Northern Health

Antimicrobial Stewardship

Annual Report 2024–2025

northern health
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Table of 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) library expansion – including addition of Candidemia guidelines Infectious Diseases Consultation for Prolonged Duration Intravenous Antimicrobials (Clinical Practice Standard 1-20-6-4-120) – reviewed and revised – published May 2024.
- Allergy Documentation (Policy and Procedure 2-4-2-000)– reviewed and updated.

Education Initiatives

- SPRINT: Spreading Quality Improvement (SQI) initiative for Penicillin Allergy De-labeling (October 2024).
- Vancomycin and Aminoglycoside dosing and management pharmacist education session (December 2024).
- Update in the Treatment of ABSSI patients with MRSA – Dr. Nguyen (Feb 2025).

Order Set Development

- SaferCare Project – Powerplan content creation:
  - Community Acquired Pneumonia
  - Clostridioides Difficile Infection
- Order set revisions:
  - Oseltamivir for treatment and prophylaxis of Influenza like illness
  - Paxlovid

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. The 2024/25 fiscal year compared to 2023/24 showed increased antimicrobial usage throughout Northern Health collectively. The Northwest showed a greater than 10% increase.

Clinical Services: Audit and Feedback

The Audit and Feedback (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 disease specialist when necessary.

Clinical Services: Penicillin Allergy De-Labeling Clinic

- At UHNBC led by Dr. Sharla Olsen and Dr. Irina Sainchuk, supported by the AMS Program Coordinator Pharmacist.
- Accepting referrals for adult patients including pregnant patients (Penicillin Allergy De-Labeling Clinic Referral).
- During the 2024/25 fiscal year the clinic has successfully de-labeled 121 patients without adverse events.

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 patient's bedside are unaware of our program. To strive for positive change and outcomes the AMS program hopes 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 within 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. If you are interested in providing feedback on distribution methods for this information or on the information contained therein, please feel free to contact the Program Coordinator (see contact information on page 14).

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. 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

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

As Medical Lead, Dr. Black will be reporting 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 and 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 Lead 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 Lead, 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.

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 31, 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. 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.

Best Practices

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.

Firstline Electronic Library

Firstline is an electronic library that is 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. 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 NH can be found in the locations list. Figures 1–3 in the Appendix show the most frequently viewed content within the Northern Health Firstline library. Many of the clinicians within NH access this resource through various avenues on a regular basis, see Appendix Figure 4.

Through the NH drug monographs there is access to pediatric antimicrobial dosing guidance supplied from the BC Children's hospital library. In a constant effort to improve usability we are always looking for feedback and suggestions. Based on recent user feedback we have restructured content categories to include a new category for Clinical Tools and Resources.

Education Initiatives

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.
- 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 five 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 reactions
    - IV to PO step down
    - Limiting urine cultures (asymptomatic bacteriuria) – using content from AMMI Canada ‘symptom free pee let it be’ campaign
    - 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 various topics for education and program awareness to different audiences. They welcome these requests from any area/site within NH. Examples of sessions provided over the 2024/25 fiscal year:

- Penicillin Allergy De-Labeling Presentation for Spreading Quality Improvement SPRINT conference (Oct 2024).
- Pharmacist education session for Dosing and Management of Vancomycin and Aminoglycosides (Dec 2024).
- Update in the treatment of ABSSI patients with MRSA: by Dr. Nguyen (Feb 2025).

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:

- To increase patient safety and effectiveness of care while digitally enabling clinical processes, practices and documentation.
- To facilitate all Northerners to actively engage in their digital health information and support online health services.
- To 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 five 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 over the 2024/25 fiscal year:

- Community Acquired Pneumonia
- Clostridioides Difficile Infection
- Adult Sepsis

Clinical Services

Prospective Audit and 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

Directed by the Professional Practice Clinical Pharmacy Leads our clinical pharmacists will track and record their key performance indicator activities during pre-determined two-week intervals. These two-week intervals are scheduled once every three month quarter resulting in a total eight-week reporting period for the fiscal year.

When comparing the 2024/25 fiscal year to 2023/24 there remains a consistent trend for percentage of AMS DTPs resolved compared to total number of DTPs with 17% of total DTPs resolved in 2024/25 being associated with AMS (Appendix Figure 5). This result is encouraging as the pharmacy department continues to deal with staffing shortages and reflects the hard work, contributions and efforts of our clinical pharmacists to the AMS program and stewardship. This cannot be understated and we are appreciative and grateful for all their efforts.

Penicillin Allergy De-Labeling Clinic

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 typically less expensive antibiotics that can be used to narrow antibiotic spectrum, resulting in less adverse events such as C. difficile infections.

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 ten years of avoidance.

The Penicillin Allergy De-Labeling Clinic at UHNBC led by Dr. Sharla Olsen and Dr. Irina Sainchuk, supported by the AMS Program Coordinator/Lead Pharmacist, are accepting patient referrals for adult patients including pregnant patients with a penicillin allergy label (Penicillin Allergy De-Labeling Clinic Referral). During the 2024/25 fiscal year the Penicillin Allergy De-labeling clinic has successfully de-labeled 121 patients without adverse events (see Appendix Table 1).

Outcome and Process Measures

At this time the outcome measures shared in this report are high level indicators of antimicrobial prescribing. Process measures to understand influences and drivers of prescribing practices, such as changes in disease profile, antimicrobial resistance, inappropriate prescribing and other site-specific factors, are lacking. Systems need to be developed within our reporting system to gain an understanding of these processes.

Antimicrobial Utilization and 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). Overall, total antimicrobial (antibiotics, antifungals and antivirals) use (in all settings, inpatient and outpatient) was increased compared to the previous fiscal years (see Appendix Table 2). This increase is greatest (over 10%) in the northwest region of our health authority.

To investigate which drugs are contributing to these increases, the DDD for individual antimicrobials is calculated and can be displayed separately. We have chosen to show the usage of a small selection of historically high use agents and or those that are reserved for multi-drug-resistant organisms. See Appendix Figures 6–9 for these individual breakdowns according to HSDA. The top contributors to the increase in usage, particularly in the NW, are piperacillin-tazobactam, ceftriaxone, daptomycin, vancomycin and the carbapenem class (meropenem, imipenem and ertapenem). Other agents showing high use include azithromycin, cefazolin, ciprofloxacin, metronidazole and cloxacillin. Currently, the reason for increase usage is not clear. The information and tools to understand this data are not readily available. The AMS program leads in collaboration with other clinical programs such as Infection Prevention and Control and Lab services (microbiology department) will need to perform further analysis. One of the ways to audit process measures is to align the SaferCare system with best practice and to build in functionality for an audit tool that allows easier and more timely analysis.

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 (Appendix Figures 10–14). From a stewardship perspective the goal is to see a preference for use of oral agents from this group of therapies. From Figure 9, we can see this is true for all agents except for metronidazole and clindamycin which historically have shown there tends to be a preference for IV over oral. This pattern of use is consistent throughout the HSDAs except for the IV use of azithromycin being higher in the NE and NI (excluding UHNBC) which was also seen in the previous fiscal year. Interestingly the use of clindamycin oral is higher than IV in the NW alone which was also observed the year prior. The differences reflect either a different culture of prescribing or differences in order sets across regions and allows an opportunity to try and standardize approaches based on best practice.

