

NSHA ANTIMICROBIAL STEWARDSHIP PROGRAM

Strategic Plan

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1. INTRODUCTION

This strategic plan was developed by NSHA's Antimicrobial Stewardship Program (ASP) to outline a detailed plan for the initiation of the program.

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1.1 Vision

Safe and effective use of antimicrobial agents in patients cared for in the Nova Scotia Health Authority.

1.2 Purpose

To establish a NSHA wide ASP to optimize antimicrobial use in the health authority. Through implementation and maintenance of an ASP we will;

1. contribute to improved patient outcomes, reduce the risk of infections, promote patient safety, and reduce or stabilize levels of antimicrobial resistance
2. educate health care professionals, patients, and their families on the best use of antimicrobials
3. undertake antimicrobial stewardship research that will translate to practice in Nova Scotia
4. monitor the efficacy of interventions and feedback performance to stakeholders
5. optimize the cost-effective and safe use of antimicrobials in NSHA

1.3 Rationale

Approximately 50% of antimicrobials are prescribed without an indication and broad-spectrum antibiotic use is increasing in Canada.^{6,14} In hospitals surveyed by the Canadian Nosocomial Infection Surveillance Program (CNISP) in 2009, 40% of inpatients were on antimicrobials.¹⁴ Antibiotics are a limited resource requiring more judicious use. In addition to resistance, excessive use of antimicrobials exposes patients and healthcare systems to other risks such as *Clostridium difficile* infections and drug toxicities. The obligation to address increasing resistance and antimicrobial overuse was highlighted in the 2015 Spring Report of the Auditor General of Canada.¹¹

Antimicrobial Stewardship Programs (ASPs) have emerged as an organized approach to ensure that antimicrobials are used properly: for the right indication, at the correct dose, for the recommended duration, and by the appropriate route. Because of patient safety improvements demonstrated by ASPs, Accreditation Canada has made antimicrobial stewardship a Required Organizational Practice (ROP). Effective ASPs combine numerous initiatives to decrease antimicrobial use by 20-40%, resulting in less antimicrobial resistance, toxicities, and *C. difficile* infections.^{2,4,7,10} Patient outcomes, including mortality, are improved by optimizing treatment through evidence-informed clinical guidelines and education.⁵ A well-established secondary benefit is initial cost savings, ranging from \$200,000 - \$900,000 or US\$ 5-10/patient-day.^{6,8}

Achieving these goals, however, requires a team of stewardship specialists with dedicated time and resources to implement, maintain, and evaluate initiatives. Institutions without established resources have little impact on inappropriate antibiotic use when compared to resourced ASPs.⁴ Analogous to public health and infection prevention and control, ASPs also need surveillance data. For ASPs, key measures to inform and evaluate stewardship strategies are antimicrobial use, resistance patterns, and patient outcomes.

NSHA's ASP will not police antimicrobials. Instead, we aim to improve patient care by modelling and promoting best antimicrobial use practices. Over time, effective ASPs influence the culture of antimicrobial use by changing behaviours of physicians, pharmacists, nurses, students, patients and their families.

2. BACKGROUND

To date there have been pockets of stewardship activities throughout Nova Scotia with minimal coordination at a provincial level. In addition, such programs have had variable implementation in each acute care hospital. NSHA's ASP will build on these successes and utilize evidence-based ASP initiatives to optimize antimicrobial use across NSHA. The NSHA ASP will also monitor efficacy of initiatives using standard metrics, conduct ASP research, and collaborate with IWK ASP, NSHA infection prevention and control, and the Department of Health and Wellness.

2.1 Structure and Funding

- The leadership of the program will include the Physician Co-lead (0.5FTE) and Pharmacist Co-lead (0.5FTE). The 0.5FTE physician position will be filled July 1st, 2017. This ASP leadership will report to NSHA's Antimicrobial Stewardship Leads (see Section 5. OVERSIGHT: Gail Blackmore, Dr. Steven Soroka, Glenn Cox) but also have distinct reporting structures for non-ASP responsibilities to their respective division/department heads.
- In addition, a 0.5FTE Medical Microbiology Lead will coordinate and implement microbiology lab stewardship initiatives. This physician will report to the Chief of the Division of Microbiology in the Department of Pathology and Laboratory Medicine (Dr.

