NORTHERN HEALTH

# ANTIMICROBIAL STEWARDSHIP

## ANNUAL REPORT
## 2023 -2024

northern health
*the northern way of caring*

# CONTENTS

# 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

- Firstline Northern Health (NH) guideline library expansion
- Infectious Diseases Consultation for Prolonged Duration Intravenous Antimicrobials (Clinical Practice Standard 1-20-6-4-120) – reviewed and revised – published May 2024

### Education initiatives

- SPRINT: Spreading Quality Improvement (SQI) initiative for Penicillin Allergy De-labeling
- Penicillin Allergy De-labeling Presentation for 2023 Northern BC Research and Quality Conference
- BCPhA Rural Pharmacy Panel Event and Presentation

### Order set development

- SaferCare Project – Powerplan content creation:
  - Hospital Acquired Pneumonia
  - Ventilator Associated Pneumonia
  - Intra-abdominal Infections
  - Meningitis
  - Pyelonephritis

## ANTIMICROBIAL USAGE METRICS

Antimicrobial utilization, measured in defined daily dose (DDD) per 1000 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. Our current year compared to 2023/24 showed reduction in antimicrobial usage throughout Northern Health collectively. However, the Northern Interior (excluding UHNBC) is the exception showing for a second consecutive year an increase in antimicrobial utilization.

### Clinical Service/Audit & Feedback

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

- Optimizing choice of empiric therapies
- Optimizing 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 IV agents
- Providing education to prescribers on the clinical practice guidelines for the treatment of infections
- Promoting consultation of infectious disease specialist when necessary

# 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.

However, our program has recognized that over the years many healthcare professionals particularly those at the front lines of direct patient care are unaware of our program. To strive for positive change and outcomes the AMS program is presenting the 2023-24 annual report differently than years past. We hope to provide readers with strategies and solutions that reflect stewardship that will help their practice and improve outcomes and patient care.

Sharing this report with interested healthcare providers is as important as creation of the report itself. We will supplement the data shared in this report with key messages on how to implement stewardship in your practice. Key messages we would like to highlight include IV to oral stepdown of antimicrobials, the use of highly bioequivalent oral antimicrobials, limiting the use of broad-spectrum antimicrobials and recognizing the distinction between asymptomatic bacteriuria and urinary tract infection. The report this year will also encourage healthcare providers from all disciplines to utilize the many clinical tools the AMS program endorses to foster stewardship. This includes our online library, Firstline, the Northern Health antibiogram, order sets, and clinical practice standards.

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 the information contain therein, please feel free to contact the Program Coordinator (see contact information on page 11).

We are constantly seeking engagement at the site level and request participation from site leadership. If you are a site or team lead you will see monthly reminders in your inbox for completion of the Required Organizational Practice (ROP) checklists/audits for priority ROPs. Antimicrobial Stewardship (AMS) checklists will be included in the October email. The purpose of this checklist is to assess compliance with the AMS ROP to benefit our patients and families with regards to management of their infections. Our AMS program can only grow, expand, and better support our sites in becoming compliant if we are able to engage with each site; these checklists help us identify and connect with sites that require assistance.

Only when we work together can we truly improve the use of antimicrobials within Northern Health.

# AMS MEDICAL LEAD

## DR. ABU HAMOUR

We would like to extend our sincerest gratitude and well wishes to Dr. Abu Hamour as he finished his tenure as AMS Medical Lead on March 31st, 2024. Dr. Hamour has been an influential and integral part of healthcare in the North for nearly 20 years. His name is synonymous with antimicrobial stewardship, and he is highly regarded for his work on infectious diseases within Northern Health and abroad. Throughout his career, Dr. Hamour provided excellent patient care and has been an advocate for collaborative multi-disciplinary practice, always willing to provide mentorship and share his vast knowledge.

Dr. Hamour along with Alicia Rahier, pioneered the Antimicrobial Stewardship program from its inception in 2015 and built it into a valuable resource for healthcare professionals and patients. During his time as AMS medical lead, Dr. Hamour played an essential role in policy development, clinical practice standards, order sets, education, as well as participation in guideline creation, research, and provincial committees.

Our AMS services and our approach to healthcare in many ways, would not be where it is today without the significant contributions of Abu Hamour. Thank you, Dr. Hamour for being a great mentor, educator, leader, colleague, and friend. Your legacy will continue to serve the citizens and healthcare providers of Northern Health through all that you have provided and achieved in the last 19 years of service.

## DR. JOHN BLACK

We are pleased to welcome Dr. John Black as the new Medical Lead, Antimicrobial Stewardship (AMS) and Infection Prevention & Control (IPC) Program effective April 1, 2024.

As Medical Lead, Dr. Black reports to the Vice President Medicine. The Medical Lead, NH AMS and IPC program, provides regional leadership, clinical expertise and coordination to the Antimicrobial Stewardship program and the Department of Infection Prevention & Control. As a facilitator and leader within NH, the Medical Lead works in a co-leadership model with the Regional Manager for Infection Prevention and the Antimicrobial Stewardship Program Coordinator to establish effective cross functional teams to promote optimal care for

patients. The Medical Lead, in collaboration with the Regional Manager for Infection Prevention & and the Antimicrobial Stewardship Program Coordinator, serves as an essential link between NH, physician partners and the Provincial Clinical Experts groups, promoting communication and positive working relationships.

Dr John Black joined the Infectious Diseases team at UHNBC in October 2023. He completed his undergraduate and post graduate training in Internal Medicine and Infectious Diseases at the University of Cape Town in South Africa, after which he led the Infectious Diseases team at Livingstone Hospital in Port Elizabeth, South Africa from 2014 until 2023.

He has been involved in a variety of aspects relating to infectious diseases including clinical work, medical student and resident training, research in opportunistic infections in HIV as well as in the development and implementation of antimicrobial stewardship programs.

His experience in antimicrobial resistance includes the development of local hospital-based programs as well as supporting policy development at a national level as part of a national advisory committee on antimicrobial resistance. He has an interest in supporting a pragmatic collaborative approach to antimicrobial prescribing and infection control that focuses on adapting best practice to local environments to educate and empower all health care workers to be part of the drive to preserve our future antimicrobials.

He is excited to be joining the passionate team at Northern Health to further advance the management of antimicrobial resistance and to support infection prevention and control.

Dr. Black is located at the University Hospital of Northern British Columbia (UHNBC). He can be reached by e-mail at john.black@northernhealth.ca.

# REPORT SUMMARY

Our data shows that overall antimicrobial utilization throughout Northern Health is down for the third consecutive fiscal year (FY) which is encouraging (Table 2). However, determining all the reasons behind the reduction in antimicrobial utilization is difficult. One of the more obvious explanations of decreased utilization is the decreased number of hospitalizations directly connected to the COVID-19 pandemic. Regardless, there is still much work to be done for antimicrobial stewardship. Unlike years past where we have presented data and the work the AMS program has done over each fiscal year, this year's report is more centered on education and providing readers strategies and tools to help foster stewardship in their practice areas. We will provide the data from this year's report in the appendix section for readers to view if they desire to see a visual representation of the data.

## IV IS NOT ALWAYS BETTER!

Timely conversion from intravenous (IV) to oral (PO) antimicrobial therapy is effective for a variety of infections, especially for agents with high bioavailability (the fraction of unchanged drug that is absorbed and reaches the systemic circulation). Conversion from IV to PO antimicrobials in select patients results in cost savings for the facility, as well as positive clinical outcomes such as shortened hospital stay, reduced risk of line-related infections and adverse events and no IV related mobility restrictions for patients. There is a group of antimicrobials where the oral formulation is equally potent compared to the IV formulation; this group is referred to as high bioequivalent antimicrobials.

A selection of these highly bioequivalent targeted antimicrobials is compared per HSDA using the DDD per 1000 patient-days (Appendix: Figures 7 to 11). From a stewardship perspective the goal is to see a preference for use of oral agents from this group of therapies.

The ways that we can help our healthcare providers and prescribers to better utilize highly bioequivalent antimicrobials is by promoting tools and policies we already have in place to make informed and appropriate decisions. This includes using the Intravenous to Oral Conversion for Antimicrobials: Clinical Practice Standard.

Overall, the data for high oral bioequivalent antimicrobials illustrates that work needs to be done throughout all the HSDAs to educate, advocate and implement IV to PO step down therapy when clinically appropriate. The positive clinical outcomes as mentioned earlier and their associated savings to healthcare costs are reason enough to continue to stress the importance of highly bioequivalent antimicrobials.

## SAVE THE BIG GUNS FOR THE BIG ONES!

Although we have seen a reduction in overall antimicrobial utilization throughout all the HSDAs in Northern Health except for the Northern Interior, it is still important that we reserve our broad-spectrum antimicrobials or big guns for those infections

that truly require them. This list includes but is not limited to carbapenems, piperacillin-tazobactam, echinocandins, and fluoroquinolones.

The emergence of multi-drug resistance (MDR) and super bugs is one of the biggest risks to healthcare systems around the globe and our region and health authority is no different. Piperacillin-tazobactam has historically been an antimicrobial that is often prescribed for empiric treatment of many infectious diseases due to its broad coverage of anaerobes, gram positive and gram-negative microbes including Pseudomonas aeruginosa. However, anti-pseudomonal coverage is often not needed even empirically and agents such as ceftriaxone or amoxicillin-clavulanate could be used instead.

There are also cases when a patient has a penicillin allergy label and piperacillin-tazobactam is replaced by a carbapenem such as meropenem. The carbapenems are one of our most important classes of antibiotics and should be reserved for severe gram-negative or polymicrobial infections in patients with risk factor for resistance or directed therapy where there is resistance to ceftriaxone, piperacillin-tazobactam, fluoroquinolones, and cotrimoxazole.

