

Antimicrobial Stewardship Program

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Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
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1.0 Introduction

- 1.1 The major impact that a successful ASP has on a healthcare organization rests on its ability to improve patient outcomes and reduce adverse events, including morbidity due to antibiotic-resistant pathogens (also known as MDROs) and *Clostridium difficile* (*C difficile*), organisms responsible for an increasing number of HAIs. MDRO infections and other HAIs lead to substantial patient morbidity, increased healthcare costs, prolonged hospitalization, and, most importantly, patient mortality.
- 1.2 A key partner in an organization's ASP—which seeks to reduce HAIs and the incidence of MDROs is the organization's IPC program. IPC programs are in place at most healthcare organizations to encourage practices that prevent HAIs; systematically assess the burden of HAIs and MDRO infections; develop policies and practices to prevent HAI transmission; educate healthcare personnel (HCP), patients, caregivers, and visitors about infection prevention strategies; monitor adherence to recommended prevention practices; investigate outbreaks of HAIs; and prepare organizations for new infectious threats, such as novel MDROs. These efforts can synergize with those of an ASP to help reduce the burden of these infections.
- 1.3 The prevalence and incidence of infections caused by MDROs continue to increase, and new MDROs have emerged for which there are limited to no effective therapeutic options, such as the Carbapenem-resistant *Enterobacteriaceae* and the highly resistant bacteria that carry NDM-1 (New Delhi metallo-beta-lactamase). MDROs have been associated with an increased risk of worsened clinical outcomes (including an increased risk of death and prolonged length of stay) and with higher costs of hospitalization in some patient populations. The increase in the frequency of infections caused by MDROs, the higher risk of death associated with these pathogens, and the lack of promising novel pharmaceutical agents to treat these infections pose a significant challenge to the healthcare system. Strikingly, it has been **estimated that as much as 50% of antibiotic use in hospitals is inappropriate**. Thus, antimicrobial stewardship efforts to reduce inappropriate utilization of antibiotics can have a marked impact on reducing selection pressure for the development of MDROs and the proliferation of *C difficile*. Targeting antibiotic therapy against identified pathogens, placing restrictions on prescribing key broad-spectrum agents, and avoiding the use of antibiotics in patients with suspected viral or noninfectious illnesses are strategies that will help reduce unnecessary antimicrobial prescription, MDRO colonization, and resultant HAIs.
- 1.4 Organization's microbiology laboratory is an important partner of the IPC program and ASP, and a close partnership between microbiology laboratory and IPC department is another key component of IPC programs. Data from microbiology testing are essential to develop an **Organizational Antibigram** which is an important tool for prescribing clinicians that denotes specific organism antimicrobial susceptibility results based on an institution's culture data.

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

- 1.5 Antibigrams allow providers to select the antimicrobials that are most likely to target the predominant pathogens in their organization, thus potentially avoiding the use of ineffective agents.
- 1.6 The microbiology laboratory can also assist with specialized testing during investigations of suspected HAI outbreaks and can provide a system to alert IPC personnel about the identification of a newly isolated MDRO, so that isolation precautions can be implemented rapidly.
- 1.7 In order to decrease HAIs all infection control policies, procedures and programs must be followed strictly by all caregivers.
- 1.8 All policies and procedures are regularly reviewed and updated to ensure that they contain the latest evidence-based guidance.
- 1.9 Ensuring compliance with organization wide IPC policies through practice audits and the implementation of tools to reinforce adherence.

2.0 Purpose.

- 2.1 To improve patient outcomes and reduce adverse events, including morbidity due to antibiotic-resistant pathogens.

3.0 Goals.

3.1 Timely and appropriate antibiotic utilization in the hospital:

3.1.1 Primary drivers:

- 3.1.1.1 Timely and appropriate initiation of antibiotics
- 3.1.1.2 Appropriate administration and de-escalation
- 3.1.1.3 Data monitoring transparency and stewardship infrastructure
- 3.1.1.4 Availability of expertise at the point of care

3.1.2 Secondary drivers:

- 3.1.2.1 Prescribe Antibiotics only with clear clinical justification
- 3.1.2.2 Document decision making in antimicrobial prescribing
- 3.1.2.3 Interfere surgically when indicated
- 3.1.2.4 Collect specimens for culture before starting
- 3.1.2.5 Prescribe according to local guidelines
- 3.1.2.6 Prescribe antibiotics at the correct dose
- 3.1.2.7 Choose narrow spectrum antibiotic
- 3.1.2.8 Only prescribe broad spectrum antibiotics when indicated
- 3.1.2.9 De-escalate to narrow spectrum promptly
- 3.1.2.10 Get microbiology/ID advice if you need to use an alert agent
- 3.1.2.11 Use oral antibiotics when feasible
- 3.1.2.12 Switch to oral treatment once indicated
- 3.1.2.13 Record stop date in patient notes
- 3.1.2.14 Review antimicrobial treatment regularly