Todd Hatchette) to ensure ASP initiatives are feasible for and supported by the Division of Microbiology.

- ASP clinical pharmacists in each zone will perform the clinical work of the program: 1.0 FTE for Central and 0.5 FTE in each of the other zones (Northern, Western, and Eastern). ASP pharmacists will have matrix reporting to the ASP Co-leads and Pharmacy Site Managers within their respective zones. NSHA pharmacy departments have provided funding/allocated resources for these positions.
- The funding for an administrative assistant is pending.
- Information technology support (0.2 FTE) from the Performance, Analytics and Accountability (Decision Support), will aid in collecting and validating metrics data.

2.2 Scope

NSHA’s ASP will develop initiatives to optimize antimicrobial use among inpatient acute care, inpatient cancer, inpatient rehabilitation, and complex continuing care.

2.3 Timeline

2017*

Activity	Details	Date
1 ASP Team Kick-off meeting	<ul style="list-style-type: none"> a. Introduce team members b. Outline ASP initiatives in place to date within each zone c. Brainstorm potential ASP initiatives achievable in the first year of the program d. Discuss desired metrics and feasibility of collecting reliable data e. Determine frequency of team meetings 	Jan 15 – Feb 1
2 Education and training of ASP team members	<ul style="list-style-type: none"> a. Public Health Ontario (PHO) materials b. Online courses c. Observerships d. Infectious Diseases rounds and teaching 	Jan 15 – June 30

3	Strategic Plan development and dissemination	a. Outline plan for NSHA ASP initiation	April 1-May 1
4	Preliminary gap analysis and stakeholder engagement	a. Identify high antibiotic-use areas and potential ASP initiatives b. Identify stakeholders with interest in ASP and willing to implement initiatives	Feb 15 – May 31
5	Establish metrics and initial data collection methods/sources	a. Identify data sources b. Establish uniform definitions and data collection methods c. Collect baseline data to enable trending and evaluation of interventions	Feb 15 – May 31
6	Strategic plan signature		June 15
7	Introduce healthcare workers to NSHA ASP	a. Media b. Communications strategy c. Website development d. Meet and greet with clinical teams e. Presentations/Grand Rounds	Apr 1 – Dec 31
8	Refinement of metrics	a. Data validation b. Establish daily antibiotic use reports by patient and inpatient location c. Clinical applications tool (dashboard) d. Utilize additional data sources	June 1 – Dec 31
9	ASP initiatives	a. Start new interventions	June 1 – Dec 31
10	Prepare reports	a. Summary of interventions b. Reports on process, outcome, and, balancing measures c. Distribute to stakeholders	June 1 – Dec 31

*New timelines will be prepared and distributed for 2018 and 2019 prior to each calendar year

Quality Improvement & Safety Action Plan deliverables in relation to AMS:*

Key Actions	Start Date	End Date
Develop NSHA wide oversight structure for Antimicrobial Stewardship Program	July 25, 2016	Aug 31, 2016
Develop NSHA AMS Steering Committee	Sept 1, 2016	Nov 30, 2016
Establish and monitor antimicrobial stewardship metrics	Sept 1, 2016	Mar 31, 2017
Collect and evaluate process and outcome measures to ensure successful antimicrobial stewardship practices	Sept 1, 2016	Mar 31, 2017
Develop/implement evidence based guidelines	Sept 1, 2016	June 30, 2017
Education for prescribers, pharmacists, clinicians about AMS, enhancing knowledge on antimicrobials and their use	Sept 1, 2016	June 30, 2017

*The timelines above were developed prior to the formal ASP team being in place. The entire ASP pharmacy team was not in place until April 2017. The pharmacy co-lead was hired in January 2017. Nevertheless, the ASP team has been working to implement these actions in an expedited manner while meeting the Accreditation Canada Tests for Compliance.