Penicillin allergy labels often lead to the use of broader-spectrum antibiotics or multiple agents that a penicillin-based agent covers as a single agent. For those patients with penicillin allergy labels we highly recommend to prescribers to refer these patients to the Penicillin Allergy De-labelling Clinic at UHNBC for assessment and possible removal of penicillin allergy label (Penicillin Allergy De-labeling Clinic Referral).

## ID SERVICES CONSULTATION FOR STAPHYLOCOCCUS BACTEREMIA AND CANDIDEMIA

The AMS program strongly recommends and endorses infectious diseases consult for SAB and candidemia to start appropriate antifungal therapy as soon as possible. *Staphylococcus aureus bacteremia* (SAB) is a major cause of community and health-acquired bacteremia. SAB is associated with significant morbidity, mortality and complications including deep-seeded infections such as infective endocarditis, device-associated infections, prosthetic joint and bone infections, and recurrent infections. Risk factors for SAB include advanced age, underlying medical conditions such as Diabetes mellitus (DM), injection drug use, and presence of intravascular catheters or prosthetic devices. It is essential when assessing patients to note these risk factors especially for those patients presenting with infectious etiology.

Candidemia is a blood stream infection caused by Candida species and is a condition associated with significant morbidity and mortality that requires clinical expertise and appropriate empiric therapy. Northern Health like many other health jurisdictions is seeing a rise in invasive fungal

infections resulting in increased ICU admissions and stays. However, our data still shows we are not requiring much use of echinocandins such as micafungin, but the numbers are rising. The monitoring of blood cultures is essential in the process. The presence of gram-positive cocci (GPC) in the blood even if it is 1 out of 2 cultures requires the use of an anti-MRSA agent such as IV vancomycin plus an anti-staphylococcal beta-lactam such as IV cloxacillin or cefazolin. Studies have shown that vancomycin empirically as monotherapy is inferior to combination therapy of vancomycin plus an anti-staphylococcal beta-lactam. Even in cases of MRSA bacteremia the combination therapy empirically has shown to improve morbidity and mortality. In terms of candidemia cases, empiric therapy with an echinocandin (e.g. micafungin) is preferred over azole antifungals (e.g. fluconazole) until the micro-organism is identified.

For treatment guidance and information please refer to our bacteremia and candidemia guidelines on Firstline.

## PENICILLIN ALLERGIES AND WHY WE NEED TO CHALLENGE.

Removing a penicillin allergy label ensures patients have the best antibiotic options available for treatment of infections in the future. Harms associated with using alternative antibiotics for a patient with a penicillin allergy label include: increased risk of side effects, needing to use several antibiotics in combination to treat an infection that may only require penicillin monotherapy, increased risk of developing multi-drug resistance (MDR), increased costs to patients, increased risk of infection post-delivery in obstetric patients and increased risk of treatment failure for certain conditions (e.g. syphilis) where penicillin based antibiotics are the drug of choice. From an antimicrobial stewardship perspective, the advantages of penicillin de-labeling greatly outweigh the risks. Penicillins are inexpensive antibiotics that can be used to narrow antibiotic spectrum, resulting in less adverse events such as C. difficile infections which can cause patient harm as well as an increased length of hospital stay.

The reality is 10% of the population report they have an allergy to penicillin, however; after careful evaluation, 90% of these individuals are found not to be allergic. In those patients who are allergic to penicillin, 50% outgrow their allergy after 5 years and 80% outgrow their allergy after 10 years of avoidance.

Dr. Sharla Olsen and Dr. Irina Sainchuk, supported by the AMS Program Coordinator/Lead Pharmacist, are accepting patient referrals for all adult patients including pregnant patients to the Penicillin Allergy De-labeling Clinic at UHNBC (Penicillin Allergy De-labeling Clinic Referral) . Since it's inception in February 2023 through to March 31st, 2024, the Penicillin Allergy De-labeling clinic has successfully de-labelled 67 patients without adverse events.

***Who can refer patients to the penicillin allergy de-labeling clinic?***

Family physicians, specialists, nurse practitioners, midwives and dentists.

***Where is the clinic located?***

The clinic is located on the 5th floor of UHNBC at the Northern Medical Clinic. Clinics are currently run once per month on Friday afternoon from 1 - 4 pm.

## APPROPRIATE USE IV ANTIMICROBIALS IN THE OUTPATIENT SETTING

Outpatient parenteral therapy is an important part of healthcare systems and Northern Health is no different. We are an organization providing healthcare to a vast and remote geographical landscape of over 600,000 square kilometers. Outpatient parenteral therapy will be essential going forward as our hospitals and acute care facilities continue to deal with staff and bed shortages among other challenges to provide patient care. The objective of outpatient parenteral therapy is to facilitate the discharge or prevent admission to an acute care facility of a select group of appropriate clients. This in turn will hopefully decrease barriers to care for clients and families, including those self-identifying as Indigenous, Inuit or Metis.

The principal advantages of outpatient parenteral therapy relative to inpatient therapy include enhanced patient quality of life, reallocation of hospital resources for patients of a higher acuity status, and prevention of nosocomial infections.

However, there are risks to patients on outpatient antimicrobial therapy (OPAT) that need to be recognized and prevented. Firstly, for those infections that are longer than two weeks in duration such as deep-seeded infections like osteomyelitis a consultation with Infectious Diseases specialist is highly recommended. Furthermore, often IV antimicrobial therapy can be changed to oral agents after a few days or upon initial treatment. Lastly, there are certain conditions when severe enough to warrant IV antibiotics are not deemed safe for outpatient management due to risk of rapid patient decline and the requirement of close monitoring until improved enough for transition to oral therapy (e.g. pneumonia). (Clinical Practice Standard 1-20-6-3-170).

## SYMPTOM FREE PEE - LET IT BE!

One of the common struggles we face as antibiotic stewards is assessing patients who are prescribed antibiotics because something has grown in a urine culture. Often these cultures are collected to diagnose a UTI, but a UTI is a clinical diagnosis NOT a laboratory diagnosis.

Unfortunately, there is misinformation among nurses and many prescribers that lead to belief in common myths and inappropriate cultures being collected. The result being inappropriate antibiotic prescriptions.
In response to a site-specific request to have Northern Health specific guidance regarding urinary tract infections in the

elderly patient population, an algorithm was developed with input from several interested parties. This algorithm can be ordered directly from Document Source. Our clinical pharmacists supporting long term care across NH have already been involved previously as the initial intention was for that population. However, after gaining further feedback from the AMS Committee it was slightly adapted to be more inclusive to the hospitalized, medically stable, elderly population.

What is the purpose of this guidance and education? To re-frame historical beliefs and to ensure safer care for our patients/clients. Unnecessary urine cultures can lead to prescribers feeling a need to treat (in absence of symptoms) and therefore unnecessary antimicrobial exposure.

| PRACTICE POINTS | | |
|---|---|---|
| 1. | Asymptomatic bacteriuria is bacteria recovered from urine samples in a person without signs and symptoms associated with urinary tract infection (UTI). | It is a colonization state NOT infection.<br>Routine urine drips are NOT recommended. |
| 2. | Asymptomatic bacteriuria and pyuria are more common in people greater than 65 years; incidence is higher in institutionalized patients regardless of the presence of an indwelling catheter. | Dipsticks positive for leukocytes and nitrates DO NOT indicate infection; urine drips can be misleading and are not recommended in the elderly institutionalized population.<br>Routine urine drips are NOT recommended. |
| 3. | Asymptomatic bacteriuria is NOT associated with long-term negative outcomes. | Routine urine drips are NOT recommended. |
| 4. | Due to the possibility of colonization of the urine with bacteria, UTI in the elderly institutionalized population is a clinical diagnosis (based on signs and symptoms), NOT a lab diagnosis. | Routine urine drips are NOT recommended. |
| 5. | 100% of catheterized LTC residents will be colonized in their urine and test positive for leukocytes without presence of infection | Routine urine drips are NOT recommended. |

| MYTHS | FACTS |
|---|---|
| ✗ Urine is cloudy and smells bad therefore patient has a UTI. | ✓ Visual inspection and smell are unreliable indicators and usually dependent on resident's hydration status, diet, medications, and concentration of urea in the urine. |
| ✗ Falls or change in mental status (including confusion or "feeling off") in the elderly indicate UTI. | ✓ A fall or change in mental status in the elderly without any other signals and symptoms of infection should be assessed for other causes. Once all other possibilities (e.g. dehydration, new medications/drug interactions, sleep disturbances, sensory deprivation, trauma, hypoxia, hypoglycemia and other infections) are excluded a UTI may be considered. |
| ✗ You need to request urine cultures after treatment. | ✓ There is no reason to re-culture urine after treatment unless the patient is not improving clinically. Bacteriuria can occur after effective therapy (colonization) and is not a reason to prolong therapy in an asymptomatic patient. |

# APPENDIX

## ANTIMICROBIAL STEWARDSHIP PROGRAM TEAM MEMBERS

| AMS Program Coordinator (Pharmacist Lead) |
|---|
| Alicia Rahier (on leave May 2023 to Jan 2025) |
| Sumeet Hayer (interim AMS Program Coordinator May 2023 – Jan 2025) |
| **AMS Program/ Infection Prevention and Control Medical Lead** |
| John Black (NH Infectious Diseases Specialist) |
| **AMS Subcommittee Members** |
| Barb Falkner (Professional Practice Lead Pharmacist) |
| Barret Barr (Clinical Pharmacy Specialist - NI) |
| Carey-Anne Lawson (IT - CIS Pharmacist) |
| Allissa King (Quality Resource Technologist Microbiology) |
| Debora Giese (CIC - Certified Infection Control - NW) |
| Tracy Moraes (Clinical Pharmacist - NW) |
| Valerie Weber (Clinical Pharmacist – NE) |
| Juanita Kerbrat (Coordinator, Infection Control RN - NE) |
| Kyla Bertschi (Clinical Pharmacy Specialist - NI) |
| Rachel Henri (Clinical Nurse Educator, Medicine - NI) |
| Marilyn Ringdal (Clinical Nurse Educator – Community Nursing - NI) |
| Minh (Jason) Nguyen (NH Infectious Diseases Specialist) |
| Sandra Vestvik (GP Physician, BVDH - NW) |
| Lauren Feldhoff (GP Physician, UHNBC – NI) |
| Kailee MacIssac (Clinical Pharmacist, LTC – NI) |

