

NORTHERN HEALTH
ANTIMICROBIAL
STEWARDSHIP

ANNUAL REPORT
2019 – 2020



northern health
the northern way of caring

CONTENTS

EXECUTIVE SUMMARY.....	2
INTRODUCTION.....	3
BEST PRACTICES.....	6
Clinical Tools, Standards and Policies.....	6
Education Initiatives.....	6
Order Set Development.....	7
Research.....	8
CLINICAL SERVICE (PROSPECTIVE AUDIT & FEEDBACK).....	13
OUTCOME AND PROCESS MEASURES.....	17
AMS AND COVID-19.....	18

EXECUTIVE SUMMARY

BEST PRACTICES

There is ongoing work to develop and revise clinical tools, protocols and order sets. Items completed and actively being developed/revised include:

Clinical tools, standards, and policies

- Clinical tool pocket-cards for empiric treatment and antimicrobial dosing (2020 update in progress)
- Prolonged duration intravenous antibiotics policy in development

Education initiatives

- Learning hub modules for pneumonia (completed February 2019)
- Education session for prescribers (Gram positive bacteremia) – Friday Grand Rounds (Jan 24, 2020)

Order set development

- Creation of regional vancomycin and aminoglycoside initiation order sets (completed Spring 2019)
- Updated oseltamivir dosing in order set for influenza outbreak declared by medical health officer (10-111-5021)
- Creation of a regional Clostridium Difficile order set (submission for approval May 2020)
- Updates to order sets for febrile neutropenia and community acquired pneumonia in adults in progress

Research

- Pharmacy resident project – Assessing the use of a standardized allergy history questionnaire in patients with a reported penicillin allergy (completed May 2019; manuscript awaiting publication)
- High cost antibiotics in outpatient setting – clinical pharmacist surveillance

ANTIMICROBIAL USAGE METRICS

Antimicrobial utilization, measured in defined daily dose (DDD) per 100 patient-days, is calculated to track the utilization trend over time. The DDD is the assumed average adult maintenance dose per day for a drug used for its main indication. The conversion of drug utilization to this standardized measurement allows for comparisons to be made across different antibiotic classes and facilities.

Data collection and analysis with regard to antimicrobial use and costs in NH has proven to be challenging; an aspect that is shared with other AMS programs across Canada. The NH AMS data analysis team continues to work on determining the most appropriate methods for pulling the required data for analysis of these metrics. Despite rigorous methods used previously there have been issues identified with previously reported data that points to inaccuracy and renders any further analysis inappropriate until these issues have been confidently resolved. This work is still ongoing and therefore we are unable to share any antibiotic cost/usage metrics at this time.

CLINICAL SERVICE/AUDIT & FEEDBACK

Throughout this fiscal year variations of Prospective Audit and Feedback (A&F) of targeted antimicrobials have been continued (with mentorship from the AMS program coordinator at UHNBC) at NH sites with onsite pharmacist support. Over the course of the 2019/20 fiscal year, our clinical pharmacists identified over 11, 000 drug therapy problems (DTPs). Those related to AMS accounted for 26.6%. The resolution rate for these AMS DTPs reached an all time high this year at 96.75% (Table 1). The top 3 drug therapy problems were: 1. Antimicrobial dosage too low (suboptimal with regard to efficacy), 2. Unnecessary antimicrobial discontinued and 3. New antimicrobial needed and initiated (necessary) see Figure 1.

INTRODUCTION

Northern Health's Antimicrobial Stewardship (AMS) Program is continually striving to meet the needs of our various facilities and patient populations being managed at these facilities. We are working towards improvements in antimicrobial prescribing and ultimately patient care.

Sharing this report with interested stakeholders is just as important as having the report at all. With the vast geographical size of our health authority comes the constant challenge of finding effective ways to distribute information and other program related communications. We will be utilizing several avenues to distribute this report and apologize for any duplications. If you are interested in providing feedback on distribution methods for this information or on what you read in this report please feel free to contact the program coordinator (see page 5 for contact information).