2.4 Preparation for Accreditation 2017

Tests for Compliance

Major	The organization implements an antimicrobial stewardship program.	Complete
Major	The program includes lines of accountability for implementation.	Complete

Major	The program is inter-disciplinary involving pharmacists, infectious diseases physicians, infection control specialists, physicians, microbiology staff, nursing staff, hospital administrators, and information system specialists, as available and appropriate.	Complete
Major	The program includes interventions to optimize antimicrobial use that may include audit and feedback, a formulary of targeted antimicrobials and approved indications, education, antimicrobial order forms, guidelines and clinical pathways for antimicrobial utilization, strategies for streamlining or de-escalation of therapy, dose optimization, and parenteral to oral conversion of antimicrobials (where appropriate).	See Section 3: ASP TEAM ACTIVITIES
Minor	The organization establishes mechanisms to evaluate the program on an ongoing basis, and shares results with stakeholders in the organization.	See Section 4: REPORTING & EVALUATION Results will be reported to NSHA ASP Leads, executive sponsors, clinical services, and ASP website. Communication plan in development. Interventions will be modified based on these metrics.

3. ASP TEAM ACTIVITIES

3.1 Core clinical strategy:

Prospective Audit and Feedback (PAF) with Academic Detailing:

Implement PAF across NSHA acute care hospitals. PAF is a core clinical strategy for ASPs and has been shown to decrease antimicrobial use and *C. difficile* rates with no increase in

infectious related events.³ ICU physicians generally support ASPs and believe patients benefit from these programs.¹³

However, such implementation across diverse patient populations over a broad geographic area requires organization and time. We will utilize a Hub-and-Spoke model which has been successful used in Ontario to implement ASPs through the Community Hospital ICU Local Leadership (CHILL) project as part of the Adopting Research to Improve Care (ARTIC) program. The Council of Academic Hospitals of Ontario (CAHO) supported the Sinai Health System – University Health Network Antimicrobial Stewardship Program (SHS-UHN ASP) to establish ASPs in community ICUs. In NSHA, there will be one hub site in each zone with ASP pharmacist and physician support. NSHA ASP co-leads will aid in the development and support of hub sites.

These hub sites will then serve as local experts for other acute care hospitals (spoke sites) in their respective zones. The hub sites will aid in the development and ongoing support of PAF in spoke sites. Such a model will allow for regional flexibility, and the features of PAF at each hospital will be tailored for the site's local needs, expertise, and patient population. Resources such as guidelines, teaching materials, and data collection aids will be shared among all sites. We will standardize antimicrobial use (AMU), process, outcome, and balancing measures across sites when possible.

PAF recommendations typically include:

- i) stopping antimicrobials with no indication
- ii) narrowing therapy from broad-spectrums
- iii) broadening therapy if indicated (bug-drug optimization)
- iv) establishing stop dates, including patients deceased from unit or being discharged home
- v) reviewing dosage and scheduling, including therapeutic drug monitoring (vancomycin, aminoglycosides)
- vi) changing IV to oral
- vii) suggesting source control or other consultations when appropriate
- viii) review drug interactions/contraindications/adverse effects

Academic detailing:

- Interpretation and application of treatment guidelines
- Microbiology education and interpretation of diagnostics/results
- Antimicrobial efficacy, toxicities, and spectrum

Additional benefits from this initiative may include:

- Fostering a relationship between ASP team and clinical services
- Identifying important microbiology information that may be otherwise missed or incorrectly managed (i.e. *S. aureus* bacteremia, candidemia)

- Education for healthcare workers that can be disseminated throughout the institution
- Developing the knowledge and experience of junior ASP pharmacists

A separate project charter will be developed for this initiative.