## CONTACT INFORMATION

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# BEST PRACTICES

## 1. CLINICAL TOOLS, STANDARDS, POLICIES AND FORMS

### All-Staff Antimicrobial Stewardship webpage on MyNH and NH Physicians website

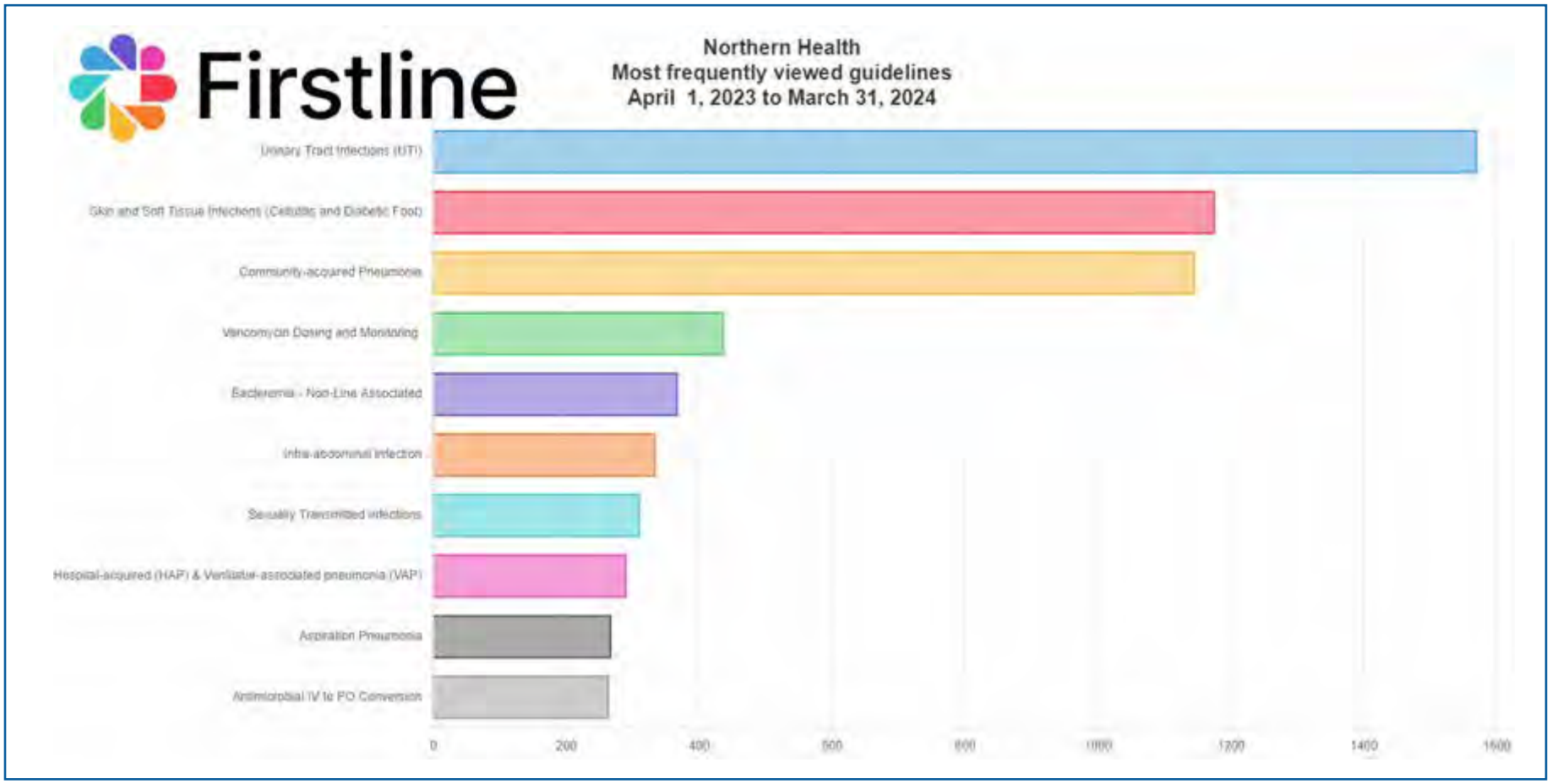
Northern Health (NH) staff can quickly and easily gain access to information about the NH Antimicrobial Stewardship (AMS) program as well as any relevant clinical practice standards, clinical memos or bulletins, annual reports, and other online resources from the MyNH Antimicrobial Stewardship Sharepoint. NH prescribers can also access this information on the NH Physicians webpage. Under Physicians Resources > Clinical Resources, the Antimicrobial Stewardship link is at the top of the list.

### Firstline Electronic Library

Firstline is an electronic library that can be customized to deliver local antimicrobial stewardship and infectious diseases resources within any health system. It is available both as a mobile application or via web browser. There is a how-to guide available on the NH Physicians webpage. This means that NH prescribers, pharmacists and nurses are now able to access NH supported guidelines and antimicrobial/pathogen information easily and quickly from their mobile devices and computers. Firstline can be downloaded for free and Northern Health can be found in the locations list. Figures 1 and 2 show the most frequently viewed guidelines and antimicrobial monographs respectively.

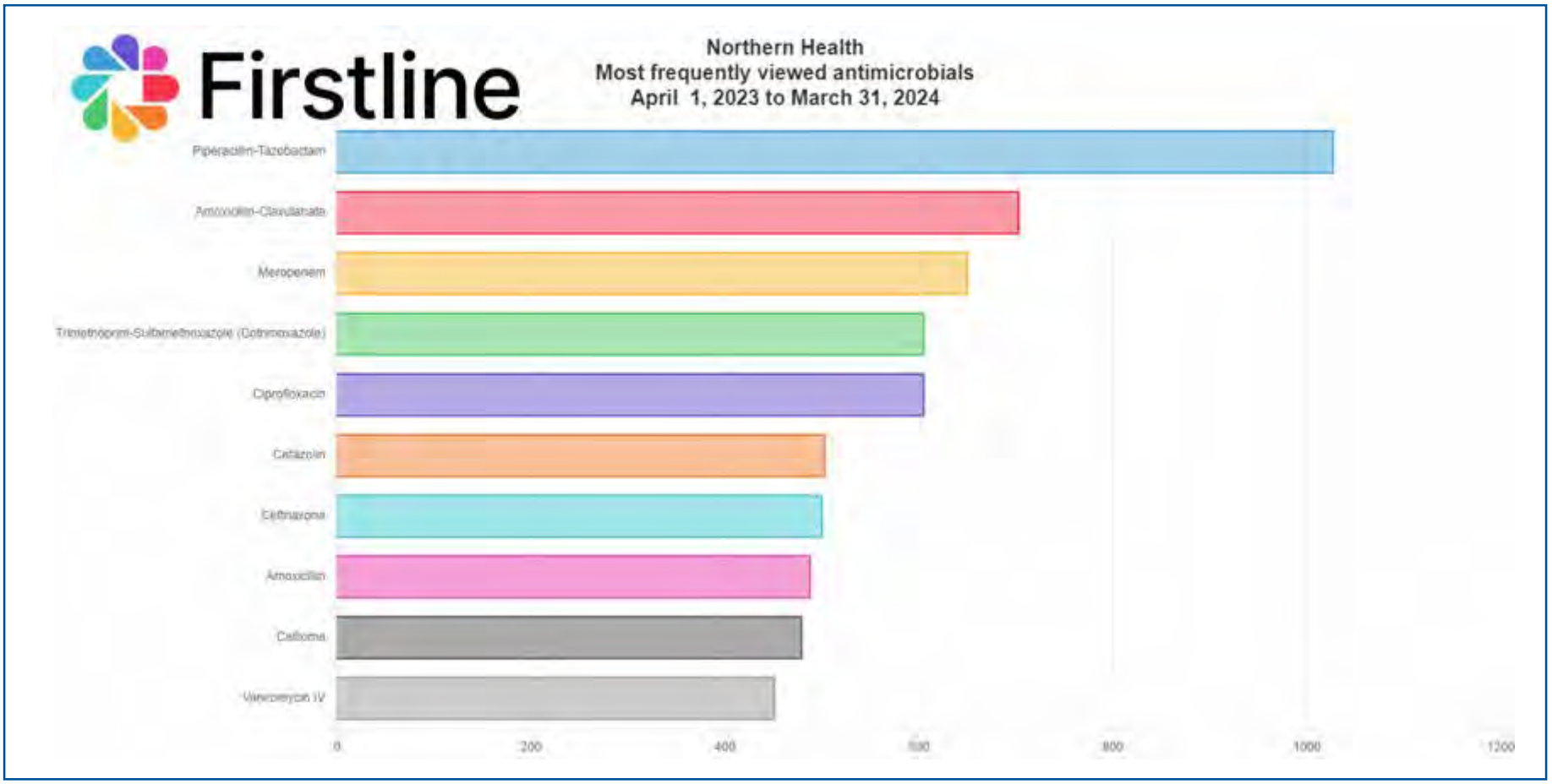
Previously created clinical tool pocket cards (Empiric Treatment Guidelines for Common Infections in Adults and Dosing of Antimicrobials in Renal Dysfunction) will no longer be updated via print/pdf files. Information and guidance with regards to these topics will continue to be found in the Firstline NH library. There is now access to pediatric dosing information for antimicrobials, directly connected to the guidance from BC Children's hospital library and accessible through our NH drug monographs.