Overall, it is reassuring to see that most usage of this subset of antimicrobials is in the oral formulation.

Antimicrobial Costs

The total drug cost per inpatient day for the 2024/25 fiscal year saw an 11% increase compared to the 2023/24 fiscal year (Appendix Figure 15). The antimicrobial cost per inpatient day saw a smaller increase of 6% compared to the previous year. This increase in costs however remains lower than total expenditures during the 2020–2023 fiscal years. The overall proportion of antimicrobial cost remains less than 30% of the total drug costs for the health authority as it has since 2021/22 fiscal year.

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 to 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)

← Return to introduction

Contact Information

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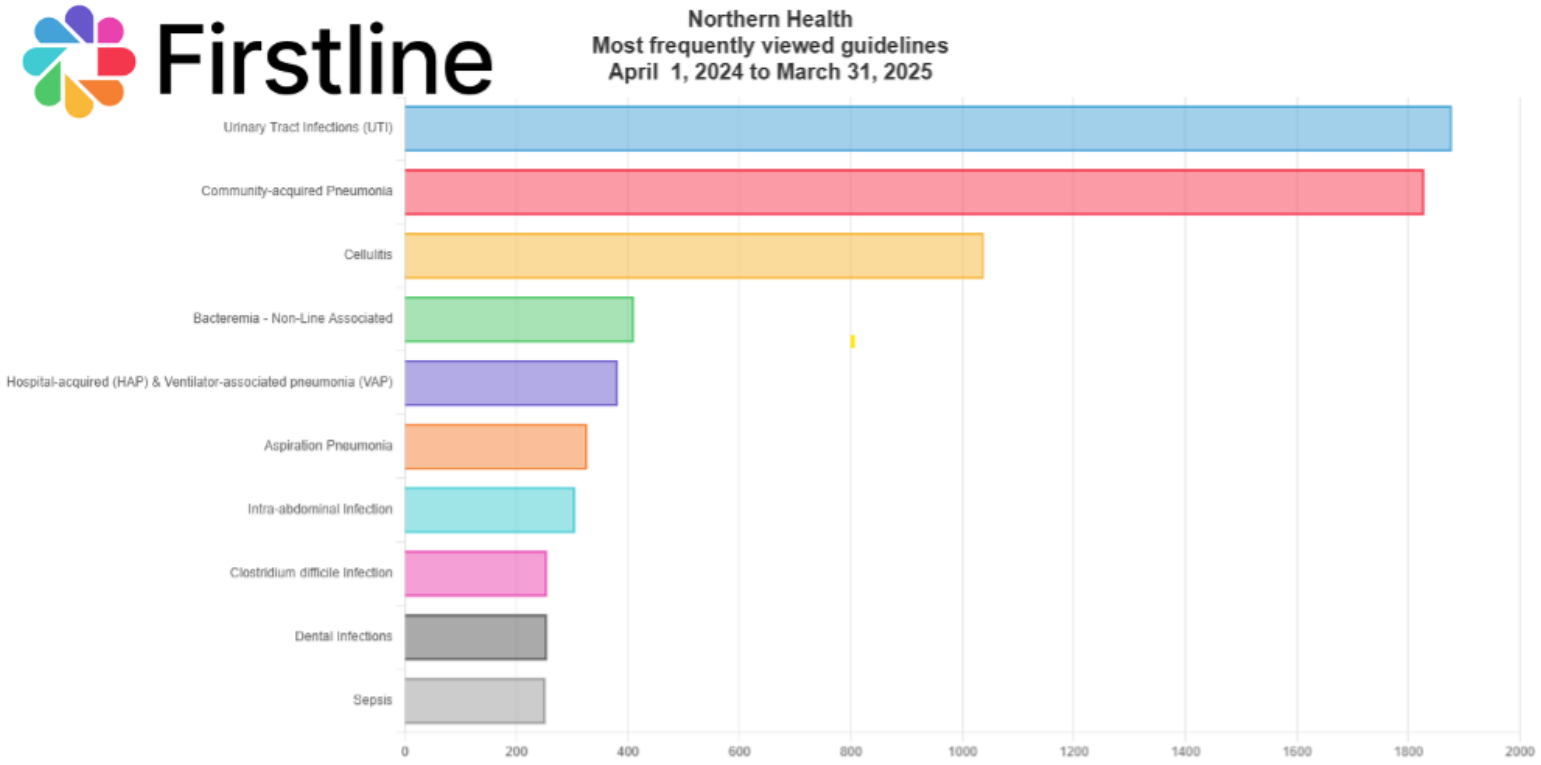
Phone: 250-645-8663

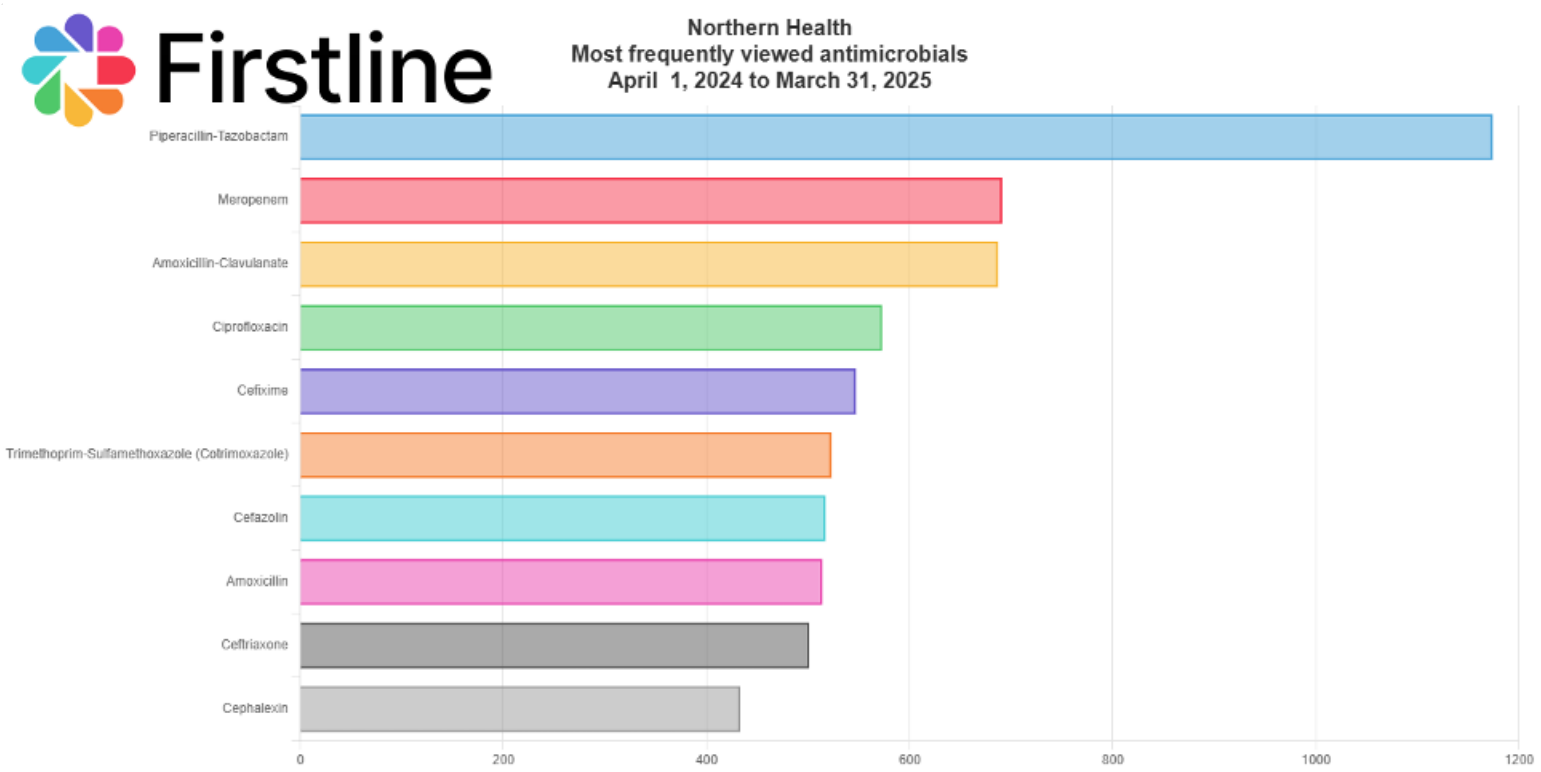
Figure 1 – Most Frequently Viewed Guidelines