We are constantly seeking engagement at the site level and encourage anyone interested in antimicrobial stewardship and how it can be improved at their facility to also contact the program coordinator. Only when we work together can we truly improve the use of antimicrobials within the Northern Health Authority.

ANTIMICROBIAL STEWARDSHIP PROGRAM TEAM MEMBERS

AMS Program Coordinator (Pharmacist Lead)
<ul style="list-style-type: none"> • Ryan Doerksen (Interim Coordinator) • Alicia Rahier (returned September 2019)
AMS Program/ Infection Prevention and Control Medical Lead
<ul style="list-style-type: none"> • Abu Hamour (NH Infectious Disease Specialist)
AMS Subcommittee Members
<ul style="list-style-type: none"> • Audrey Da Costa (Internal Medicine physician – UHNBC) • Amy Nunley (Clinical Pharmacy Specialist – NI) currently on leave until fall 2021 • Andrew Lowe (Clinical Pharmacist – NE) • Barb Falkner (Professional Practice Lead Pharmacist) • Barret Barr (Clinical Pharmacy Specialist – NI) <i>covering for Amy Nunley May 2020 until end of leave</i> • Carey-Anne Lawson (IT – CIS Pharmacist) • Carly Rosger (Clinical Pharmacist – NW) currently on leave until fall 2020 • Carol Pruner (Clinical Pharmacist – NI) • Alissa King (Quality Resource Technologist Microbiology) • Debora Giese (CIC – Certified Infection Control – NW) • Gordon Ling (Clinical Pharmacist – NW) covering for Carly Rosger until fall 2020 • Rikinder Sandhu (Infectious Disease Specialist) • Ryan Doerksen/Jessica Brecknock (Medication Use Management Pharmacist) • Juanita Kerbrat (Coordinator, Infection Control RN – NE) • Judy Klein (IPC – Infection Prevention Professional – NE) • Kyla Bertschi (Clinical Pharmacy Specialist – NI) • Kyla Redlon/Rachel Henri (Clinical Nurse Educator – NI) • Sandra Vestvik (Chief of Staff MD, BVDH – NW)
Clinical Pharmacists (who provide data for Audit and Feedback)
<ul style="list-style-type: none"> • Rebecca Arsenault – MMH • Manuela Krisinger – MMH • Laura Mussfeld – BVDH • Samantha Holland/Jessie McIntosh – Omineca Lakes District • Tracy Moraes – PRRH • Eyad Abu Sabiha – KGH • Oseyi Oseghale – FSJ • Michael Matula – GRB • Leah Smith – Remote Relief Pharmacist • Michael Gentleman – Relief Pharmacist

CONTACT INFORMATION

Alicia Rahier, NH AMS Program Coordinator
alicia.rahier@northernhealth.ca
 University Hospital of Northern BC
 Phone: 250-565-5956 Cell: 250-612-2030
 Fax: 250-565-2885

Ryan Doerksen can be contacted at
ryan.doerksen@northernhealth.ca
 Phone: 250-565-5956 Cell: 778-349-5108
 Fax: 250-565-2885
*Note: Interim Program Coordinator
 from September 2018 – 2019*

BEST PRACTICES

1. CLINICAL TOOLS, STANDARDS AND POLICIES

All-Staff Antimicrobial Stewardship webpage on OurNH and NH Physicians website (ongoing)

NH staff can quickly and easily gain access to information about the NH AMS program as well as any relevant clinical tools, clinical practice standards, clinical memos or bulletins and other online resources from the [All-staff Antimicrobial Stewardship Webpage](#). NH prescribers can also access this information on the [NH Physicians' Webpage](#). Under Physicians Resources, Clinical Resources, prescribers will find the Antimicrobial Stewardship webpage at the top of the list.

Clinical tools pocket cards for antibiotic dosing and empiric treatment updates

The [Adult Dosing Guidelines pocketcard](#) was updated to include antibiotic considerations for obese patients (BMI 30 and greater). Several antibiotics were also updated to include the most recent order sets created where applicable. The updated document is available on the Antimicrobial Stewardship webpage as well as the NH Physicians' webpage.

