NSHA ANTIMICROBIAL STEWARDSHIP PROGRAM

Quarterly Report
Q1 2017

Sept 21, 2017
Table of Contents

Summary ........................................................................................................................................ 2
Interventions ................................................................................................................................... 3
Results & Metrics ......................................................................................................................... 4
Education ......................................................................................................................................... 12
Research ........................................................................................................................................ 13
Guidelines ....................................................................................................................................... 13
Other Activities ............................................................................................................................. 14
Strategic Planning .......................................................................................................................... 14
Acknowledgments ........................................................................................................................ 15
Summary

The vision of the NSHA Antimicrobial Stewardship Program (ASP) is to ensure the safe and effective use of antimicrobial agents in patients cared for in Nova Scotia Health Authority.

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. 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

The NSHA ASP team was fully formed in the Spring 2017. Our early activities have focused on forming the structure of the program and surveying the current AMS activities throughout NSHA. A significant focus has been placed on our communication strategy to introduce the NSHA ASP to all healthcare workers. In addition, our ASP pharmacists have been receiving Infectious Diseases and AMS training through online courses and observerships within NSHA and abroad.

We have established zonal subcommittees with oversight by the NSHA ASP Steering Committee (see organizational chart below). These committees are multidisciplinary including pharmacists, physicians (representing a variety of services), microbiology, nursing, IPAC, and quality improvement. A strategic plan has been developed and approved by our sponsors. This plan outlines the vision, structure, and planned initiatives of this program.

In addition, we have spent significant time obtaining quality, validated antimicrobial use, process, and outcomes measures. This task has been complicated by different EMR systems across NSHA. We have obtained purchasing data which provides crude antimicrobial use (AMU) data at the level of institutions/zone (summarized below). This data may be useful for showing trends over time and determining relative use of antibiotics at each site. We have also been working with Meditech to obtain reliable dispensing data (DOT and/or DDD) outside of Central Zone. Within Central Zone, DDD and cost data is available. Once we have obtained dispensing AMU data, we will validate the data over the next 6 to 12 months using secondary data sources and manual chart review.

We have initiated NSHA-wide initiatives based on baseline stewardship activities, level of ASP pharmacist training, and a point prevalence survey conducted in 2015 (Black et al 2017). The NSHA ASP Steering Committee has met twice to help guide the clinical ASP team.

**Interventions**

The 2 main focuses of the NSHA ASP in the short term have been 1) IV to PO policy and 2) Prospective audit and feedback with academic detailing.

The need for an IV to PO policy was identified by a point prevalence survey showing high IV use rates for bioavailable drugs in NS. Such an initiative is recommended by Choosing Wisely Canada and the Infectious Disease Society to reduce costs, complications from parenteral drugs, and hospital stays. This was initiated in July/August depending on the location with the plan to measure clinical pharmacist utilization and changes in IV rates over time. We will also perform a point prevalence survey to ensure the policy is being used correctly according to the inclusion and exclusion criteria. The ASP team has been introducing clinical pharmacists to this initiative over the past 3 months across NSHA and communication has been developed to inform end-users prior to implementation.
Prospective audit and feedback (PAF) is a core clinical strategy of ASPs. PAF has been occurring in the Eastern Zone (Cape Breton Regional ICU) and Northern Zone (Colchester East Hants Health Centre). In the latter, with a new hire of an ASP pharmacist, there has been an interruption in PAF during the Spring 2017. However, it was restarted and PAF targets specific antimicrobials throughout the Colchester East Hants Health Centre. Eastern Zone is expanding PAF into the CBRH CCU. In Central Zone, PAF was initiated in the two medical surgical ICUs (VG and HI). For Western Zone, PAF includes the Valley Regional Hospital ICU and urinary infections/asymptomatic bacteriuria among inpatients based on a previous survey identifying suboptimal use of antimicrobials for such infections. Once PAF is established in these hubs, the ASP will help establish PAF in spoke hospitals within each zone.

A NSHA Antimicrobial Handbook is being developed and designed. We are reviewing previous work on this project and have assigned topics for review. We plan on updating and disseminating topics in a stepwise fashion according to priority. This will expedite workflow and facilitate approval process. These topics will be available electronically.