Data source and graph prepared by: Firstline analytics dashboard

← Return to Article

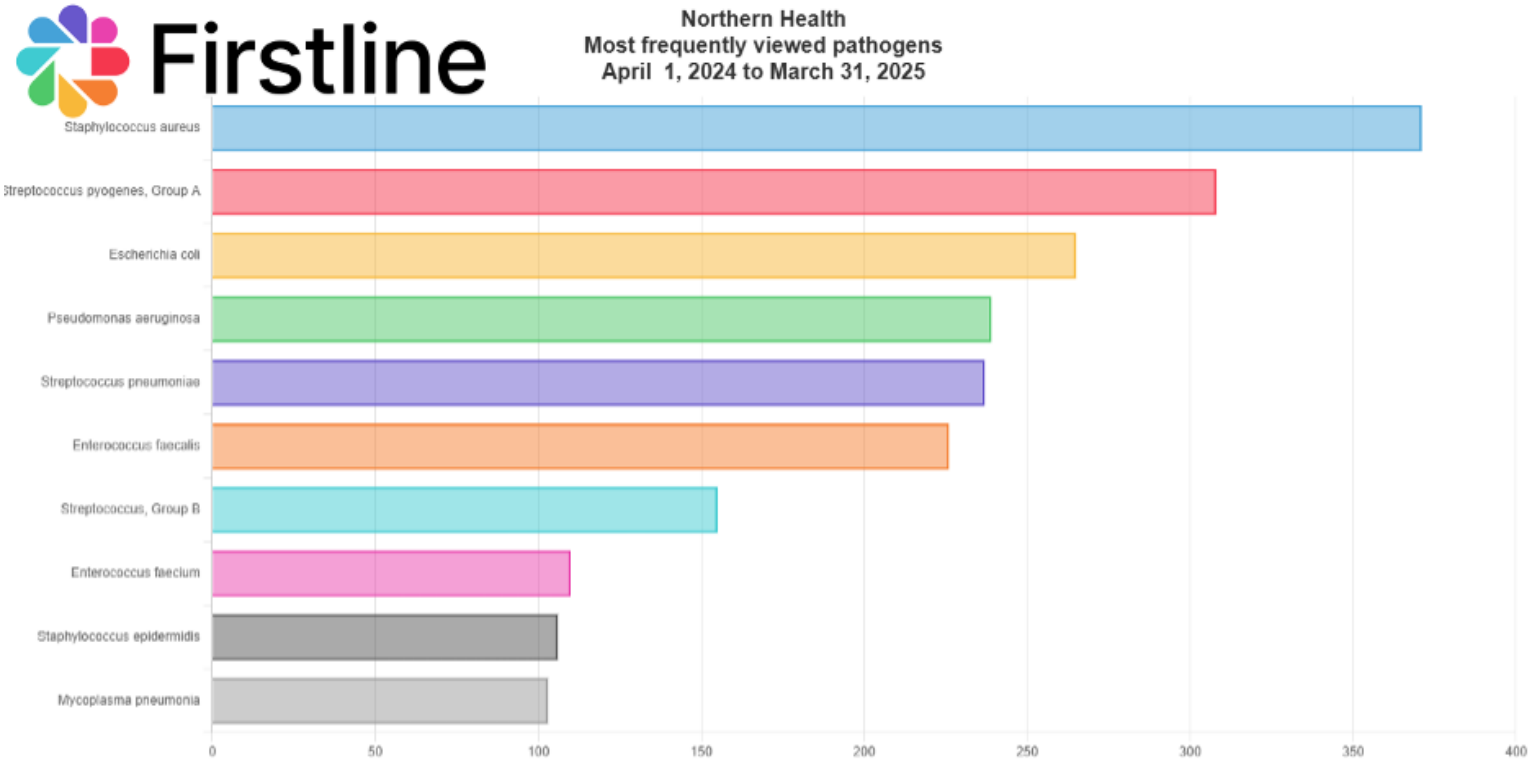
Figure 2 – Most Frequently Viewed Antimicrobials