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

4.0 Responsibilities.

4.1 Top Management.

- 4.1.1 Top management is responsible for providing the necessary support for the program including allocating required budgets, technology, time, authority and resources to succeed.
- 4.1.2 Leadership support is crucial for the success of the program

4.2 Infectious Diseases

- 4.2.1 In reference to IDSA, HICPAC and CDC guidelines, the infectious diseases team in our hospital, is mainly responsible for many of the goals listed above; Promptly responding to all consultation requests in the hospital within 24hours, unless in emergency cases the response will be immediate
- 4.2.2 Ensures timely and appropriate initiation of antibiotics
- 4.2.3 Ensures appropriate administration and de-escalation
- 4.2.4 Review data monitoring, transparency and stewardship infrastructure
- 4.2.5 Document decision making in antimicrobial prescribing
- 4.2.6 Prescribe according to local guidelines
- 4.2.7 Prescribe antibiotics at the correct dose
- 4.2.8 De-escalate to narrow spectrum promptly
- 4.2.9 Use oral antibiotics when feasible
- 4.2.10 Switch to oral treatment once indicated
- 4.2.11 Record stop date in patient notes
- 4.2.12 Review antimicrobial treatment regularly

4.3 Infection Control Department:

- 4.3.1 In reference to the Healthcare Infection Control Practices Advisory Committee (HICPAC), a federal advisory committee chartered to provide advice and guidance to the Centers for Disease Control and Prevention (CDC) regarding the practice of infection control and strategies for surveillance, prevention, and control of healthcare-associated infections, antimicrobial resistance and related events, antibiotic stewardship has become a critical responsibility for all healthcare institutions and antibiotic prescribers.
- 4.3.2 Performing ongoing surveillance of resistance pattern for hospital infected patients.
- 4.3.3 Notify when rates of resistance increase.
- 4.3.4 Screening of carriers of MDROs.
- 4.3.5 Cohorting of infected and colonized patients with MDROs.
- 4.3.6 Using hygiene controls to limit spread of single (clonal) strains.
- 4.3.7 Monitoring adherence of health-care workers to control measures.
- 4.3.8 Regular feedback of individual and ward rates of hygiene adherence and antibiotic resistance.
- 4.3.9 Health-care worker education and motivation.

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

4.4 Microbiology:

- 4.4.1 Timely reporting significant results & recommending antimicrobial treatment
- 4.4.2 development of local resistance profiles (cumulative and stratified antibiogram) to guide the choice of empirical therapy
- 4.4.3 Giving advice about best use of the laboratory (diagnostic stewardship)
- 4.4.4 Optimal use of rapid diagnostics e.g. automated AST and MALDI-TOF
- 4.4.5 Restrictive reporting i.e. reporting of susceptibility results to be limited to those antibiotics that ASP committee wants the clinician to prescribe
- 4.4.6 Conducting research in the field of antimicrobial resistant genes to explore the local genotypic antibiogram
- 4.4.7 Aid in the developing ASP guidelines
- 4.4.8 participation in ASP training & auditing
- 4.4.9 Participation in ASP quality improvement projects

4.5 ID pharmacists:

4.5.1 Patient care:

- 4.5.1.1 Pharmacists can make interventions such as IV to oral conversion, renal dosage adjustments, therapeutic drug level monitoring and review antibiotic durations of therapy.
- 4.5.1.2 Pharmacist are able to provide more advanced interventions including PK/PD optimization based upon patient-specific factors and MIC (minimum inhibitory concentration) of the organism and rapid de-escalation of therapy.
- 4.5.1.3 The interventions will be documented in Infectious Disease Pharmacy form on Cerner
- 4.5.1.4 Pharmacists are able to participate in development and implementation of local hospital guidelines

4.5.1.5 Drug therapy expert:

- 4.5.1.5.1 Pharmacokinetic/ Pharmacodynamic (PK/PD) optimization: As drug therapy experts, pharmacists are able to develop and advise treatment plans that optimize PK/PD parameters
- 4.5.1.5.2 Therapeutic drug monitoring: Many antibiotics require therapeutic drug monitoring (e.g., Vancomycin, aminoglycosides, Voriconazole). In these instances, the pharmacist's familiarity with the medications plus their understanding of complex drug interactions can be valuable.

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

4.5.1.5.3 Formulary decisions: Pharmacists play a part in hospital antimicrobial formulary management. They help to decide which antibiotics should be on “protected status” to assure they are used appropriately with ASP oversight.