The beta-lactam allergy algorithm for preoperative patients is a project initiated in Central Zone. This was identified as a need by Anesthesia. The New Brunswick AMS group has developed an excellent algorithm and are sharing this resource with our program. Allergy and Immunology is also collaborating on this project. After development of the algorithm we will pilot it in Central Zone and measure use of non-beta-lactams for surgical prophylaxis and the choice of antibiotic in true allergic patients. We will then modify as necessary and expand it across the province.

With the amalgamation of health authorities, there has been the need to review the formularies across the province. We have done a review of these formularies to streamline the unified NSHA formulary while taking the opportunity to review and implement formulary automatic substitution/therapeutic interchanges and restrictions.

Separate project plans have been developed for these interventions.

---

**Results & Metrics**

**Purchasing Data**

Purchasing data was used to calculate DDDs and antibiotic cost, standardized according to patient-days for FY2016-17. Because some larger hospitals purchase for other hospitals in their zone, patient-days were summed for all hospitals each institute purchases for (e.g. St Martha’s purchases for Strait Richmond, so Strait Richmond patient-days were added to St Martha’s patient-days). The patient-day denominator includes all bed types such as acute care, long term care, psychiatry beds, and etc. The only exclusion was Nova Scotia Hospital and East Coast Forensics given the minimal antibiotic use and large patient-days for these institutions, which would falsely lower AMU metrics for their purchasing hospitals. In addition, Eastern Zone (CBRH, Glace Bay, Inverness, Northside, St. Martha’s, New
Waterford) supplies VON and continuing care with antimicrobials so their data includes outpatient IV antibiotic use. Aberdeen also supplies outpatients with IV vancomycin.

Therefore, there is significant difficulties interpreting this data, but it can be used across time to identify trends and AMU patterns to guide more granular data analyses. While purchasing data has significant limitations compared to dispensing or consumption metrics, data over 12 months can correlate with dispensing data (Tan et al. J Antimicrob Chemother 2016; 71: 547-53).

We will compare this data to FY2017-18, when available, to identify any trends.

For now, we will plan future AMS interventions using this purchasing data as a guide. For instance, we plan on using PAF for carbapenem use in Cape Breton.

Purchasing data for targeted antibiotics is outlined in the graphs below:
Summary of clinical pharmacist interventions for the 4th Quarter FY16-17:
- 169 antimicrobial-related interventions
- 131 accepted interventions

Trend in dispensing data 2007-2017 for QEII and Dartmouth General Hospital acute care:
Bridging surveys 2016

Eastern:

Guysborough Memorial and St. Martha’s Regional: Developing IV to PO step-down program, PPOs, clinical pharmacist activities (de-escalation, dose adjustments, and monitoring), education sessions, formulary review, and antibiogram. Recording pharmacist interventions electronically and ICU physician indication charting.

Cape Breton: ICU PAF, clinical pharmacist activities (de-escalation, dose adjustments, and monitoring), PPOs, IV to PO step-down program, education sessions, formulary review, and antibiogram. Monitoring physician indications, clinical pharmacist activities, PAF acceptance rates, and resistance rates.

Northern:

Colchester East Hants: weekly prospective audit and feedback rounds for select broad-spectrum antibiotics, clinical pharmacist recommendations (de-escalation, dose adjustments, and monitoring), review of hospital formulary, IV/PO step-down program, Clinical pathways (UTIs and community acquired pneumonia), yearly antibiogram, and education sessions. Metrics included monitoring acceptance rates, antimicrobial use/cost (Omnicell), resistance rates, C. difficile rates, pneumonia rates, and LOS.

Over 5 fiscal quarters from 2014-2106; there were approximately 41 interventions, with prescribers agreeing to 44% of the recommendations. However, a large portion of forms were left blank (36%) by the prescribers.

This program was successful in reducing fluoroquinolone use with an associated decline in C. difficile rates and LOS for pneumonia. However, there was a 60% increase in piperacillin/tazobactam use with an associated decrease in Pseudomonas sensitivity to this agent.

To build on this success we will utilize dedicated AMS pharmacy resources to follow-up with prescribers and have our feedback reviewed. In addition to reviewing piperacillin/tazobactam during PAF, we have added vancomycin among the agents to review, based on the above purchasing data.