Data source and graph prepared by: Firstline analytics dashboard

← Return to Article

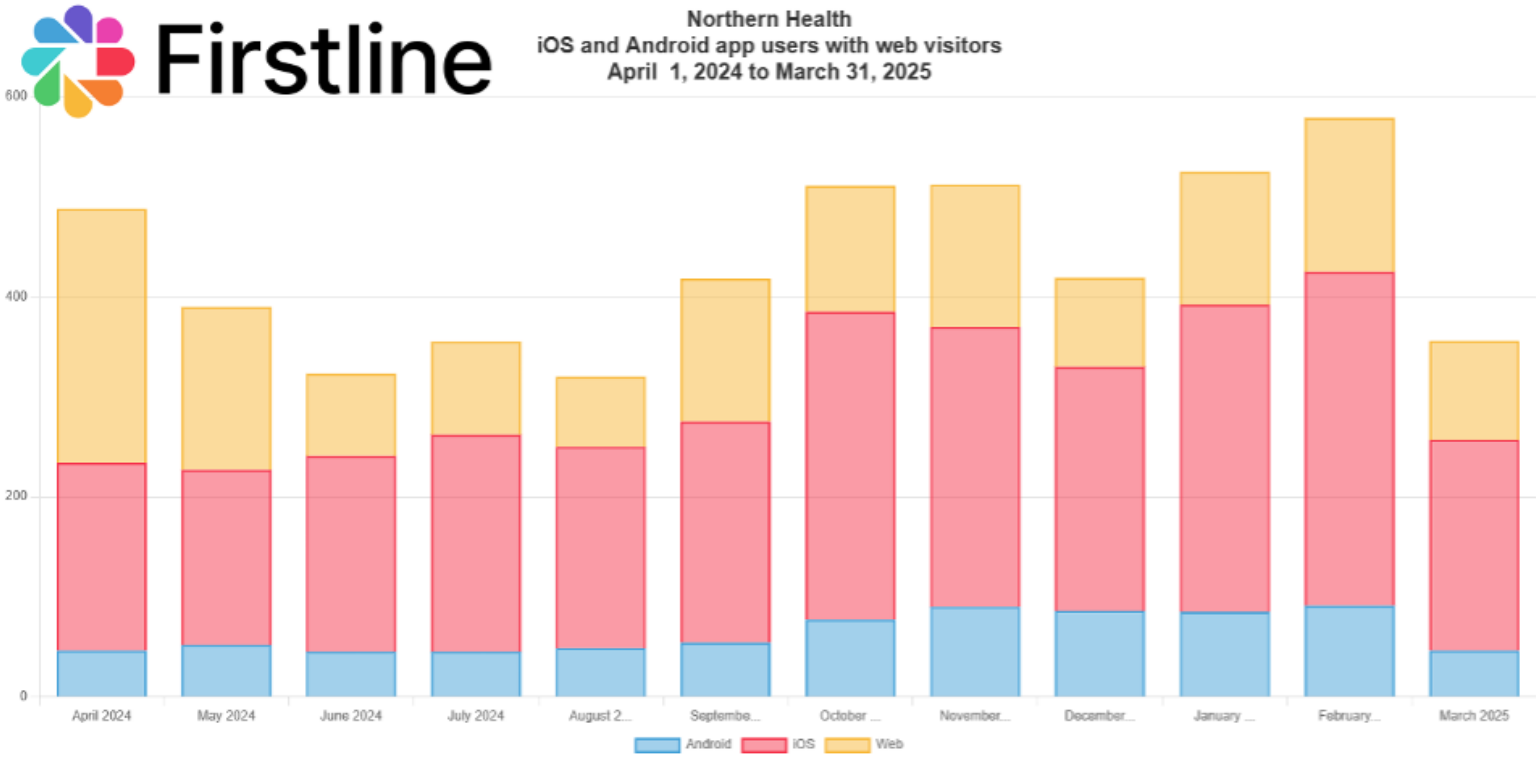
Figure 3 – Most Frequently Viewed Pathogens



Data source and graph prepared by: Firstline analytics dashboard

← Return to Article

Figure 4 – Monthly Users



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← Return to Article

Figure 5 – Drug Therapy Problems (DTP) Resolved by Pharmacists in 2024/25

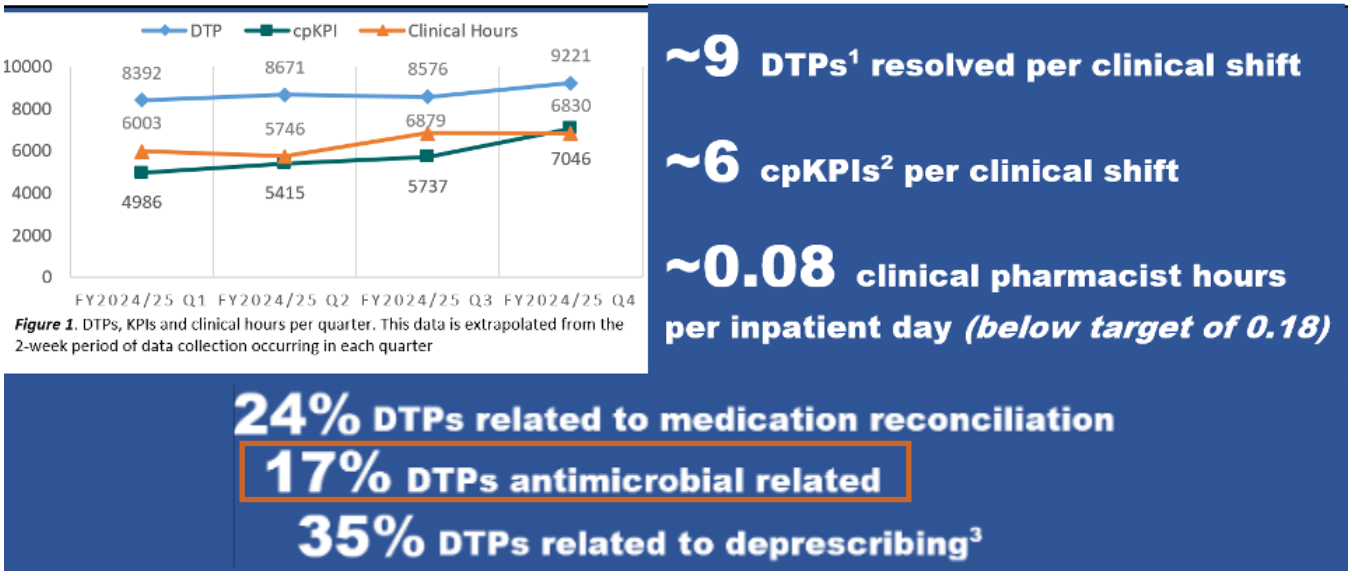
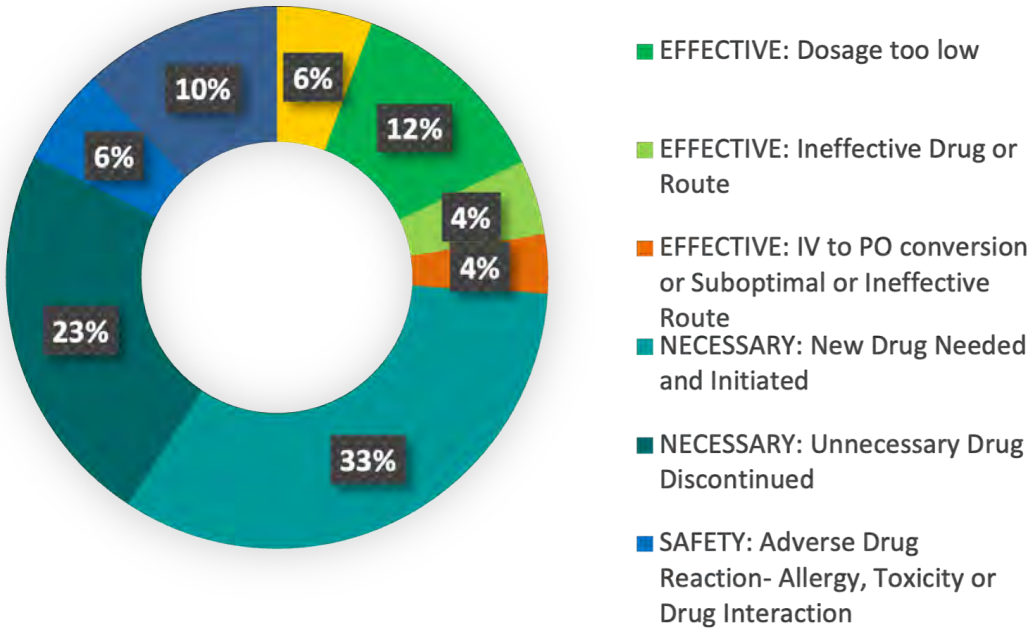