3.2 Other current strategies

An inventory of current strategies across NSHA will be obtained by zonal ASP pharmacists using the PHO Gap Analysis Checklist as a guide. Some current strategies include:

- **Antibiograms**
 - Developed in each zone
 - Ensure meet Clinical and Laboratory Standards Institute (CLSI) standards
 - Improved dissemination to end-users (i.e. ASP website)
 - Develop stratified antibiograms across NSHA
- **Cascading microbiology susceptibility reporting**
 - Broad spectrum antimicrobials are not reported if other options are available
 - Currently in place for Central zone, working on implementing in other zones through representation on the Susceptibility Testing Subcommittee (see 6. Collaborations)
- **Parenteral to oral conversion:**
 - Elevated parenteral use identified in recent NSHA point prevalence survey for highly bioavailable antibiotics (approximately 66% of inpatient use was IV)
 - Policy currently in approval stage
 - Separate project plan
- **Formulary review/streamlining**
 - NSHA-wide closed-formulary
 - Eliminating agents with duplicate spectrums of activity
 - Regularly reviewed on request or after minimum time interval
 - Utilize purchasing data for institutional costs of antimicrobials and/or drug utilization (drug class or individual agent)

- **Dose optimization**
 - Clinical pharmacists regularly review dosing based on weight, renal function, indication, and liver function
 - Point prevalence survey or chart review
 - Percentage of patients receiving an appropriate dose/adherence to dosing recommendations.

3.3 Supplementary strategies (preliminary stages or potential)

These strategies will be developed based on available resources, evaluations of antimicrobial use patterns, and feedback from healthcare workers.

- **Urinary Tract Infections and Asymptomatic Bacteriuria (ASB)**
 - Collaboration with researchers at Dalhousie College of Pharmacy to develop NSHA wide PAF research project for UTIs/ASB
 - Study the effectiveness of PAF methods and co-interventions
 - High rates of treatment for ASB in acute care hospitals and long term care (30-50%)^{9,12}
 - Utilize AMMI “*Symptom-Free Pee: LET IT BE*” resources
 - Application pending for research funding
 - Reassess microbiology testing and reporting of urine culture results
 - Positive urine culture is a strong driver of starting antibiotics
 - Already work done to stop reflex culture testing based on urinalysis by Microbiology. Will continue to address this issue across NSHA.
- **Clinical Pathways and Guidelines**
 - Support formation of NSHA Antimicrobial Handbook using the Capital Health Antimicrobial Handbook as a basis
 - Incorporates best practices based on available evidence while incorporating local resistance epidemiology
 - Treatment guidelines for common infectious syndromes
 - Guidance on appropriate empiric therapy
 - Indications and guidance for appropriate prophylactic therapy

- Dosing of antimicrobials
 - Therapeutic drug monitoring guidelines
 - Develop a searchable and indexed electronic version
 - Reviewed and updated every 5 years (more frequently if major changes in standard of care or resistance patterns)
- **Beta-lactam allergy protocol**
 - Working with Anesthesia and Allergy/Immunology in central zone to develop and implement preoperative beta-lactam allergy assessment tool to optimize surgical prophylaxis use
 - Modify algorithm and implementation for other NSHA patients
- **Redundant therapy**
 - Algorithm to contact prescriber for redundant therapies
- **Automatic *Staphylococcal aureus* bacteremia consults**
 - Central zone: Infectious Diseases consultation improves outcomes¹
 - Outside central zone: Will collaborate with Internal Medicine in each zone to ensure available resources and standardization of practice using a standard order set.
- **Surgical antimicrobial prophylaxis (SAP) optimization**
 - Review compliance with *Safer Healthcare Now!* benchmarks (choice of drug, timing, redosing, and duration)
- ***Clostridium difficile* algorithm**
 - Create inpatient algorithm in collaboration with IPAC to identify, treat, and limit spread of *C. difficile*
 - Nurse recognize potential *C difficile* symptoms and initiates early testing
 - Patient placed in contact isolation

- Physician contacted to consider empiric treatment, assess need for non-*C. difficile* antibiotics, and early imaging and consultations
- Test result recognized and communicated to physician for definitive treatment
- Provide treatment guidelines
- UHN/SHS First Episode *Clostridium difficile* Infection (CDI) Management Algorithm as a reference

3.4 Microbiology

- Guidance on diagnostic methods and microbiological culturing practice that leads to appropriate prescribing of antimicrobials
- Review and update automatic comments for microbiology results to guide healthcare workers
- Evaluating the time to effective therapy and time to de-escalation with introduction of matrix-assisted laser desorption/ionization time-of-flight mass spectrometry for speciation