4.5.1.6 **Patient safety:**

4.5.1.6.1 Through individual action and by participating on inter-professional teams, pharmacists are working to impact patient safety in the area of antimicrobial use.

4.5.1.6.2 In improving patient safety, pharmacists can be involved in:

4.5.1.6.3 Reporting medication errors

4.5.1.6.4 Evaluating data from reported errors

4.5.1.6.5 Participating in root-cause analysis

4.5.1.6.6 Developing and implementing system-wide changes to improve pharmaceutical practices

4.5.1.6.7 Participating in hospital committee work

4.5.1.7 **Educator:**

4.5.1.7.1 Pharmacists provide education on antimicrobial stewardship by sharing drug expertise knowledge within and external to the pharmacy profession

4.5.2 **Antimicrobial stewardship pharmacist:**

4.5.2.1 The role of a specialist Antimicrobial stewardship pharmacist (*Antimicrobial Guardians*) is collecting prescribing data (surveillance) and optimizing antimicrobial prescriptions

4.5.2.2 **Surveillance**

4.5.2.2.1 Surveillance of antimicrobial consumption and antimicrobial resistance data are essential to understand the development and actions required to reduce antimicrobial resistance.

4.5.2.3 **Optimizing prescribing**

4.5.2.3.1 It suggests that restrictive interventions (that is interventions that put a limit on how antibiotics are prescribed) work faster than persuasive interventions (interventions that advised physicians how to prescribe or gave them feedback about how they've prescribed).

4.5.2.4 **Monitoring antibiotic use and adherence to guidelines**

4.5.2.4.1 Hospital pharmacists play their role as they ‘clinically screen’ drugs as part of their everyday practice.

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

- 4.5.2.4.2 Advice includes the provision of guidance on antibiotic dosing regimens, like in cases of organ dysfunction (for example, renal adjustment), being based on therapeutic monitoring for drugs with a narrow therapeutic index, or for highly drug-resistant bacteria, where higher doses may be required.
- 4.5.2.4.3 Pharmacists should facilitate the early switch from intravenous (IV) to oral antibiotic therapy. This has a number of advantages, most notably a reduction in the likelihood of hospital-acquired bacteremia and infected IV lines.
- 4.5.2.5 **Antimicrobial Stewardship (AMS) should be strengthened by:**
- 4.5.2.5.1 Pharmacist leadership in the development of guidelines to ensure a robust evidence based approach to the use of antibiotics.
- 4.5.2.5.2 Effective collaboration across the multidisciplinary team (MDT) in them implementation of AMS. Plans should maximize the expertise of pharmacists in medicines leadership to provide greater communication and coordination in the delivery of consistent approaches to AMS.
- 4.5.2.5.3 Pharmacist access to the patient health record, including diagnostic results as well as up to date local formulary information. This will enable more informed clinical decisions, in partnership with patients and the multidisciplinary team regarding antibiotics, ensuring safe prescribing alongside the patients' other medicines and health conditions.
- 4.5.2.5.4 Ongoing high quality education and training for pharmacists to keep up to Date with the latest evidence base for antibiotics. This will ensure pharmacist are empowered to confidently contribute to prescribing decisions, patient counselling and advice regarding antibiotic use.

4.6 Heads of Medical/Surgical Departments/Units:

- 4.6.1 Demonstrate support and commitment to safe and appropriate antibiotic use in the hospital, through their personnel in each department

4.7 Clinical Research:

- 4.7.1 Compilation and analysis of antibiotic process measures

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

4.7.2 Facilitating ID study team meeting

4.8 CPID (Continuous Performance Improvement Department):

- 4.8.1 Ensures the integrity of the program with hospital-wide infection control management programs & quality improvement activities.
- 4.8.2 Cooperates with Infectious disease and Infection Control departments in the development, review and update of the program.
- 4.8.3 Cooperates with infectious disease and Infection Control departments in the monitoring and evaluation activities.
- 4.8.4 Aid in the validation and data collection process when required

4.9 All Staff Members

- 4.9.1 Comply and abide by all program components and hospital policies within relevant work responsibilities.