Figure 1. DTPs, KPIs and clinical hours per quarter. This data is extrapolated from the 2-week period of data collection occurring in each quarter



[1]***DTP:*** *Undesirable event or risks experienced by a patient that involved or are suspected to involve drug therapy. Pharmaceutical care involves identifying, resolving and preventing drug therapy problems.*

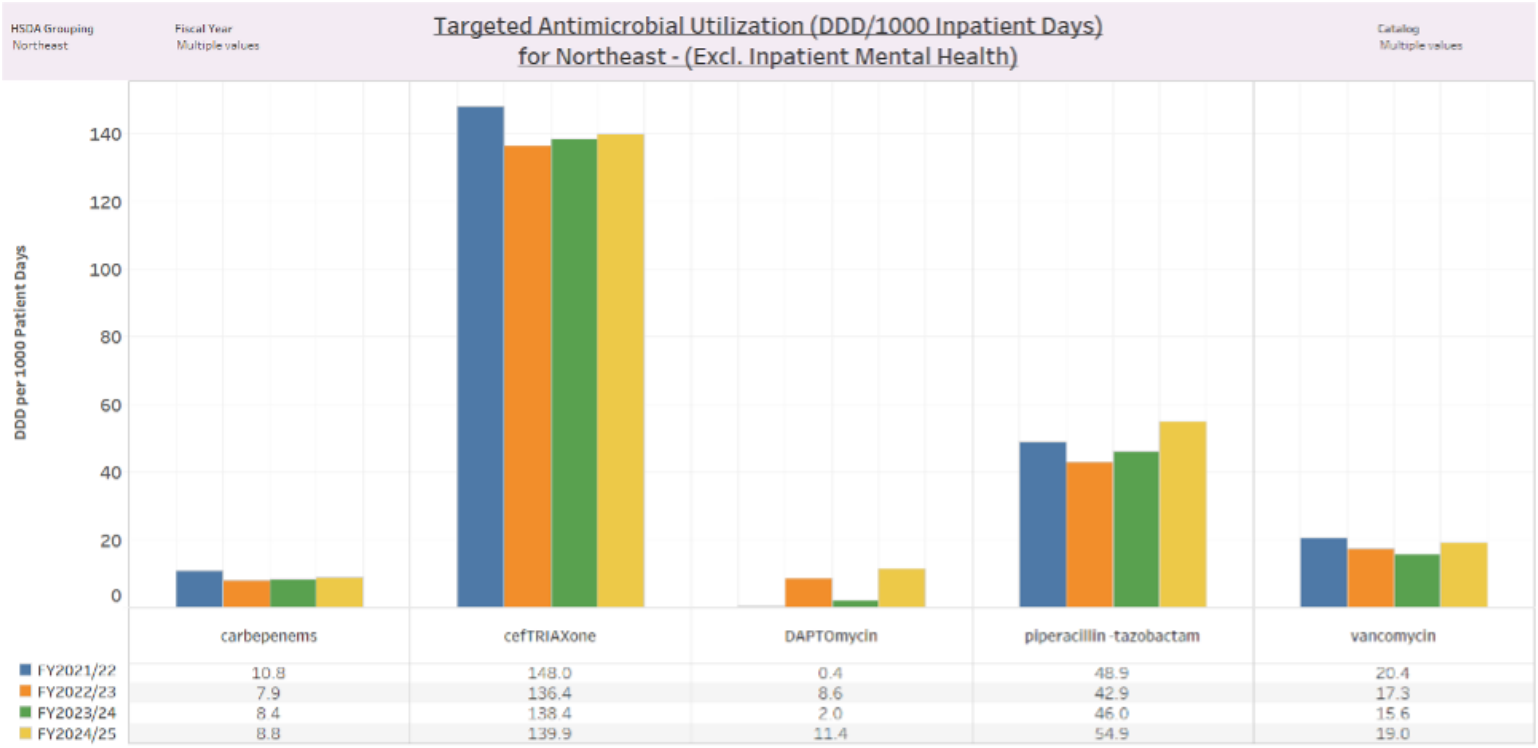
[2]***cpKPI:*** *Quantitative measure that reflects identified priorities and is designed to measure progress for a particular clinical pharmacy activity*

[3]**Deprescribing:** *Dose reduction or stopping of medication that might be causing harm, or no longer be of benefit*