2. EDUCATION INITIATIVES

Education sessions for prescribers – Friday Grand Rounds

Prescriber education has been shown to benefit AMS outcomes when done in conjunction with other initiatives. The AMS program conducted an education session for internal medicine grand rounds held in person at UHNBC and via videoconference on the topic of Gram Positive Bacteremia, with a focus on Staph aureus infection, January 24th by Dr. Abu Hamour. Prescribers (at all sites) are encouraged to provide requests for topics and future education sessions to the interim AMS Program Coordinator who will work with sites to set up opportunities.

Education Modules – Learning Hub

Learning modules have been designed for use by pharmacists, nurses, physicians and other health care professionals. The AMS program has two topics on the learning hub, which were identified by the AMS subcommittee as areas of education interest: 1) urinary tract infections (searchable as NHA – AMS – Urinary Tract Infections) and 2) pneumonia (completed in February 2019, searchable under NHA – AMS – Pneumonia). Each course contains 3 modules, with each module taking approximately 20 minutes to complete (including the quizzes). Participants will receive a certificate of completion once all modules, corresponding quizzes and feedback evaluations are completed.

3. ORDER SET DEVELOPMENT

Aminoglycosides for Adult Inpatients regional order sets

These order sets were adapted (with permission) from other B.C. health authorities. They were developed with the intent to help simplify initial dosing of these antibiotics for prescribers which can be difficult as there are variations in dose and dosing frequency depending on patients' weight and height in addition to serum creatinine/renal function. NH pharmacists will continue to do all follow up monitoring and dosing of vancomycin and aminoglycosides. These order sets were approved by NHMAC in May 2019 and have been implemented and are available for use at all NH inpatient facilities.

Clostridium Difficile Infection in Adult Inpatients regional order set

A retrospective chart review done at UHNBC showed that there is a large variation in treatment strategies (including drug, route of admin and duration) within NH. Considering that C Diff infection remains one of the most common infections acquired in a health care setting that impacts both patient safety and efficiency of healthcare delivery, management standardization would be preferred. To assist with achieving standardization, the AMS committee felt development of a regional order set was indicated. Work on this order set began shortly after the publication of the 2017 update to the Infectious Disease Society of America guidelines. Prior to the update of these national guidelines, the mainstay treatment for first episodes of CDI was with metroNIDAZOLE orally. The 2017 guideline removes metroNIDAZOLE from the forefront of treatment and instead promotes use of vancomycin orally as first line. The NH AMS committee has left metroNIDAZOLE as first line for 1st episode non-severe disease. We decided to keep metroNIDAZOLE orally here due to a few factors:

1. The 2017 guidelines were not based on any NEW evidence but rather were based on a re-look at the old evidence
2. These guidelines are based in the USA where their rate of the hypervirulent strain of CDiff (NAP1 strain) is higher than in Canada, which would likely result in higher relapse or failure rate with metroNIDAZOLE therapy
3. Historically within NH metroNIDAZOLE orally has been a successful treatment for many patients with CDiff

Aside from the specific case of 1st episode non-severe disease, and fulminant disease, all other categories, including severe disease and recurrent disease have the sole option for vancomycin orally. There is also the option to change therapy from metroNIDAZOLE to vancomycin orally if there is no improvement by day 4 and the requirement to stop all antidiarrheal and promotility agents including laxatives. There is also an indication to consider stopping antibiotics and or PPIs depending on the patient case. The second page of the order set has some extra info such as case definitions, comment regarding repeat testing and recommendation against probiotics (due to lack of evidence of benefit) – which aligns with BC provincial antimicrobial clinical experts group recommendations. This order set was endorsed by NHMAC May 25th, 2020.