5.0 Program Strategies

- 5.1 **The core strategies make up the majority of the day-to-day workings of ASPs and are central to these programs.**
- 5.2 **The core strategies include two methods to impact antimicrobial use in hospitals:**
 - 5.2.1 A front-end approach, which is implemented before an agent is prescribed
 - 5.2.2 A back-end approach, which is used after an agent is prescribed.
- 5.3 **The front-end approach—often termed formulary restriction—refers to antimicrobial agents that have not been included on a hospital formulary or that require approval prior to prescription (preauthorization). ID physicians or ASPs develop a formulary and decide which drugs will require preauthorization.**
- 5.4 **The front-end strategy** is advantageous because it is relatively easy to implement after the agents on the formulary have been selected. Several studies have shown that this approach can reduce expenditures. However, formulary restriction and preauthorization programs may have little effect on resistance because there is no follow-up after the antimicrobial is approved. Therefore, ASPs have little control over the duration of therapy and streamlining or de-escalation activities. In addition, clinicians often view this strategy as an infringement on their autonomy, especially in nonacademic settings.
- 5.5 **The back-end approach is often referred to as prospective audit and feedback.** This strategy uses more resources than a front-end approach because it requires ASP clinical pharmacists or physicians to review prescriptions for targeted agents after they have been prescribed and to provide feedback to prescribers regarding the appropriateness of their use. This feedback usually is based on clinical-use criteria that have been approved previously by a Pharmacy and Therapeutics (P&T) Committee and/or the ID

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

section. The back-end method is useful particularly for de-escalation and promotion of appropriate duration of therapy, which impacts resistance to a greater degree than formulary restriction alone. The obvious drawback to this approach is that it is more resource-intensive than a front-end approach.

5.6 Formulary restriction and preauthorization requires ASP team members to answer inquiries requesting approval, and they can usually perform this duty while completing other tasks. Prospective audit and feedback, however, usually requires dedicated time, which is proportional to the size and complexity of the hospital.

5.7 57357 CCHE ASP's staff uses a hybrid program that implements both approaches. Formulary restriction and preauthorization may be better at saving money and optimizing doses, whereas a prospective audit and feedback program addresses resistance problems and improves overall antimicrobial use.

6.0 Training and Education of ASP:

6.1 Patient and family education:

6.1.1 Pharmacists are responsible for patient and/or family education as needed regarding the appropriate use of antimicrobial medications, including antibiotics as part of the overall medication education process in both inpatient and outpatient.

6.2 Specific Departmental training:

6.2.1 Education to all staff involved in antimicrobial ordering, dispensing, administration, and monitoring about antimicrobial resistance and antimicrobial stewardship practices

7.0 Performance Measurement and Monitoring.

7.1 Surveillance on the Antibiotic use:

7.1.1 The ID team will collect data on antibiotic use including whether the physician prescribed the appropriate empirical antibiotic, time and efficiency of Shifting to appropriate antibiotic after positive culture ... etc.

7.2 Infectious disease study team:

7.2.1 The ID study team is a multi-disciplinary team composed of physicians, ID consultants, pharmacists and nurses

7.2.2 The study team meets on a monthly basis to discuss the antimicrobial status and required actions

7.3 ASG Core Team meetings:

Issue Date:	01.10.2018	Review Date:	01.01.2023	Next Review Date:	31.12.2023
Policy Code	PROG-ID-001	Department:	Infectious disease	Issue No#:	06
Policy Name:	Antimicrobial Stewardship Program				

- 7.3.1 ASG core team composed from ID consultant, Infection control consultants, ID pharmacists, microbiologist and quality representatives
- 7.3.2 The core team will meet informally every other week to discuss patient related issues

7.4 Antibiotic stewardship Committee:

- 7.4.1 The committee will be held on biannual basis in order to discuss the stewardship program activities, improvement initiatives and recommendations
- 7.4.2 To discuss the annual evaluation of the program and the needed changes
- 7.4.3 For more information regarding the committee refer to the committee term of reference – Attachment 1

7.5 Incident Reports:

- 7.5.1 All incident reports related to antibiotic use will be referred to the infectious disease department for action taken and will be fatherly discussed in the core team meetings

7.6 Medication errors and clinical interventions:

- 7.6.1 All clinical interventions that include antimicrobial use related issues will be referred to the ID department for recommendation and will be fatherly discussed in the core team meetings

8.0 Annual Evaluation of the Program.

- 8.1 Hospital leadership, together with the ID Department, Antibiotic stewardship committee and CPID shall use the above mentioned collective reports for annual evaluation of the effectiveness of the Program. Accordingly the hospital may decide to update or change any of the program strategies or training activities.

9.0 Attachments

- 9.1 Attachment 1: Antibiotic Stewardship term of reference

10.0 References

- 10.1 Center for Disease Prevention and Control (CDC)
- 10.2 World Health Organization (WHO)

11.0 Abbreviation/Definitions

- 11.1 ASP: Antimicrobial Stewardship Program
- 11.2 MDROs: Multiple Drug Resistance Organisms
- 11.3 HAIs: Hospital Acquired Infections
- 11.4 ID : Infectious disease department
- 11.5 IPC program: Infection Prevention and Control Program
- 11.6 CPID: continuous performance improvement department