Data Source: NH DTP tracker
Figure prepared by: Clinical Pharmacy Supervisor

← Return to Article

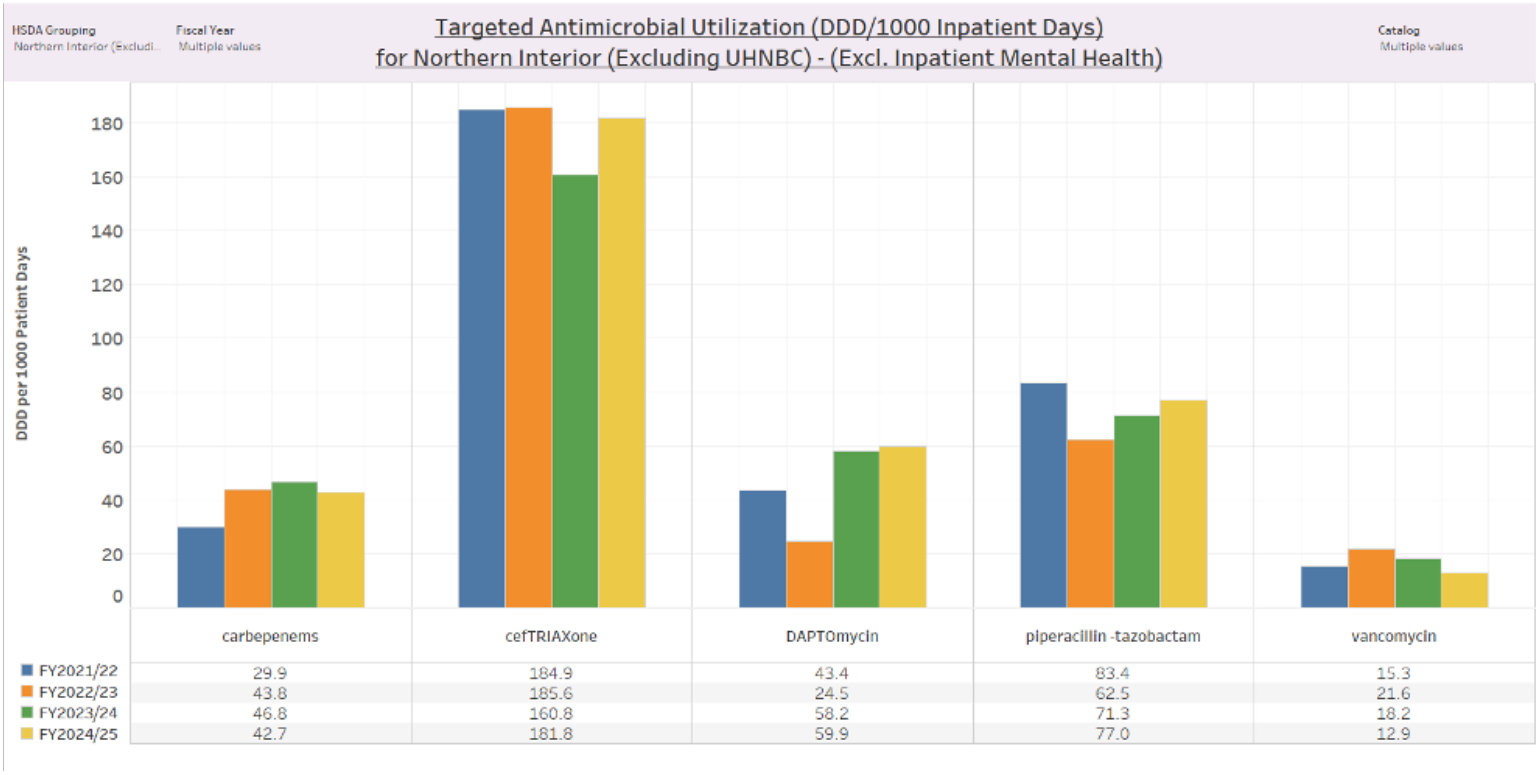
Figure 6 – Targeted Antimicrobial Utilization for Northeast (DDD/1000 inpatient days)



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

← Return to Article

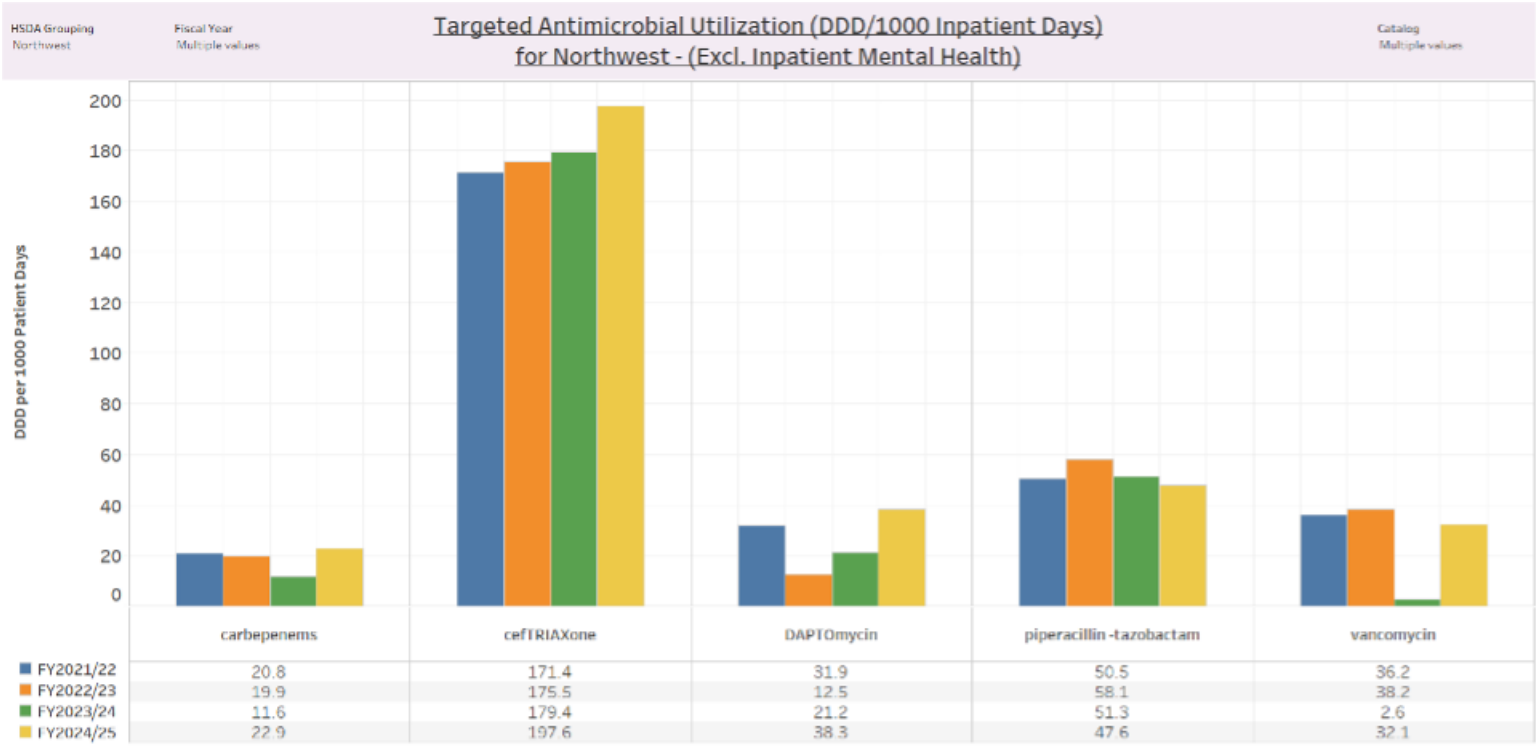
Figure 7 – Targeted Antimicrobial Utilization for Northern Interior [excluding UHNBC] (DDD/1000 inpatient days)