Updated Oseltamivir for Influenza Outbreak Declared by Medical Health Officer order set

Changes were made to this already established regional order set to ensure dosing recommendations for oseltamivir aligned with updated dosing adjustments for renal dysfunction provided to Health Canada from the manufacturer based on pharmacokinetic data.

4. RESEARCH

Pharmacy Resident Research project – Assessing the use of a standardized allergy history questionnaire in patients with a reported penicillin allergy (completed May 2019 – submitted for peer review)

ABSTRACT:

Inappropriate allergy labeling is associated with significant clinical and pharmacoeconomic implications. Detailed allergy assessments are a key component of antimicrobial stewardship and aid in identifying true immediate Type-1 hypersensitivity reactions. The allergy form currently used at the University Hospital of Northern British Columbia (UHNBC) relies on the assessor's ability to ask appropriate prompting questions to obtain a thorough history. The primary objective of this study was to compare the quality and quantity of documentation gathered from a standardized allergy history questionnaire to that of the current allergy history form. This was a prospective observational study of patients admitted to medical and surgical services at UHNBC with a penicillin allergy reported on their Electronic Medical Record (EMR).

Results: A total of 40% of patients had an inappropriate allergy label on their EMR. Out of the 48 patients assessed, only 36 had a listed reaction on their EMR. Furthermore, only 36 of the 48 patients had the same allergy reported on the allergy history form in their paper chart, of which 22 had a documented reaction. The mean time to conduct the questionnaire was 2 minutes, ranging from 1 to 4 minutes to complete.

Conclusion: Documentation of allergy histories at UHNBC is often incomplete. Detailed allergy assessments are the first step in identifying true Immunoglobulin E (IgE)-mediated hypersensitivity reactions. Therefore, implementation of a standardized allergy history questionnaire may serve to improve documentation and overall antimicrobial stewardship.

High Cost Antibiotics in outpatient setting – clinical pharmacist surveillance

Medication use evaluation question: Why is DAPTOmycin use in NH higher than expected?

Need to break this down into smaller parts for evaluation:

1. Where is the highest usage?
2. Who is prescribing?
3. What patient populations and infections are being treated?
4. Why are we not using vancomycin as the less expensive alternative?
5. How does treatment with DAPTOmycin compare to vancomycin in terms of cost and logistics
6. What do we need to change current practice?

RESULTS:

1. Where is the highest usage?

Highest use in NH is at UHNBC, IV therapy department (used this area to narrow pharmacist assessment to be able to manage the retrospective and prospective parts of this evaluation in a timely and practical manner)

- a. 106 courses prescribed in 2018/19 FY
- b. 48 courses prescribed over quarters 1 & 2 of 2019/20 FY
- c. 18 courses reviewed in Quarter 3 of 2019/20 FY

2. Who is prescribing?

73% of courses were ordered directly by Infectious Disease specialist

- a. 18% ordered as per ID consultation
- b. 9% ordered by non-ID physician (i.e. surgeon, family practice physician) but most with clinical pharmacist input

3. What patient populations and infections are being treated?

The top 4 infections being treated:

	Number of patients	Typical duration of therapy
Cellulitis	59	7 – 10 days
Osteomyelitis	37	6 – 8+ weeks
Abscess	16	Variable – depending on ability to drain
Prosthetic joint infection	12	6 – 8+ weeks

4. Why are we not using vancomycin as the less expensive alternative?

- a. Patient requires 2 – 3 doses of vancomycin per day AND is unable to manage a CADD pump/infuser bottles at home (homecare not an option for multiple doses)
- b. Patient requires 2 – 3 doses of vancomycin per day AND patient is homeless or an active IV drug user (not candidate for CADD/infuser bottle)
- c. PICC line not available at time of discharge from hospital or short course of treatment anticipated (PICC line work load too large to accommodate short course)
- d. Patient has a history of allergy or intolerance to vancomycin
- e. Patient was initiated on vancomycin BUT unable to stabilize drug levels, grew vancomycin resistant enterococci or MRSA MIC elevated at 2 and patient at risk of or experiencing clinical failure while on therapeutic vancomycin

