326/m19-1509>
10. British Society for antimicrobial chemotherapy (BSAC) (2019) Updated good practice recommendations for outpatient parenteral antimicrobial therapy (OPAT) in adults and children in the UK. Online: <https://bsac.org.uk/updated-good-practice-recommendations-for-outpatient-parenteral-antimicrobial-therapy-opat-in-adults-and-children-in-the-uk/> [accessed 5/7/22]
11. Scottish Health Technologies Group (SHTG) (2021) Recommendation on outpatient parenteral antimicrobial therapy (OPAT). Online: <https://shtg.scot/our-advice/outpatient-parenteral-antimicrobial-therapy-opat/> [accessed 5/7/22]
12. Scottish Antimicrobial Prescribing Group (2020) Local surveillance of antimicrobial use: framework for Antimicrobial Management Teams. Online: <https://www.sapg.scot/media/4075/20210603-local-surveillance-of-antimicrobial-use-framework-for-amts.pdf> [accessed 5/7/22]

Table of abbreviations

ADTC	Area Drug and Therapeutics Committee
AMT	Antimicrobial management team
COPD	Chronic obstructive pulmonary disease
ESBL	Extended spectrum beta lactamase
IPCT	Infection prevention and control team
IHOST	Intravenous to oral switch therapy
MRSA	Methicillin resistant staphylococcus aureus
NHS	National Health Service
OPAT	Outpatient parenteral antimicrobial therapy
SAPG	Scottish Antimicrobial Prescribing Group
SMC	Scottish Medicines Consortium
UTI	Urinary tract infection
WHO	World Health Organisation