## FIGURE 1 – MOST FREQUENTLY VIEWED GUIDELINES




Data source and graph prepared by: Firstline analytics dashboard

## FIGURE 2 – MOST FREQUENTLY VIEWED ANTIMICROBIALS




Data source and graph prepared by: Firstline analytics dashboard

# 2. EDUCATION INITIATIVES

***NEW* Learning Hub Module:** Antimicrobial Stewardship (AMS) – Required Organizational Practice (ROP)

The intention of this learning hub module is to provide Northern Health (NH) clinicians, pharmacists, and nurses with an overview of the Antimicrobial Stewardship (AMS) program in NH and AMS principles that can be practiced in patient care. It is important that our NH staff are aware of the various required organizational practices (including AMS) to ensure safe quality of care for our patients and clients everyday.

**Learning objectives**

At the end of the session learners will be able to:

- Define Antimicrobial Stewardship (AMS)
- Explain the importance of AMS practices for patient care
- Describe the components of the NH AMS program
- Know who the AMS program leads are
- Describe 5 ways healthcare professionals can incorporate AMS practices into their daily work routine

**Components of the module include:**

- AMS program overview
- Resource review: Firstline, antibiogram, MyNH AMS page
- Incorporating AMS into Practice
  - Allergy histories
  - Adverse reaction identification and documentation
  - IV to PO transitions
  - Limiting urine cultures (asymptomatic bacteriuria)
  - Proper wound culture collection and assessment
- Quiz to test knowledge at completion of the module

## 2.2 Education presentations:

The AMS program leads were approached to provide some education and program awareness to a few different audiences. They are happy and welcome these requests from any area/site within NH. Examples of sessions provided over the past fiscal year:

- Northern BC Research and Quality Conference Presentation (Nov 2023)
- Penicillin Allergy De-labeling Presentation for Department of Internal Medicine, Department of Family Medicine and Department of Obstetrics (Dec 2023)

## 3. ORDER SET DEVELOPMENT

**SaferCare Project** – Power Plan clinical content

SaferCare is NH's 10-year major clinical quality improvement and digital transformation initiative. The purpose of this initiative is to:

- Increase patient safety and effectiveness of care while digitally enabling clinical processes, practices, and documentation
- Facilitate all Northerners to actively engage in their digital health information and support online health services.
- Improve staff and provider experience by advancing the use and functionality of our Cerner electronic health record (EHR) by implementing full electronic documentation and ordering

The initial stage (first 5 years) will encompass, replacing variable hospital paper charts with consistent electronic documentation and ordering in NH's Cerner EHR (CPOE = computerized provider order entry). Order sets which currently exist in paper will now be referred to as Power Plans in the electronic system.

New topics that have been contributed to by the AMS committee as of March 2024:

- Hospital Acquired Pneumonia
- Ventilator Associated Pneumonia
- Intra-abdominal Infections
- Meningitis
- Pyelonephritis

# 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, considering 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 IV agents
- Providing education to prescribers on the clinical practice guidelines for the treatment of infections
- Promoting consultation of infectious diseases specialist when necessary

## AUDIT AND FEEDBACK RECOMMENDATIONS AND RESOLUTION RATES

In September 2021, the Professional Practice Clinical Pharmacy Leads decided to adopt an alternative model for tracking of drug therapy problems (DTPs) to lessen the time required by pharmacists to perform this data entry. This change involved only tracking activities carried out by the clinical pharmacists' group during pre-determined two-week intervals. These two-week intervals were performed once every 3-month quarter resulting in a total 8-week reporting period for the fiscal year. The data collection was simplified further by removing some of the granular information resulting in higher level data for AMS DTPs. Moving forward this report will no longer contain DTP category information such as necessary, effective, safety and adherence. The change in how DTP metrics are tracked and entered has resulted in some limitations for data interpretation and sharing. We will continue to be able to compare the total number of AMS DTPs to the total number of DTPs captured and compare this data between fiscal years.

When comparing the 2023/24 fiscal year to 2022/23 there remains a consistent trend for percentage of AMS DTPs resolved to total number of DTPs with 18% of total DTPs resolved in 2023/24 being associated with AMS (Table 1). This result is encouraging and reflects the hard work, contributions and efforts of our clinical pharmacists despite

the staff shortages the department is currently facing. Their dedication to antimicrobial stewardship is very much appreciated and the AMS program is grateful for all their efforts.

### TABLE 1 – ANTIMICROBIAL DRUG THERAPY PROBLEM (DTP) TYPES RESOLVED IN FY 2023/24

| DRUG THERAPY PROBLEMS BY FISCAL YEAR | | | |
|---|---|---|---|
| | AMS DTPs | % AMS DTPs | All DTPs |
| FY2021/22 Starts in July 2021 | 1,029 | 20% | 5,089 |
| FY2022/23 | 1,244 | 19% | 6,495 |
| FY 2023/24 | 1,100 | 18% | 6,219 |

Note:

FY2021/22 is incomplete as data collection changed during this time.

Starting calendar year 2022, DTPs are captured accurately during scheduled 2 week blocks each quarter.

# OUTCOME AND PROCESS MEASURES

## ANTIMICROBIAL UTILIZATION & COSTS ACROSS NH

Antimicrobial utilization, measured in defined daily dose (DDD) per 1000 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 amount to DDD units is performed to standardize utilization of different classes of antimicrobials, allowing comparisons to be made across different facilities or patient groups (excluding pediatric populations). Table 2 is a summary of the change in usage of all antimicrobials (antibiotics, antifungals, and antivirals) compared across fiscal years. Our current year compared to 2022/23 shows reductions in antimicrobial usage throughout Northern Health collectively (Figure 5). However, you can see a modest increase in the Northern Interior (excluding UHNBC).

**TABLE 2 – TOTAL ANTIMICROBIAL UTILIZATION YEAR TO YEAR COMPARISON (DDD/1000 PATIENT DAYS)**

| HSDA Grouping | FY22/23 compared to FY21/22 | FY23/24 compared to FY22/23 |
|---|---|---|
| Northeast | ↓ | ↓ |
| Northern Interior (excluding UHNBC) | ↑ | ↑ |
| Northwest | ↑ | ↓ |
| UHNBC | ↓ | ↓ |
| Northern Health | ↓ | ↓ |

↓ Decrease from previous year
↑ Between 0% and 10% increase from previous year
↑ Greater than 10% increase from previous year

Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

To investigate which drugs are contributing to the increases in the Northern Interior (excluding UHNBC) we have divided the information from Table 2 further to show individual drug usage. We can then compare to usage in each HSDA (Figures 3 to 6). For ease of assessment, we have pulled out target IV agents that have historically and anecdotally been agents of high use (e.g., ceftriaxone, piperacillin-tazobactam) and or require case by case assessment (e.g., daptomycin).

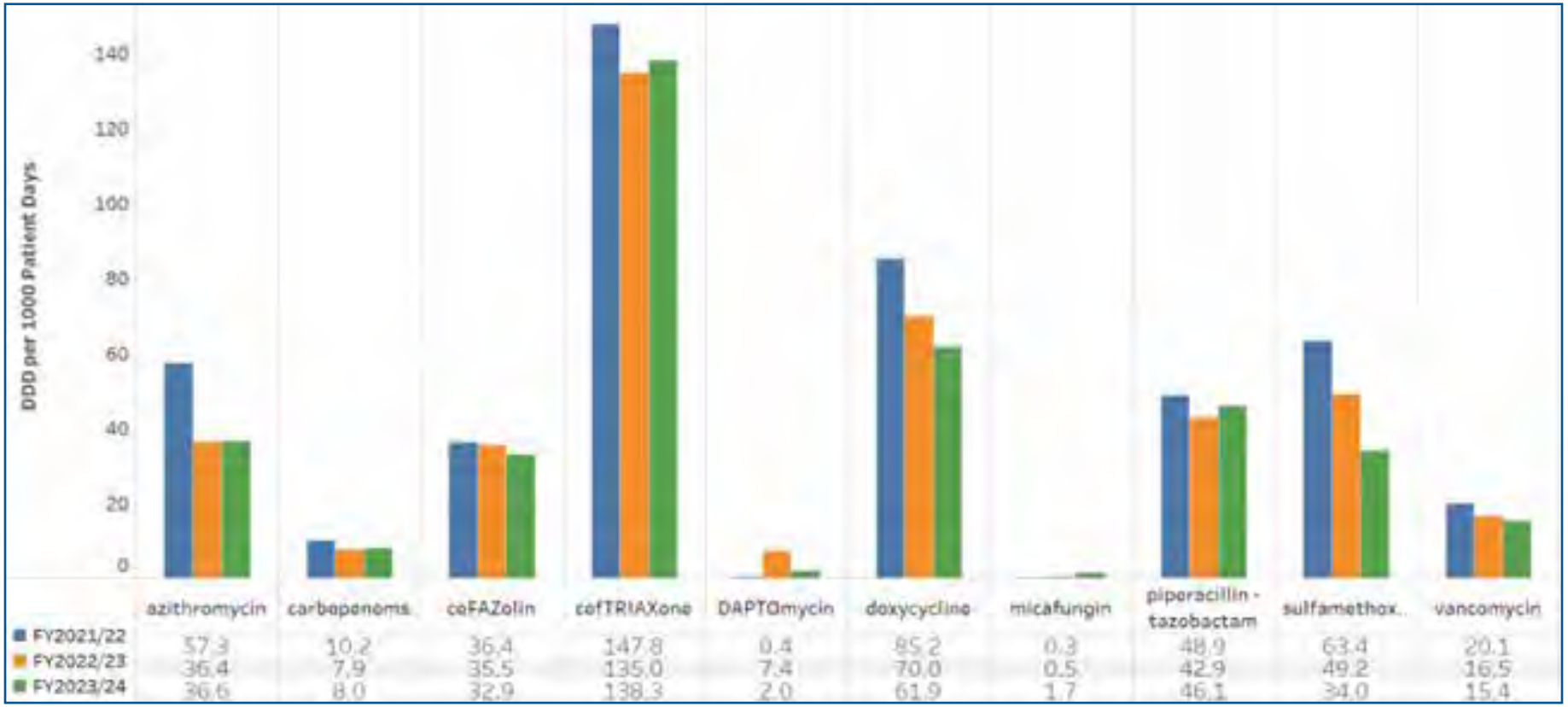
When analyzing the data to explain the increase in antimicrobial utilization in the Northern Interior (excluding UHNBC) there are modest increases in the usage of daptomycin and piperacillin/tazobactam (Figure 4). However, much of the increase is due to a significant rise in the utilization of sulfamethoxazole/trimethoprim (SMX/TMP) and doxycycline for the second consecutive year.