5. How does treatment with DAPTOmycin compare to vancomycin in terms of cost and logistics

A DAPTOmycin treatment course is roughly double the cost of vancomycin requiring infuser bottles or CADD pump (e.g. 6 week course = ~\$11,000 DAPTOmycin, ~\$5500 vancomycin)

- a. 1 week duration shows lowest discrepancy (~\$1860 DAPTOmycin, ~\$1225 vancomycin)
- b. Cost of a treatment course includes: bag cost (drug + compounding), lab costs, nursing costs, pharmacy costs
- c. Logistical differences:

Vancomycin	DAPTOmycin
Needs a PICC line (venous irritant)	Can use a peripheral line (PICC usually only needed for greater than 10 days of therapy)
Patients with average/normal renal function require 2 – 3 doses per day	Majority of patients require only once daily administration
If required for more than 2 – 3 doses per day – patients need to be capable of managing a pump or infuser bottle at home	Patient can be taught how to hang bags at home or homecare can provide support for once daily administration
Requires monitoring for dosing size/frequency – patient has to be able to come to hospital (homecare unable to deliver blood sample and sample drop off is time sensitive for ordering more antibiotic (not ideal for family to drop off)	Weekly monitoring for adverse effects – can be drawn by homecare/home collection (life labs) and delivered by family (not as time sensitive)

6. What do we need to provide more vancomycin in outpatient setting?

- a. Easier/quicker access to PICC lines
- b. Treatment area expansion (vancomycin infusions done on site typically require 2 hrs compared to 30 min for DAPTOmycin)
- c. Dedicated clinical pharmacist support
- d. Increase IV product compounding abilities (vancomycin CADD bags and infuser bottles take longer to compound and can not be done by RN outside pharmacy mixing hours)
- e. Improved communication/collaboration between Burn & Wound, Ostomy and IV therapy for ID physician clinics
- f. Increase in Home Care nursing supports
 - Approximately 30% of patients reviewed in quarter 3 may have been candidates for vancomycin if we had more homecare/home IV support (i.e. PICC lines, homecare nursing hours and abilities)

About 40% of patients reviewed retrospectively in 2018/19 FY and quarters 1&2 2019/20 FY had insufficient info to assess reason for use of DAPTOmycin over vancomycin.

CLINICAL SERVICE (PROSPECTIVE AUDIT & FEEDBACK)

Audit and Feedback (A&F) is an evidence-based practice of reviewing a patient's medical chart and diagnostic test results and engaging with prescribers to collaboratively optimize antimicrobial therapies. This practice involves the selection of the most appropriate, narrowest spectrum agent based on clinical status, indication, allergies, culture results, potential drug interactions and adverse effects, taking into account current clinical practice guidelines.

The A&F clinical service and evaluation efforts are focused on:

- optimizing empiric therapies
- targeting therapy based on additional diagnostic information
- optimizing antimicrobial dosing and treatment durations
- converting intravenous (IV) antimicrobials to oral formulations when appropriate to prevent the complications associated with xIV agents
- providing education to prescribers on the clinical practice guidelines for the treatment of infections
- promoting consultation of infectious disease specialist when necessary

AUDIT AND FEEDBACK RECOMMENDATIONS AND RESOLUTION RATES

Throughout the 2019/20 fiscal year variations of Prospective Audit and Feedback of targeted antimicrobials were carried out across NH through our clinical pharmacy service with support and mentorship from the AMS program coordinator at UHNBC.

Pharmacists identified over 11, 000 drug therapy problems (DTPs) overall and 26.6% of these were specific to antimicrobial therapy discovered during AMS reviews throughout 2019/20 with a resolution rate of 96.75%. This is our highest recorded resolution rate thus far, with an increase of over 6% from last fiscal year and well exceeding our original goal of 80%. Reasons for the small percentage of unresolved DTPs are summarized in Table 1/Figure 2; the main reasons for unresolved DTPs were prescriber or patient disagreeing with the recommended solution and pharmacists unable to contact the prescriber (51 and 36 DTPs respectively). Only 1 DTP (1%) was unresolved due to pharmacist constraints which is a large reduction from 17% last fiscal year which may be due to an increase in clinically trained pharmacists as well as improved workload efficiencies.