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

← Return to Article

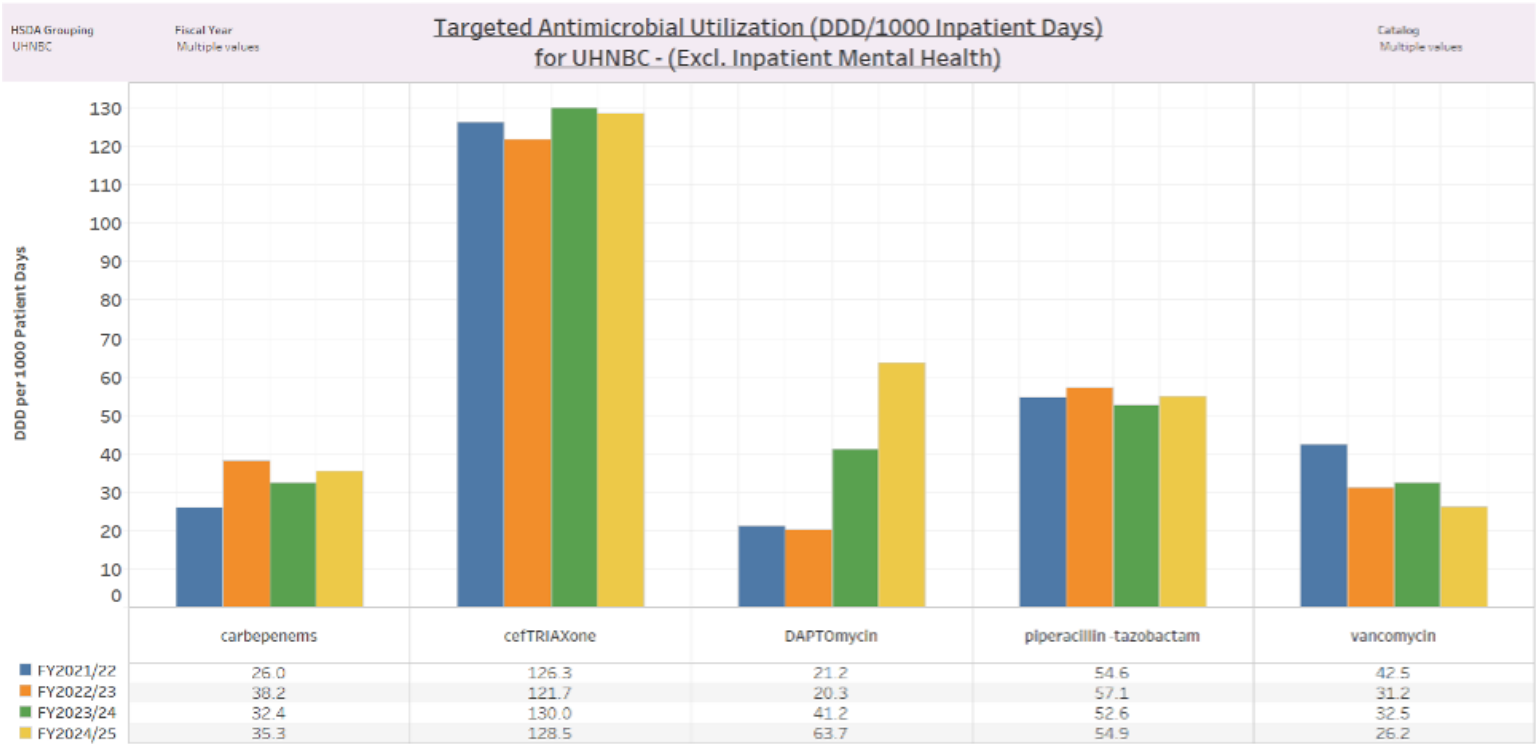
Figure 8 – Targeted Antimicrobial Utilization for Northwest (DDD/1000 inpatient days)



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

← Return to Article

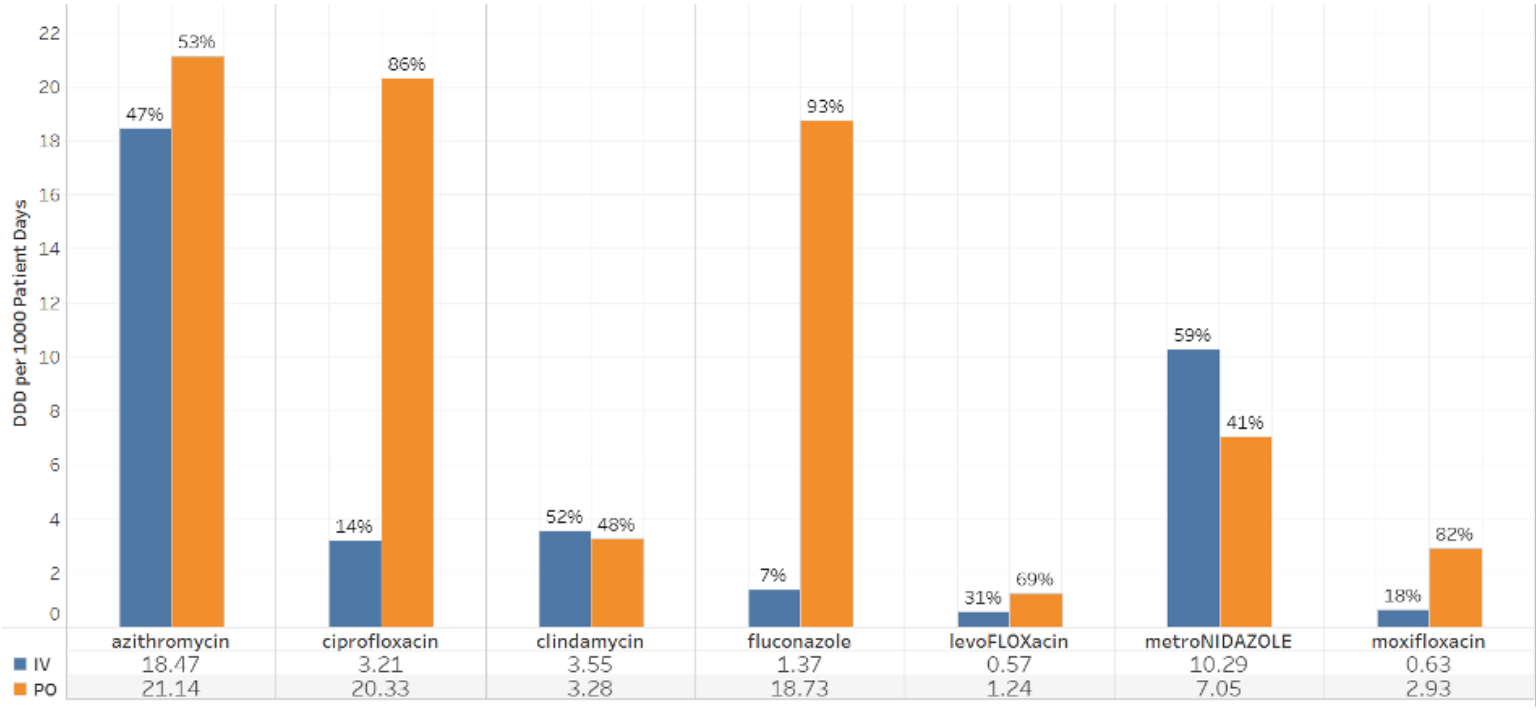
Figure 9 – Targeted Antimicrobial Utilization for UHNBC (DDD/1000 inpatient days)