Some of the increase in doxycycline can be explained by a decrease in azithromycin use. Doxycycline is the alternative to azithromycin for atypical bacterial coverage in respiratory infections. However, that only partially explains this dramatic increase in utilization. Doxycycline, besides use in respiratory infections like community acquired pneumonia (CAP) is used in skin and soft tissue infections (SSTIs) including MRSA. However it is unlikely that there was a substantial increase in doxycycline use for SSTIs. Another possibility is the use of doxycycline for the treatment of sexually transmitted infections. Over the last few years there has been a dramatic rise in the cases of syphilis throughout the province of British Columbia.

The drug of choice for treatment of syphilis is penicillin. However, the alternative for penicillin allergic patients is doxycycline.

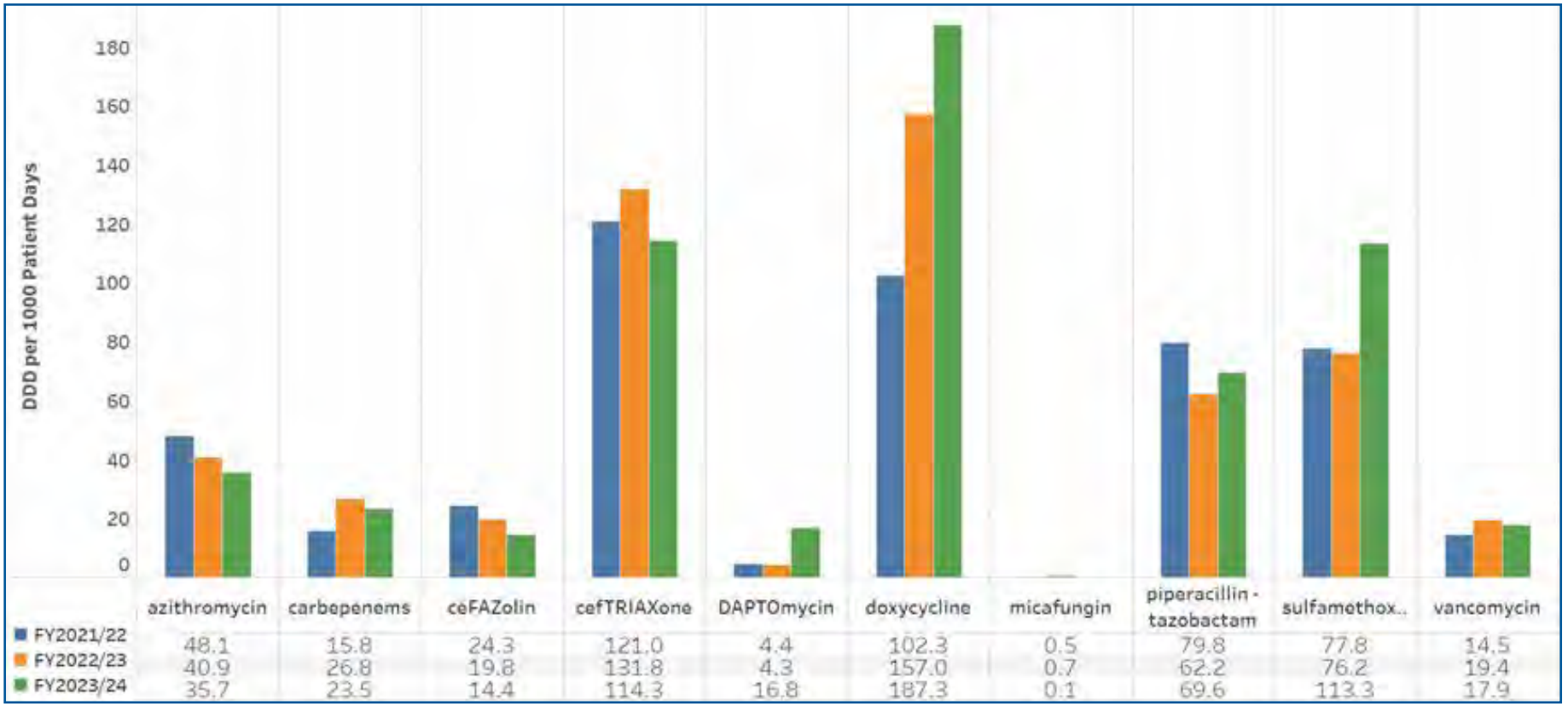
The substantial increase in the use of SMX/TMP is surprising. When analyzing Figure 4 you notice that in the two prior fiscal years the utilization of this agent was stable at ~77 DDD/1000 patient days. The increase to 113.3 DDD/1000 patient days is a near 50% increase in SMX/TMP use. Possible explanations for the increase include increased usage for treatment of skin and soft tissue infections (MRSA coverage) and urinary tract infections. However, this would only partially contribute to such a large increase. Overall, further review of data collection and follow-up will be required to corroborate the data.

## FIGURE 3 – TARGETED ANTIMICROBIAL UTILIZATION FOR NORTHEAST (DDD/1000 INPATIENT DAYS)



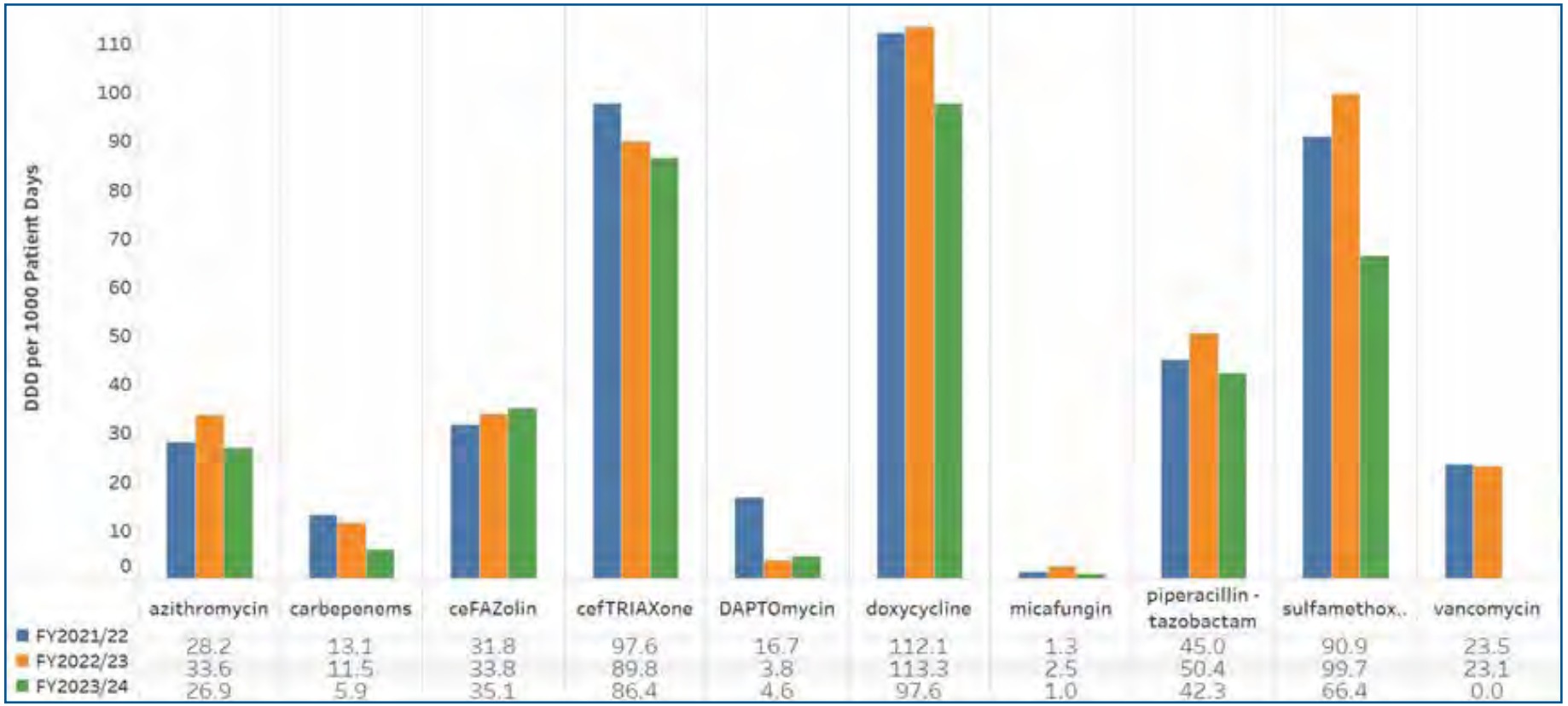

Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 4 – TARGETED ANTIMICROBIAL UTILIZATION FOR NORTHERN INTERIOR [EXCLUDING UHNBC] (DDD/1000 INPATIENT DAYS)