Table 1 – Audit and Feedback antimicrobial drug therapy problem resolutions

Measure		Number of Patients
Antimicrobial therapy problems identified		2983
Resolved antimicrobial therapy problems		2886
Unresolved antimicrobial therapy problems		97
Unresolved reason	Prescriber or patient disagreed	51 (52.6%)
	Pharmacist workload	1 (1%)
	Patient discharged	9 (9.3%)
	Unable to contact prescriber	36 (37.1%)
Antimicrobial therapy problem resolution rate		96.75%

In July 2018, an online DTP tracker system was implemented for Northern Health. It requires individual pharmacist data entry and the intent of this system is to make this tracking process more comprehensive and convenient. As predicted last fiscal, an increase in document DTPs was seen and this is likely due to pharmacists becoming more familiar with the data entry and incorporating the process into their daily workload.

There are a variety of types of antimicrobial therapy problems; Figure 1 displays types of DTPs identified and resolved. The top 3 DTPs identified and resolved include:

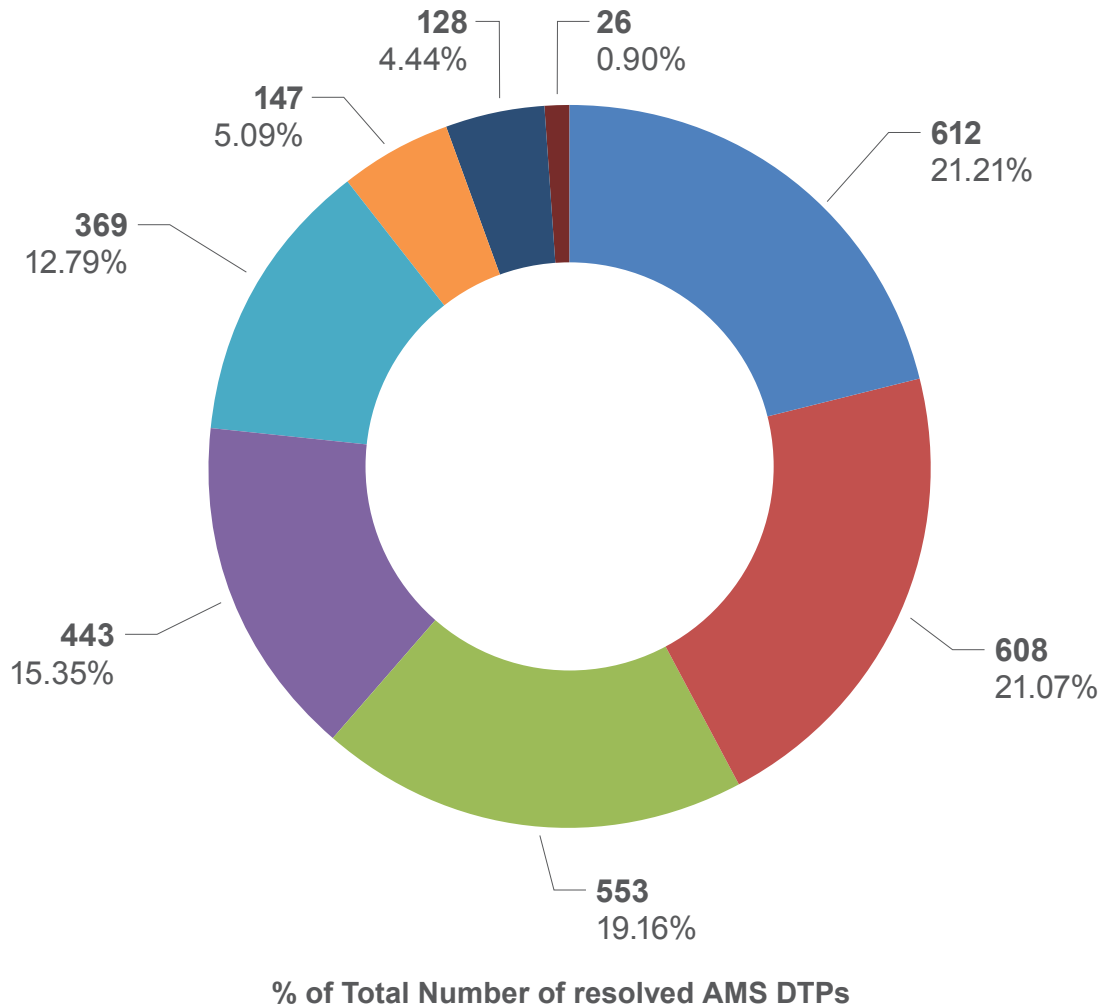
#1 antimicrobial dosage too low (suboptimal with regard to efficacy) which includes need to extending durations