Western:

Annapolis Valley: UTI audit of prescribing practices and developing UTI educational materials, programmed auto stop orders for antimicrobials requiring prescriber review, clinical pharmacist recommendations (review microbiology reports), and an antibiogram. Needs assessment identified the ICU and Medical units as high antibiotic use areas and UTIs as the syndrome requiring intervention. A review of 23 cases of bacteriuria identified empiric therapy was sub-optimal in 6 cases and duration was excessively long in another 5 patients.

We introduced PAF in the ICU and for patients with positive urine culture results at Valley Regional Hospital.
Point prevalence survey 2015


a) Excessive intravenous antibiotic use: approx. 60% of all antibiotics
   i) We are implementing an IV to PO conversion policy
   ii) Will reassess intravenous antibiotic use after its implementation

b) Highest antibiotic use in ICUs (47%)
   i) Implementing audit and feedback in ICUs

c) Low uptake of local guidelines when treating infections
   i) 30% orders compliant with 2012 Capital Health Antimicrobial Handbook
   ii) We are helping to formalize plan to update handbook and disseminate to end-users across NSHA

Beta-lactam allergy

- Surgical antimicrobial prophylaxis: Patients labelled as allergic to penicillin receive clindamycin approximately 40% of the time in QEII (2011-2017 May)
   i) Indicates allergies are not properly assessed
   ii) In true allergy, clindamycin is not an optimal antibiotic
   iii) Developing an algorithm with Anesthesia and Immunology
   iv) Will reassess antibiotic use in patients labeled as penicillin allergic after implementation

Next steps

- Obtain antibiotic dispensing data for each hospital at the unit level for zones outside central. Working with Meditech to obtain reliable data.
- Summarize the data by quarter to identify trends in antibiotic use and areas of high antibiotic use.
- Validate over the next 6-12 months with other data sources
Outcomes Data:

### NSHA ICUs Summary Data: Fiscal Year 2016-17

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Days</th>
<th>LOS Avg</th>
<th>Mortality Rate</th>
<th>Readmission rate within 30d</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBRH ICU</td>
<td>4247</td>
<td>9.14</td>
<td>18.6%</td>
<td>15.0</td>
</tr>
<tr>
<td>CBRH CCU</td>
<td>1540</td>
<td>3.36</td>
<td>5.7%</td>
<td>33.0</td>
</tr>
<tr>
<td>St. Martha's ICU</td>
<td>1726</td>
<td>2.96</td>
<td>2.6%</td>
<td>15.8</td>
</tr>
<tr>
<td>Aberdeen ICU</td>
<td>2914</td>
<td>3.82</td>
<td>4.7%</td>
<td>14.2</td>
</tr>
<tr>
<td>Colchester ICU</td>
<td>2774</td>
<td>3.63</td>
<td>4.9%</td>
<td>16.4</td>
</tr>
<tr>
<td>Cumberland ICU</td>
<td>1290</td>
<td>4.63</td>
<td>9.4%</td>
<td>20.8</td>
</tr>
<tr>
<td>DGH ICU</td>
<td>2245</td>
<td>4.77</td>
<td>8.8%</td>
<td>15.3</td>
</tr>
<tr>
<td>VG ICU</td>
<td>2325</td>
<td>4.31</td>
<td>16.4%</td>
<td>38.9</td>
</tr>
<tr>
<td>HI CVICU</td>
<td>3883</td>
<td>3.20</td>
<td>3.1%</td>
<td>11.9</td>
</tr>
<tr>
<td>HI ICU</td>
<td>3503</td>
<td>4.69</td>
<td>16.4%</td>
<td>10.9</td>
</tr>
<tr>
<td>SSRH ICU</td>
<td>1537</td>
<td>3.63</td>
<td>6.3%</td>
<td>13.2</td>
</tr>
<tr>
<td>VRH ICU</td>
<td>2377</td>
<td>3.30</td>
<td>8.7%</td>
<td>10.9</td>
</tr>
<tr>
<td>YRH ICU</td>
<td>1931</td>
<td>4.11</td>
<td>9.4%</td>
<td>14.7</td>
</tr>
</tbody>
</table>

We will report such outcomes by quarter going forward to follow trends over time.
as reported by NSHA according to the Patient Safety Act for Quarter 1 (Q1). Q1 results include data collected from April 1-June 30, 2017.