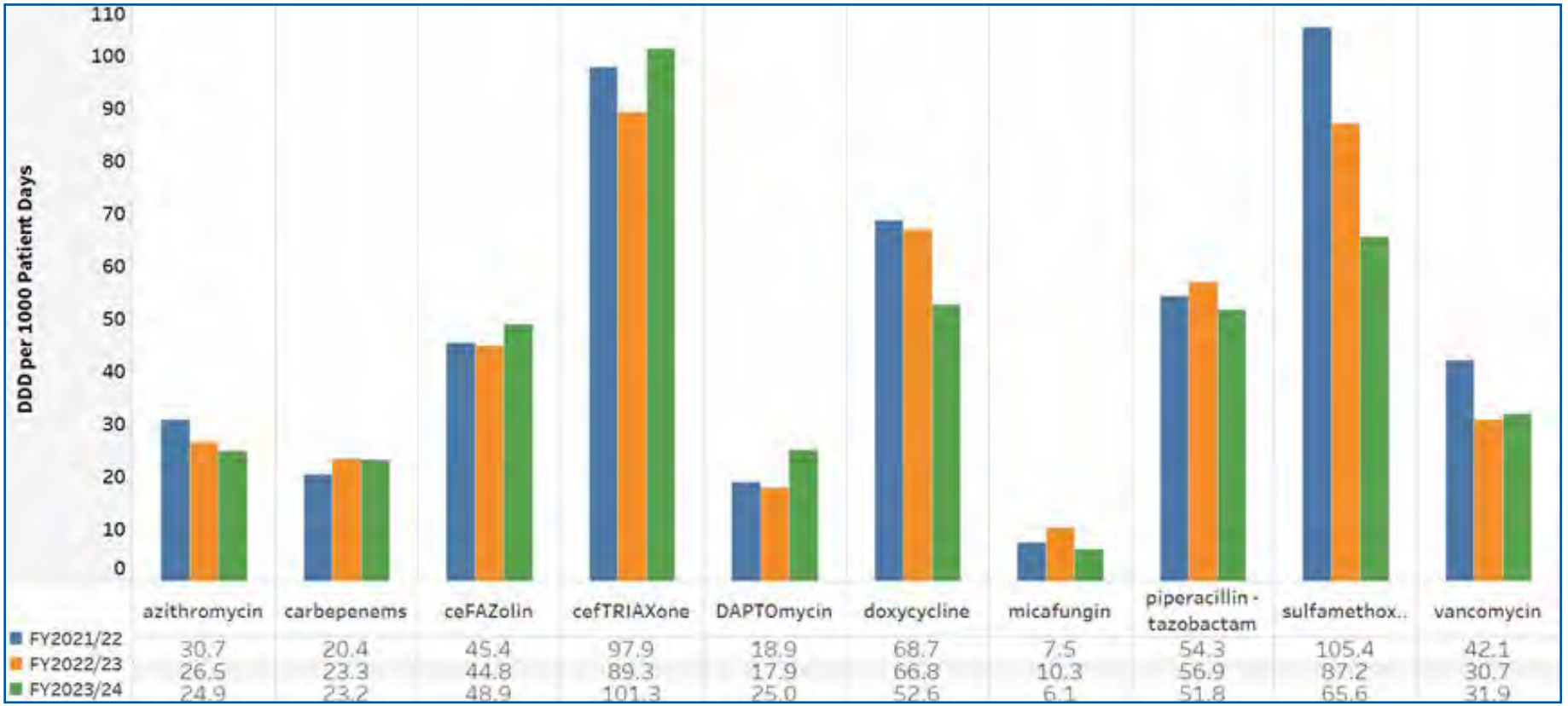

Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 5 – TARGETED ANTIMICROBIAL UTILIZATION FOR NORTHWEST (DDD/1000 INPATIENT DAYS)




Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 6 – TARGETED ANTIMICROBIAL UTILIZATION FOR UHNBC (DDD/1000 INPATIENT DAYS)




Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## HIGH BIOEQUIVALENT ANTIMICROBIALS

Timely conversion from intravenous (IV) to oral (PO) antimicrobial therapy is effective for a variety of infections, especially for agents with high bioavailability (the fraction of unchanged drug that is absorbed and reaches the systemic circulation). Conversion from IV to PO antimicrobials in select patients results in cost savings for the facility, as well as positive clinical outcomes such as shortened hospital stay, reduced risk of line-related infections and adverse events and no IV related mobility restrictions for patients. There is a group of antimicrobials where the oral formulation is equally potent compared to the IV formulation; this group is referred to as high bioequivalent antimicrobials.

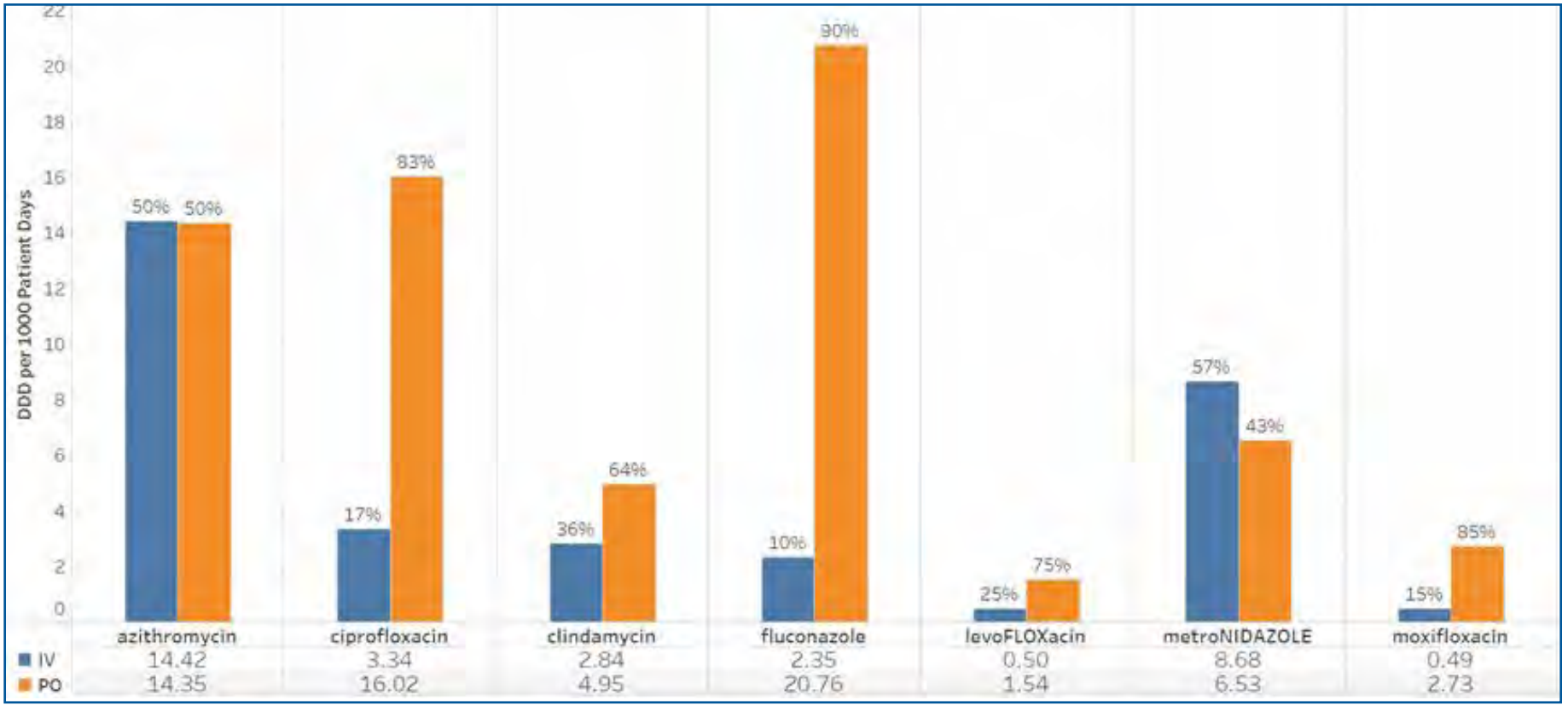
A selection of these high bioequivalent targeted antimicrobials is compared per HSDA using the DDD per 1000 patient-days (Figures 7 to 11). From a stewardship perspective the goal is to see a preference for use of oral agents from this group of therapies. From Figure 1, we can report that this year's data shows slightly increased usage of clindamycin and levofloxacin oral agents compared to IV for all of NH. The biggest positive change being the increased usage of metronidazole oral dosage forms compared to IV for some of our sites. Every other agent we target for highly bioequivalent antimicrobials stayed stable compared to the 2022/23 fiscal year.

When breaking the data down to each respective HSDA, you can see for the NE (Figure 8) most of our highly bioequivalent antimicrobials IV versus oral usage is similar to the previous year. However, it is important to report with a notable decrease in oral azithromycin use compared to IV this year. The NI (excluding UHNBC) also showed an increase in IV azithromycin usage this past year compared to previous which in relation to the NE was even higher (Figure 9). For both the NI and NE HSDAs the utilization of oral azithromycin versus IV note worthy and something that should be explored for improvement. On a positive note, the NI (excluding UHNBC) showed modest improvements in oral use of fluconazole, levofloxacin, and metronidazole.

The data for the Northwest HSDA shows similar results to the 2022/23 fiscal year (Figure 10). The same can be said for UHNBC, however, there was positive data showing increased usage of oral metronidazole compared to past years (Figure 11).