#2 unnecessary antimicrobial discontinued

#3 new antimicrobial needed and initiated (necessary)

The top 3 antimicrobials reported on were, vancomycin, cefTRIAxone and piperacillin-tazobactam. Vancomycin will likely continue to be a top medication for DTP tracking due to the need for multiple dosage adjustments which pharmacists have authority to manage on their own based on serum drug levels. In the next fiscal year we may see a slight decrease in the dosage adjustment needs due to a shift in our target serum levels (moving from 15 – 20 for all patients to 10 – 20 for most patients with exceptions for 15 – 20) whether or not this will translate into a shift in top DTP types will remain to be seen. CefTRIAxone and piperacillin-tazobactam are likely our top 2 antimicrobials in terms of usage as well due to their broad spectrum and role as empiric therapy in several different infection types. Analysis of and plans for quality improvement around broad spectrum agents will come forward once we have ability to produce, share and review our antimicrobial usage metrics.

Figure 1 – Antimicrobial Drug Therapy Problem (DTP) Types Resolved in FY 2019/20

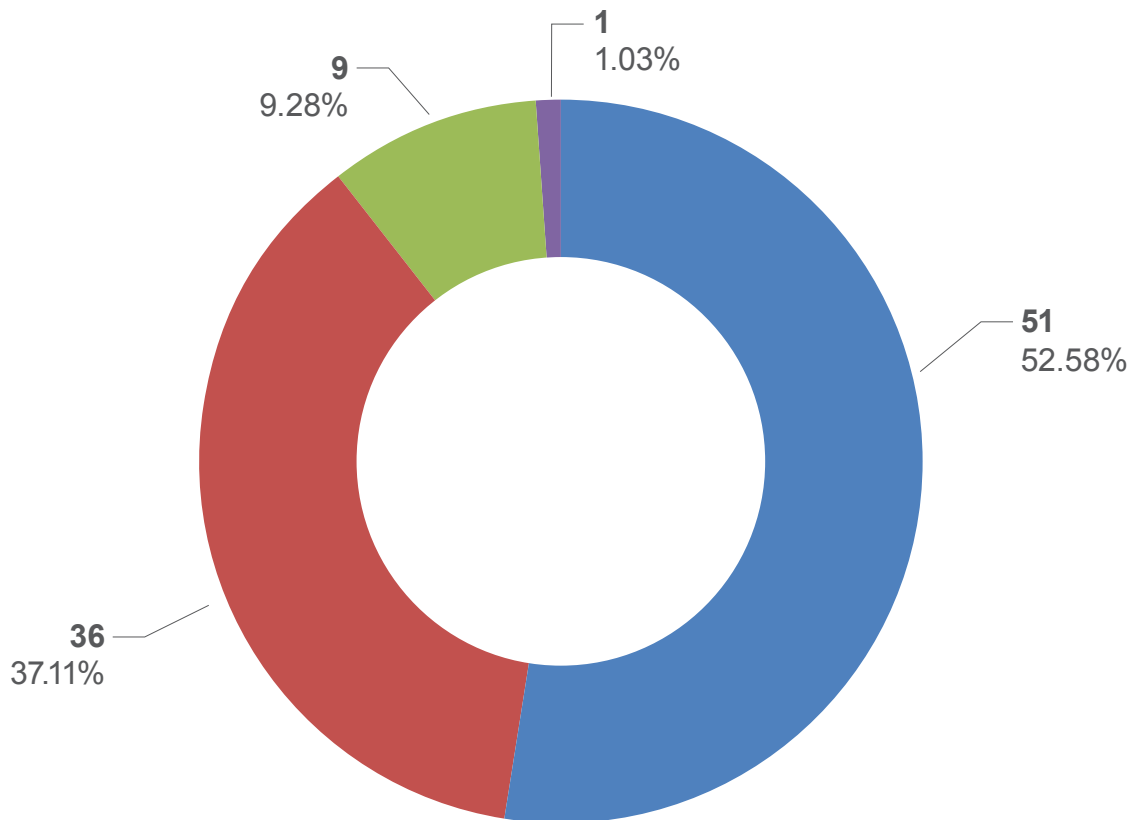


- EFFECTIVE: Dosage Too Low, includes extend duration e.g. increase from 7 to 10 days
- NECESSARY: Unnecessary Drug Discontinued
- NECESSARY: New Drug Needed and Initiated
- SAFETY: Dosage Too High – includes decrease duration
- EFFECTIVE: Improve Antimicrobial Spectrum – Sub-optimal or Ineffective Drug or Route
- SAFETY: Adverse Drug Reaction – Allergy, Toxicity, or Drug Interaction
- EFFECTIVE: IV to PO conversion or Sub-optimal or Ineffective Route
- ADHERENCE: Non Adherence

Data provided by: Planning & Performance Analyst for Medication Management

Data source: Northern Health online Drug Therapy Problem tracker

Figure 2 – Unresolved Antimicrobial Drug Therapy Problems (DTP) FY 2019/2020



% of Total Number of Unresolved AMS DTPs

- Prescriber or Patient Disagreed
- Documented in patient chart but unable to contact prescriber
- Patient Discharged
- Unable to follow up due to workload

Data provided by: Planning & Performance Analyst for Medication Management