3.5 Research

- Develop research projects locally and provincially
- Apply for grants to support research projects
- Participate in national projects
- Collaborations with Dalhousie Pharmacy Research
 - Prospective audit and feedback for treatment of UTIs in hospital
 - Summer student projects

3.6 Education

- Themes: antibiotic resistance, ASP strategies to address resistance, appropriate antimicrobial use, and diagnosing infections
- Formal sessions: Grand Rounds, noon presentations, resident orientation events (monthly presentation to incoming ICU residents), weekly ICU education rounds, academic half day for residents and medicine clerks, M and M division rounds
- Will target physicians (hospital-based and community), pharmacists, nurses, residents, medical students, administrators, and public
- ASP training for ID/Microbiology residents at Dalhousie University and other universities through electives or other funding opportunities. NSHA ASP will not provide funding for trainees.
- Incorporate ASP teaching into medicine and pharmacy clinical ID rotations
- Periodic emails and other social media/newsletters with stewardship/antibiotic tips

3.7 Branding, engagement, and program awareness

- Website development
- Short introductory sessions for healthcare workers
- Informal messaging: electronic messaging, website development, signage
- Target physicians (hospital-based and community), pharmacists, nurses, residents, medical students, administrators, and public
- Collaborate with Dalhousie University, College of Pharmacy, to conduct focus groups of front line health care providers to learn more about perceptions of antimicrobial use and stewardship in NS.

3.8 Real-time antimicrobial use database/dashboard

- Collaborate with Clinical Applications department to develop electronic interface of inpatients receiving antibiotics
- Integrated with demographic information, microbiology data (cultures, sensitivity), general laboratory data (WBC, Cr, CRP).
- Antimicrobial data: name, dose, duration, route, previous antibiotic use information
- Secure and portable for use on mobile devices/tablets
- Searchable and ability to generate reports
- Able to perform drug utilization research and reports
- Potentially model database with that developed by IWK ASP

4. REPORTING & EVALUATION

4.1 Data collection and program evaluation

- Data Sources (potential)
 - Pharmacy dispensing records
 - Provincial drug purchasing data
 - Pyxis / Omnicell
 - IPAC database
 - Laboratory Information System for microbiology data
 - Clinical chart audits and point prevalence surveys

- Information management and analytic support specialist to aid in collecting, formatting, and validating data (0.2 FTE assigned to program)
- Report metrics for inpatient acute care, inpatient cancer, inpatient rehabilitation, and complex continuing care facilities
- Antimicrobial Consumption measures
 - Defined daily dose (DDD) per patient days
 - Overall for institution and for specific agents:
 - Top 5 antibacterial/antifungal by usage
 - Top 5 antibacterial/antifungal by expenditure
 - Antimicrobial costs per patient day for total antibiotics/antifungals
- Process measures:
 - Initiative dependent
 - Trends in the ratio of IV to PO antimicrobial use
 - Acceptance of ASP recommendations
- Resistance measures
 - *Pseudomonas* susceptibility (inpatient isolates – hospital onset infections)
 - *Candida* susceptibility (inpatient isolates - hospital onset infections)
 - *E. coli* susceptibility
 - Antibiograms
- Outcome measures
 - Hospital onset *C. difficile* cases
 - Balancing measures:
 - ICU average length of stay, re-admission rates, mortality rate
- Data validation
 - Regardless of metric, data will be validated using secondary data sources on a yearly basis, at a minimum

4.2 Reporting

- NSHA's ASP will present quarterly reports to:
 - NSHA ASP Leads and executive sponsors
 - ICUs and other clinical services
 - ASP website
- Tabular and graphic trends over time and compare to national benchmarks when available
- Clinical pathways and guidelines development update
- Initiative implementation update