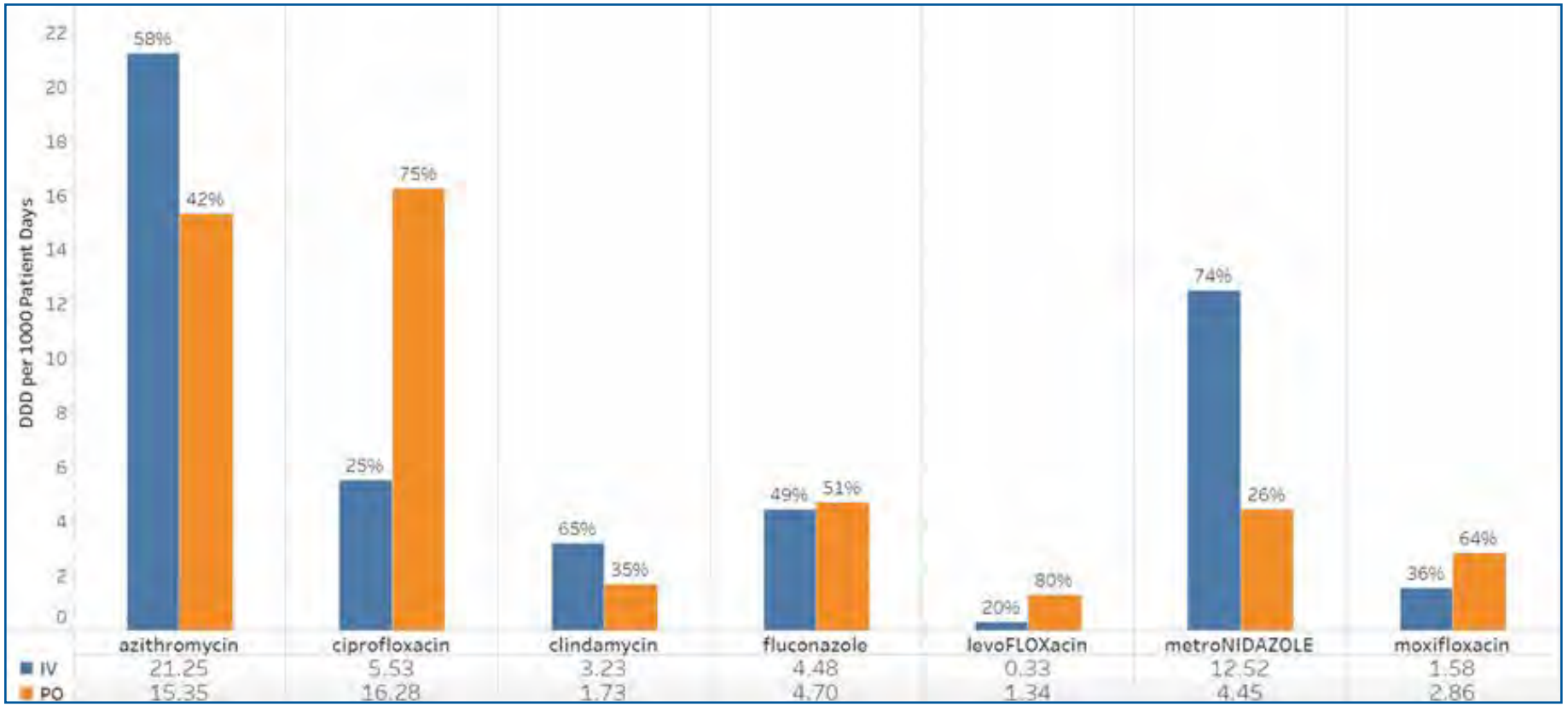
Overall, the data for high oral bioequivalent antimicrobials illustrates that work needs to be done throughout all the HSDAs to educate, advocate and implement IV to PO transitions when clinically appropriate. The positive clinical outcomes as mentioned earlier and their associated savings to healthcare costs are reason enough to continue to stress the importance of highly bioequivalent antimicrobials.

## FIGURE 7 – HIGH BIOEQUIVALENT ANTIMICROBIALS IV VERSUS ORAL FOR ALL NH (DDD/1000 INPATIENT DAYS), FY 2023/24



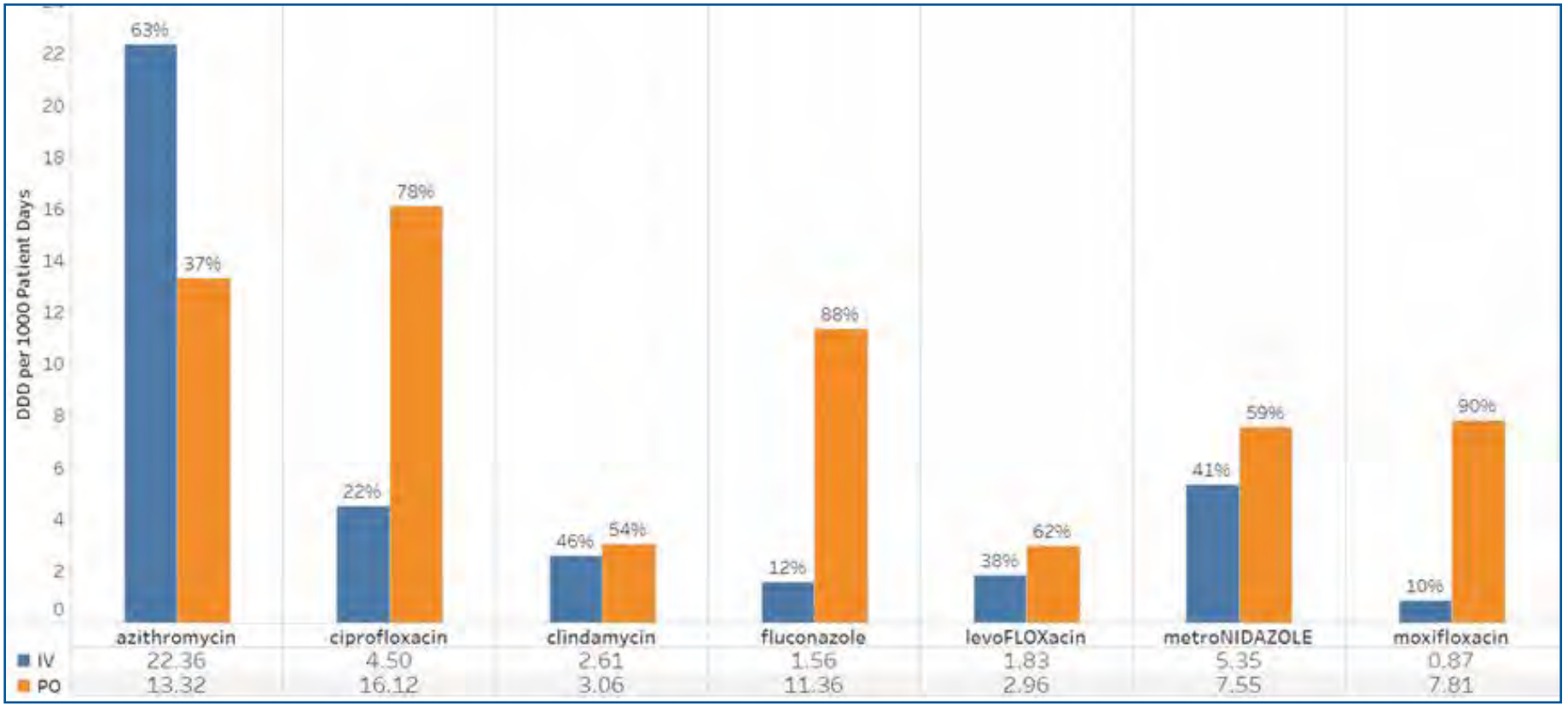

Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 8 – HIGH BIOEQUIVALENT ANTIMICROBIALS IV VERSUS ORAL FOR NORTHEAST (DDD/1000 INPATIENT DAYS), FY 2023/24



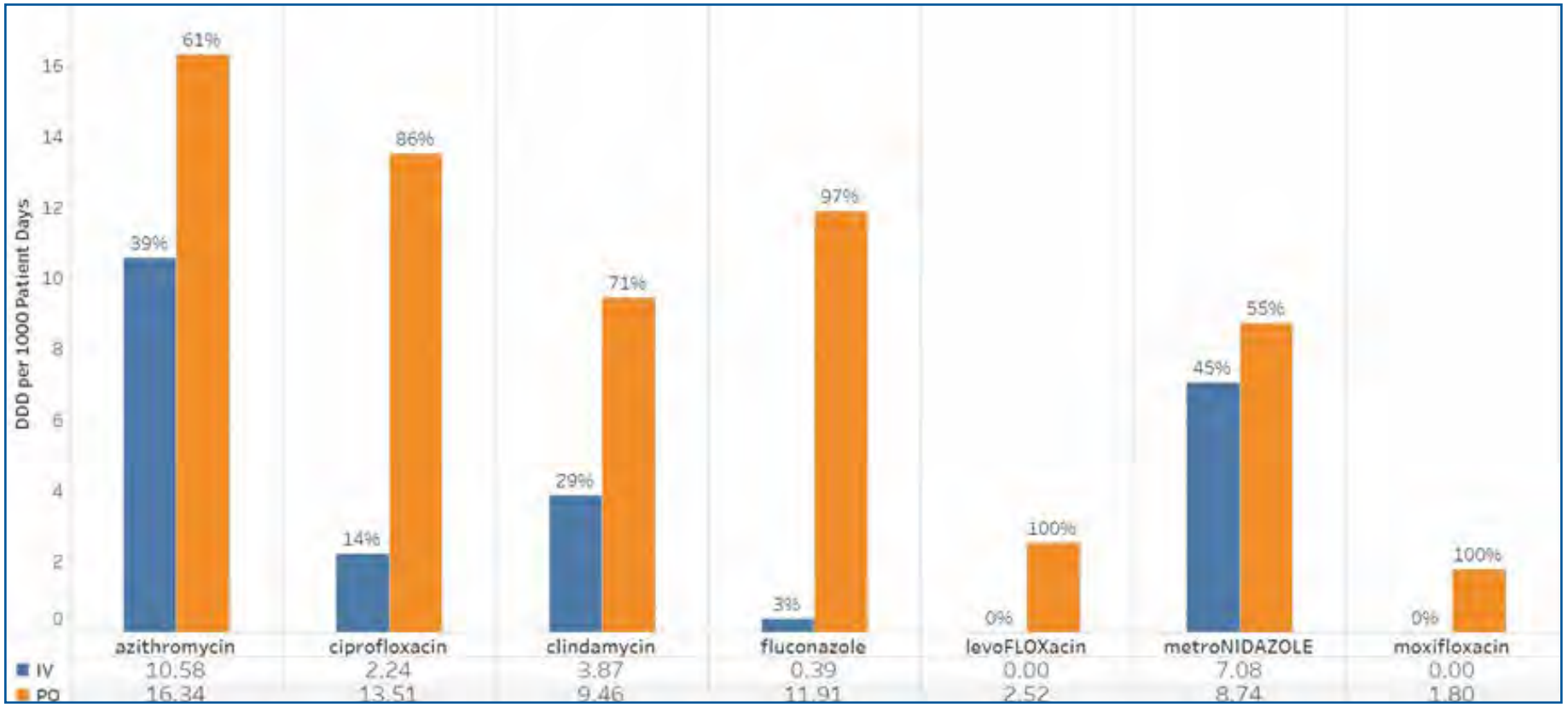

Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 9 – HIGH BIOEQUIVALENT ANTIMICROBIALS IV VERSUS ORAL FOR NORTHERN INTERIOR [EXCLUDING UHNBC] (DDD/1000 INPATIENT DAYS), FY 2023/24