Healthcare-associated *Clostridium difficile* Infection Rate

as reported by NSHA according to the Patient Safety Act for Quarter 1 (Q1). Q1 results include data collected from April 1-June 30, 2017.

---

**Education**

1. NSHA ASP Educational Day on July 13, 2017. Presentations included principles of behaviour change, introduction to microbiology, mechanism of beta-lactamases, fungal infections, and intraabdominal infections. In addition, we role-played audit and feedback scenarios based on a decision framework shared by SHS-UHN ASP.
2. Nursing presentation: August 16, 2017
3. Internal Medicine Grand Rounds: Sept 19, 2017
5. Fall 2017 Department of Medicine Day: Presentation to physicians and residents: Nov 24
6. Care by Design: Long Term Care conference: AMS in LTC: Nov 24
7. Intensive Care Grand Rounds: early 2018
8. Medicine and pharmacy training
   a. ASP introduction and teaching incorporated into the Infectious Diseases rotation for medical clerks and residents
   b. Incorporate pharmacy resident rotations into NSHA ASP
9. Infectious Diseases and Medical Microbiology curriculums
   a. Development of AMS objectives and itinerary for fellows
10. Beta-lactam allergy presentation by Dr. Lori Connors from Allergy and Immunology. Posted to ASP website.

Research

- Collaborating with Emily Black of Dalhousie Pharmacy Department for future NSHA funding application.
- Paul Bonnar will be presenting a poster from his SHS-UHN ASP quality improvement project on surgical prophylaxis at IDWeek 2017 (abstract accepted).

Guidelines

NSHA Antimicrobial Handbook

The formation of a NSHA Antimicrobial Handbook was initiated prior to the formation of the NSHA ASP by the Central Antimicrobial Agents Subcommittee. This handbook will provide guidance on antimicrobial use for a broad range of syndromes. It will also include information on best practices, therapeutic drug monitoring, and surgical prophylaxis. We will aid in finalizing the updates, establishing a review process and timelines, and disseminating the handbook to end-users. Updates will be done priority of topic to facilitate workflow and approval.

A project plan has been developed, outlining milestones, timelines, review process, and template for this handbook.
Other Activities

1. Dashboard development
   a. Working with Clinical Applications to develop a dashboard that identifies antimicrobial use in real-time, linked with laboratory data

2. Communications plan
   a. outlines methods of communication to end-users and the public
   b. educational materials

3. NSHA ASP website live on May 6, 2017

4. Microbiology initiatives
   a. Through representation on the susceptibility testing subcommittee of the Microbiology Service Advisory Committee, we will review and standardize cascading microbiology susceptibility reporting and strategic microbiology results reporting across NSHA.

Strategic Planning

- Dr. Ian Davis started as ASP Microbiology Lead July 1, 2017
- Planning for Antibiotic Awareness Week to engage healthcare workers and the public. We are working with communications to develop materials for dissemination.
- Engagement and collaboration with IPAC across NSHA through representation on committees and an introductory presentation at the Provincial ICP meeting by P. Bonnar on July 10, 2017
- The ASP team participated in the June 8 NCCID Atlantic caucus on antimicrobial stewardship. Three team members presented and we are continuing to work on future collaborations across the Atlantic Provinces.
- Andrea Kent has performed site visits to all zones to introduce pharmacy groups to the NSHA ASP
- The NSHA ASP is represented nationally by Kim Abbass who has been working on AMMI Canada Antimicrobial Stewardship and Resistance Committee (ASRC)
Acknowledgments

- Executive sponsors: Dr. Lynne Harrigan (VP Medicine & Integrated Health Services) and Colin Stevenson (VP Quality, System Performance and Transformation)
- Gail Blackmore (Senior Director Quality Improvement, Safety, Patient Relations), Dr. Steven Soroka (Senior Medical Director Pharmacy Services), and Glenn Cox (Senior Director Pharmacy Services)
- Dr. Todd Hatchette: Chief of the Division of Microbiology in the Department of Pathology and Laboratory Medicine
- Dr. Shelly McNeil, Division Head Infectious Diseases
- Tammy MacDonald, Infection Prevention and Control
- Heather Neville & Stephen MacKay, analyzing antibiotic use metrics
- Emily Black: collaborating and sharing study results
- SHS-UHN ASP: sharing resources, education of team members, and collaborations