Data source: Northern Health online Drug Therapy Problem tracker

OUTCOME AND PROCESS MEASURES

ANTIMICROBIAL UTILIZATION AND COSTS ACROSS NORTHERN HEALTH

Data collection and analysis with regards to antimicrobial use and associated costs in NH has proven to be challenging; an aspect that is shared with other AMS programs across Canada. The NH AMS data analysis team continues to work on determining the most appropriate metrics and means of analysis for the data; however, despite rigorous methods there have been issues identified with previously reported data rendering this data inaccurate and inappropriate for drawing comparisons. We are actively working with a custom reporting performance analyst to find a solution for our data analysis and ultimately create a platform that will more accurately take the raw relevant data and convert into the standard AMS metrics of defined daily dose (DDD) per 100 patient-days as well as other measures. Therefore at this time we are unable to share any metrics with our stakeholders but remain hopeful to be able to deliver for the next fiscal year.

AMS AND COVID-19

As everyone is well aware, the rise of COVID-19 within Canada and the threat to our health as individuals and a community caused some significant delays in progress of non-COVID related items towards the end of the 2019/20 FY. The efforts of the AMS program coordinator were diverted to provide support to the health authority during the rapidly changing landscape that is COVID-19 as its presence in BC grew. Due to this there was less progress made on certain active projects and program planning for the next year has also been delayed.

The AMS program would like to acknowledge all the hard work and dedication of the essential staff working at the bedside for our patients. We hope that our lives will be able to return to business as usual and until then we strive to find the ability to move forward and continue to provide support and guidance to the clinicians within NH who continue to meet the needs of our various facilities and patient populations being managed at our facilities.



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