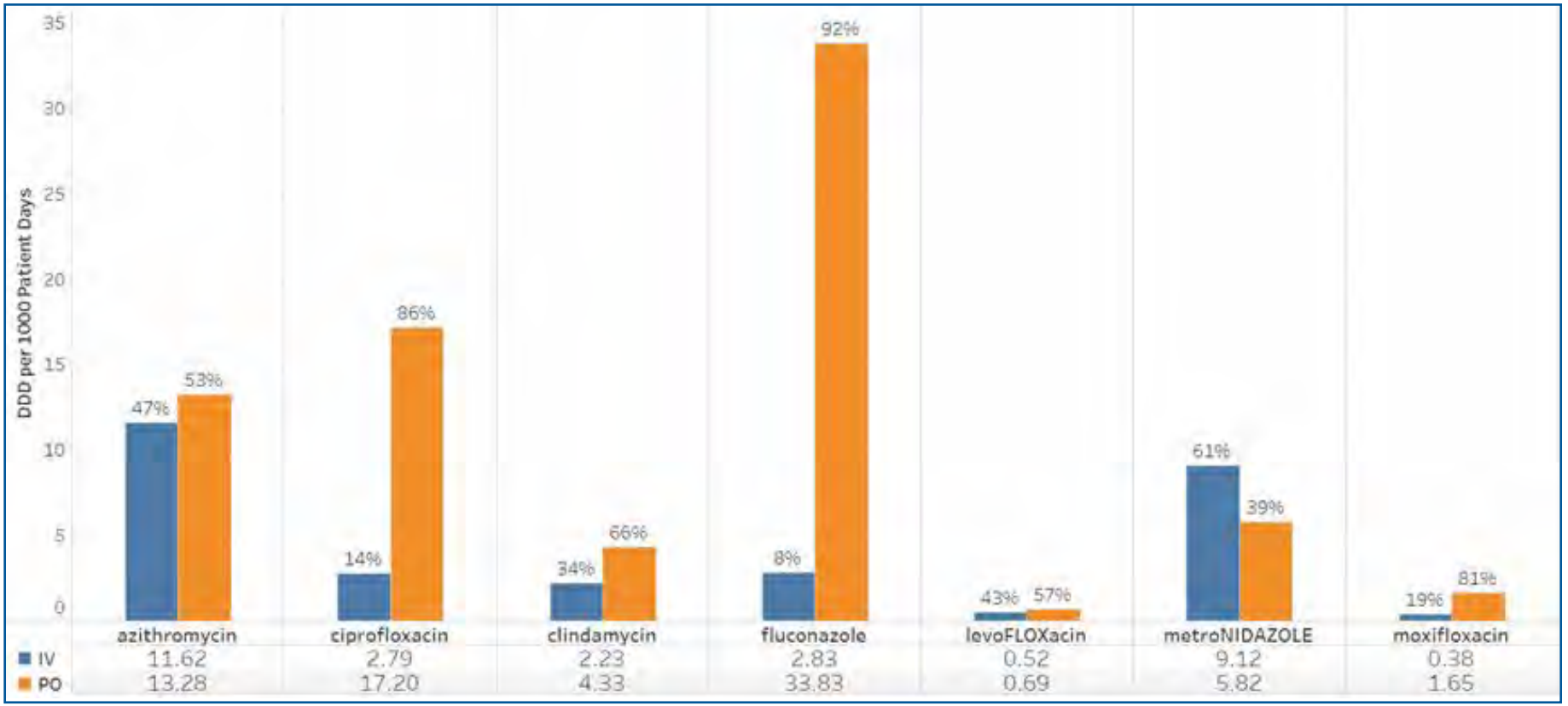

Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 10 – HIGH BIOEQUIVALENT ANTIMICROBIALS IV VERSUS ORAL FOR NORTHWEST (DDD/1000 INPATIENT DAYS), FY 2023/24




Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## FIGURE 11 – HIGH BIOEQUIVALENT ANTIMICROBIALS IV VERSUS ORAL FOR UHNBC (DDD/1000 INPATIENT DAYS), FY 2023/24

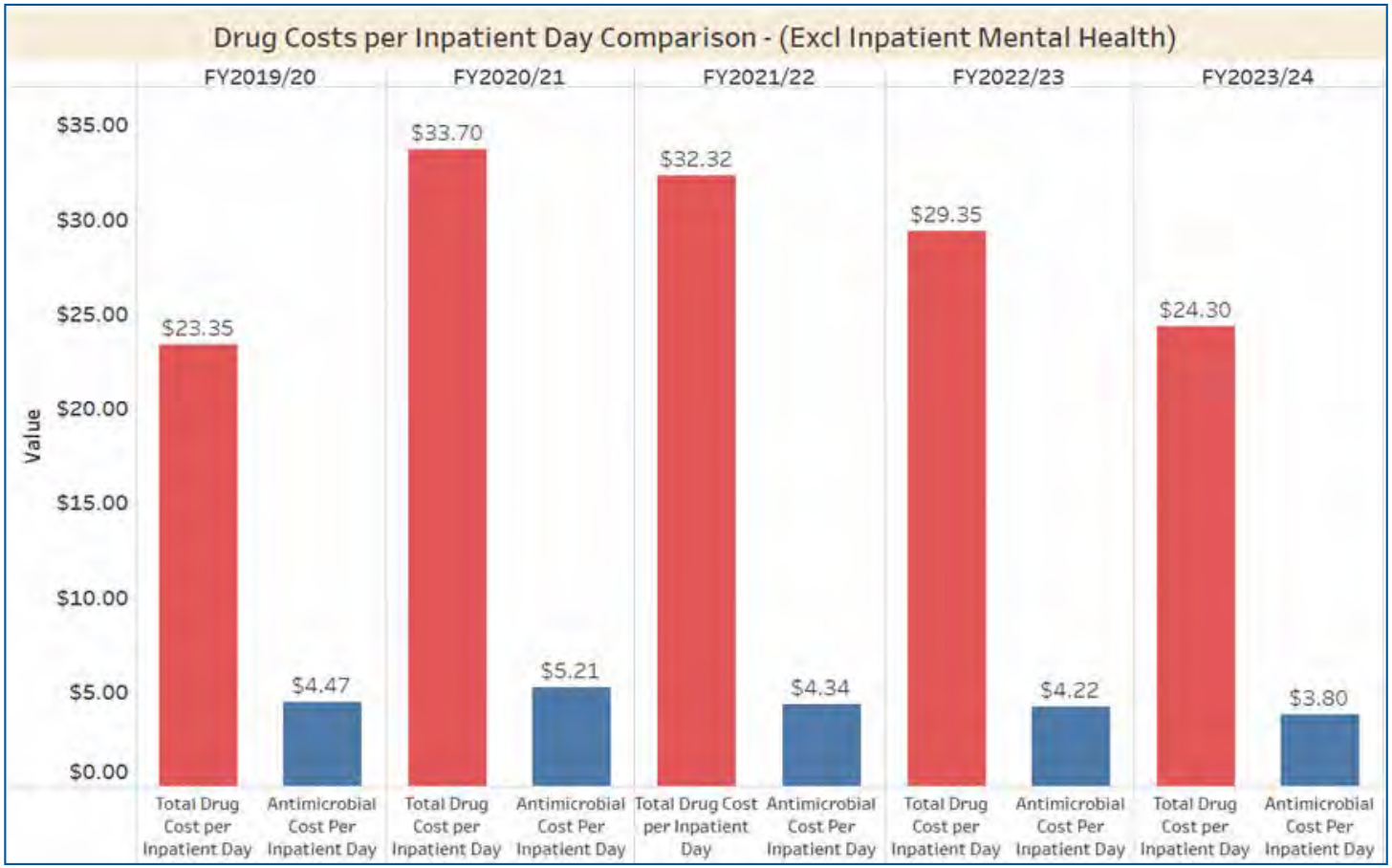



Data Source: Cerner - Product Dispense & Supply Chain
Graph prepared by: Clinical Outcomes Analyst for Medication Management

## ANTIMICROBIAL COSTS

The total drug cost per inpatient day for the 2023/24 fiscal year saw a 17% decrease compared to the 2022/23 fiscal year (Figure 12). Similarly, the antimicrobial cost per inpatient day also saw an 8.7% reduction in 2023/24 compared to the previous year. This decrease was greater than the 3% reduction in antimicrobial costs that was shown in 2022/23. In the prior two years much of the reduction in antimicrobial drug costs could be attributed to the decrease in hospitalizations related to COVID-19 which peaked in the 2020/21 fiscal year, which coincided with the start of the pandemic. However, this decrease in antimicrobial utilization is likely more reflective of improved stewardship throughout the health authority. Currently, our data does not allow for specific unit/site or prescriber group assessments and we hope to one day be able to provide that level of insight.

## FIGURE 12 – DRUG COSTS PER INPATIENT DAY TOTAL VS. ANTIMICROBIALS




Data source: Cerner database
Graph prepared by: Clinical Outcomes Analyst for Medication Management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