- Research activity

4.3 Annual Review

- Reassessment of initiatives and areas to focus resources based on microbiology surveillance data, antimicrobial use metrics, and stakeholder feedback
- Ensure initiatives are making meaningful changes
 - Survey stakeholders for feedback on utility of audit and feedback rounds
 - Independent review of sample recommendations to ensure evidence-based
 - Education session feedback
- Ensure collecting data that measures initiatives and is reported
- Review learning points from successful and failed initiatives
- Evaluate ongoing human resources requirements and performance of team members
 - Establish career development goals
 - Feedback on workload of team members
- Explore collaboration opportunities with other NSHA departments and provincial ASPs
- Development of strategic plan every 3-4 years
- Define team members' roles, reiterate vision, outline successes and failures, and set future goals

5. OVERSIGHT

The ASP will be directed by NSHA's Antimicrobial Stewardship Program Steering Committee. Multidisciplinary representation from all zones will form this Committee. The Committee will report to NSHA's Antimicrobial Stewardship Leads: Gail Blackmore (Senior Director Quality Improvement, Safety, Patient Relations), Dr. Steven Soroka (Senior Medical Director Pharmacy Services), and Glenn Cox (Senior Director Pharmacy Services). The Microbiology lead will report to the Chief of the Division of Microbiology in the Department of Pathology and Laboratory Medicine (Dr. Todd Hatchette).

The executive sponsors are Dr. Lynne Harrigan (VP Medicine & Integrated Health Services) and Colin Stevenson (VP Quality, System Performance and Transformation).

6. COLLABORATIONS

NSHA Antimicrobial Subcommittee (ASC) of the Drugs and Therapeutics Committee

Close collaboration between ASP team and ASC. There will be strong representation on this Subcommittee to provide ASP recommendations when reviewing formulary and pre-printed order sets.

NSHA IPAC

Collaborate with IPAC when possible. Proposed initiatives include:

- Surgical antimicrobial prophylaxis optimization and surveillance of surgical site infections
- Formalize a *C. difficile* management algorithm
- Data sharing including analysis, monitoring, and reporting of multi drug resistant organisms

ID Consult Service

The ASP will not provide Infectious Diseases (ID) consults when interacting with clinicians and other healthcare workers. When appropriate, the ASP will recommend formal ID consults. ASP initiatives will seek input from the ID division.

Microbiology

The Medical Microbiologist ASP Lead will liaise with the Microbiology Labs in each zone including collaboration with Laboratory Information System (LIS) personnel, laboratory technicians, and laboratory management.

Susceptibility Testing Subcommittee of the Microbiology Service Advisory Committee

Mandated to address issues related to the testing and reporting of antimicrobial agents, including the selection of agents to test, methods used, and reports and comments

Pharmacy services

Work with hospital central pharmacies and unit clinical pharmacists to advance ASP initiatives.

Potential collaborations include:

- Physician notification for patients prescribed multiple antimicrobials with overlapping bacterial coverage (duplicate therapy)
- Streamlining and de-escalation of therapy

Dalhousie College of Pharmacy:

- Collaborate on research projects
- Collaborate to incorporate ASP teaching for pharmacy residents

Nursing services

Identify nursing champions to help with stewardship efforts

IWK ASP

- Share resources (i.e. clinical pathways) when possible
- Collaborate on education initiatives and research projects

Nova Scotia Department of Health and Wellness

- Collaborate on antimicrobial education materials for healthcare workers and the public
- Advise on antibiotic stewardship initiatives/research projects for the community setting

SASS (Students for Antimicrobial Stewardship Society) – Dalhousie Chapter

- Promote antimicrobial stewardship for Dalhousie medical and pharmacy students
- Provide antimicrobial education materials
- Promote and support student research projects

7. NSHA ASP TENETS

NSHA's ASP will aim to improve patient care by modelling and promoting best antimicrobial use practices. Over time, effective ASPs influence the culture of antimicrobial use by changing behaviours of physicians, pharmacists, nurses, students, patients and their families. We will not focus on restrictive/preauthorization interventions. The NSHA ASP will aim to

- Promote a culture of optimal antibiotic use in NSHA
- Respect and promote regional strengths
- Act in collaborative and engaging manner
- Make evidence-based recommendations
- Maintain an open/transparent program
- Start small, build on success

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