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

← Return to Article

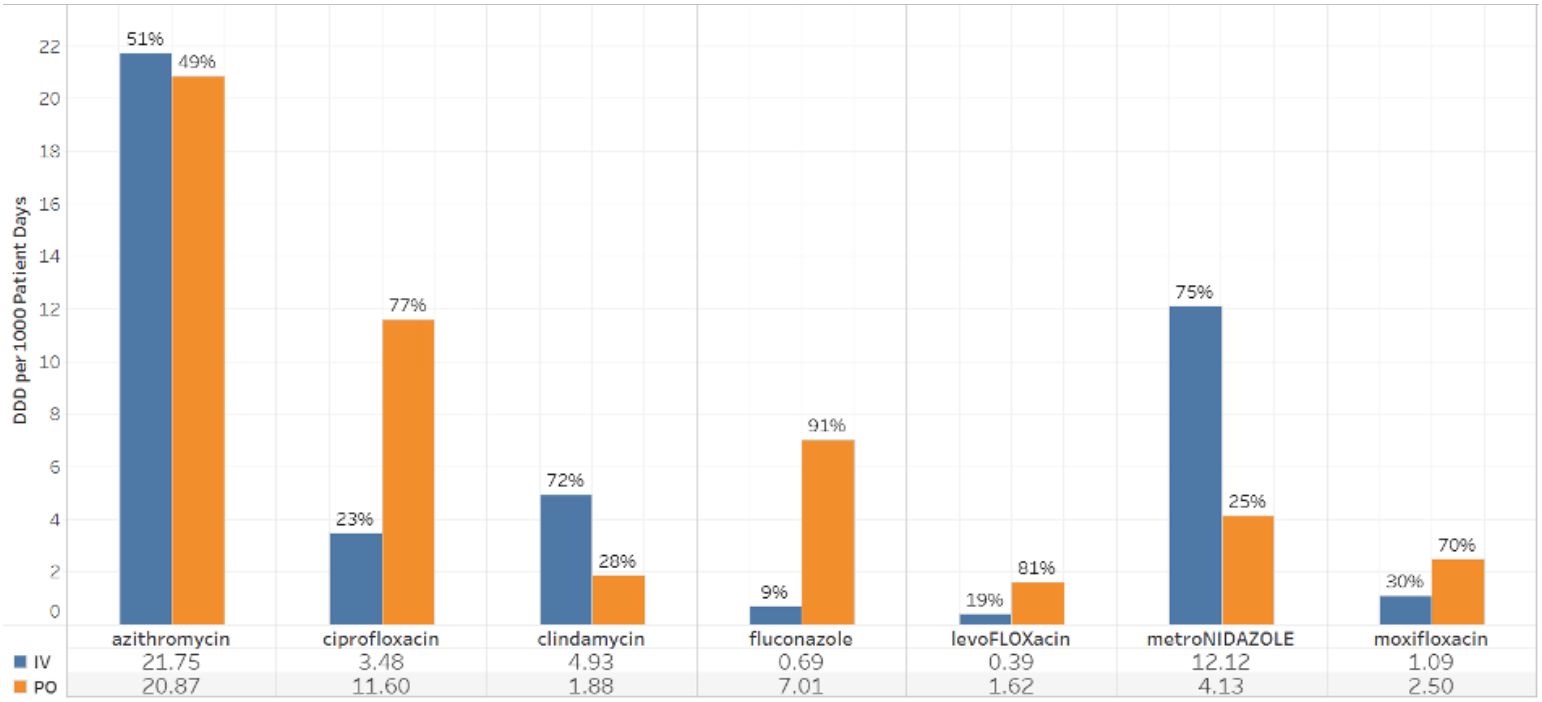
Figure 10 – High Bioequivalent Antimicrobials IV versus Oral for all NH (DDD/1000 inpatient days), FY 2024/25



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

← Return to Article

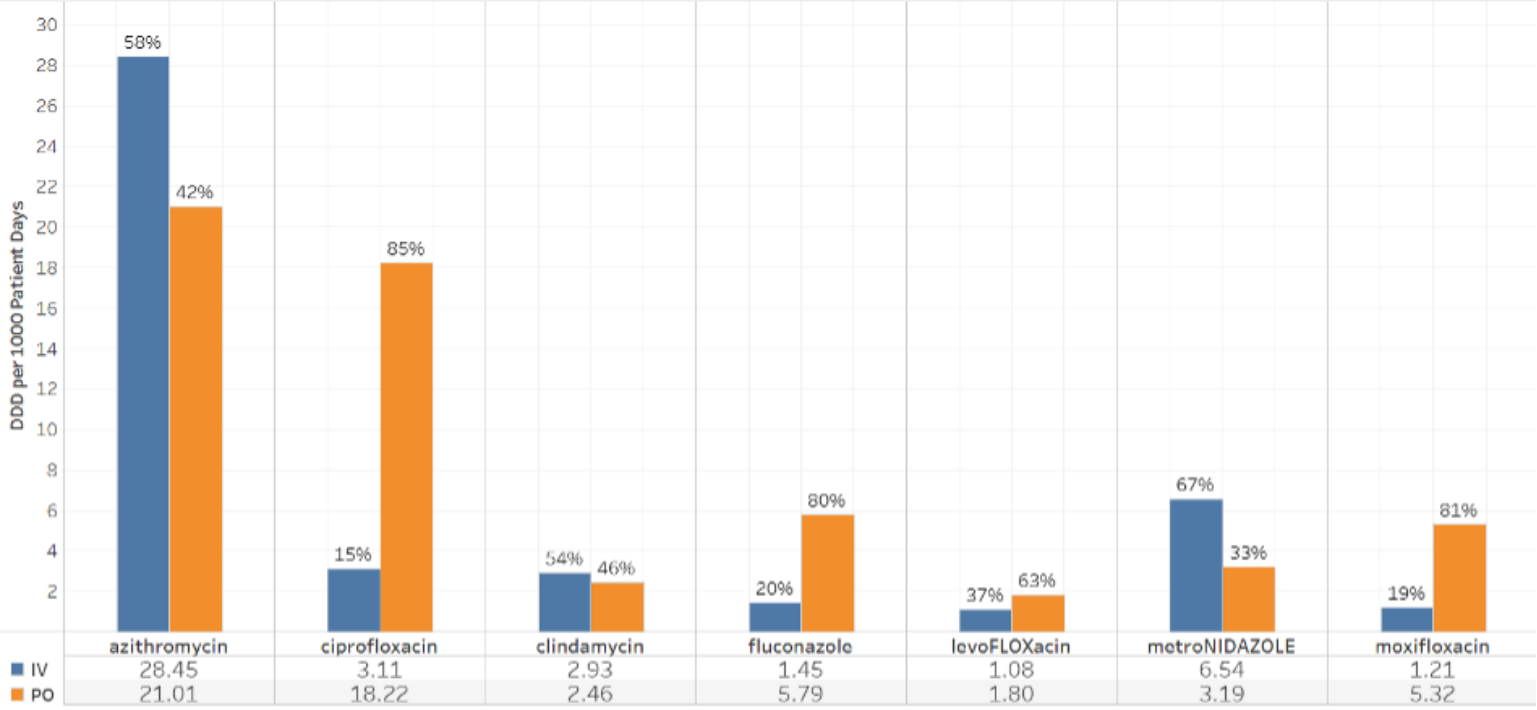
Figure 11 – High Bioequivalent Antimicrobials IV versus Oral for Northeast (DDD/1000 inpatient days), FY 2024/25



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

← Return to Article

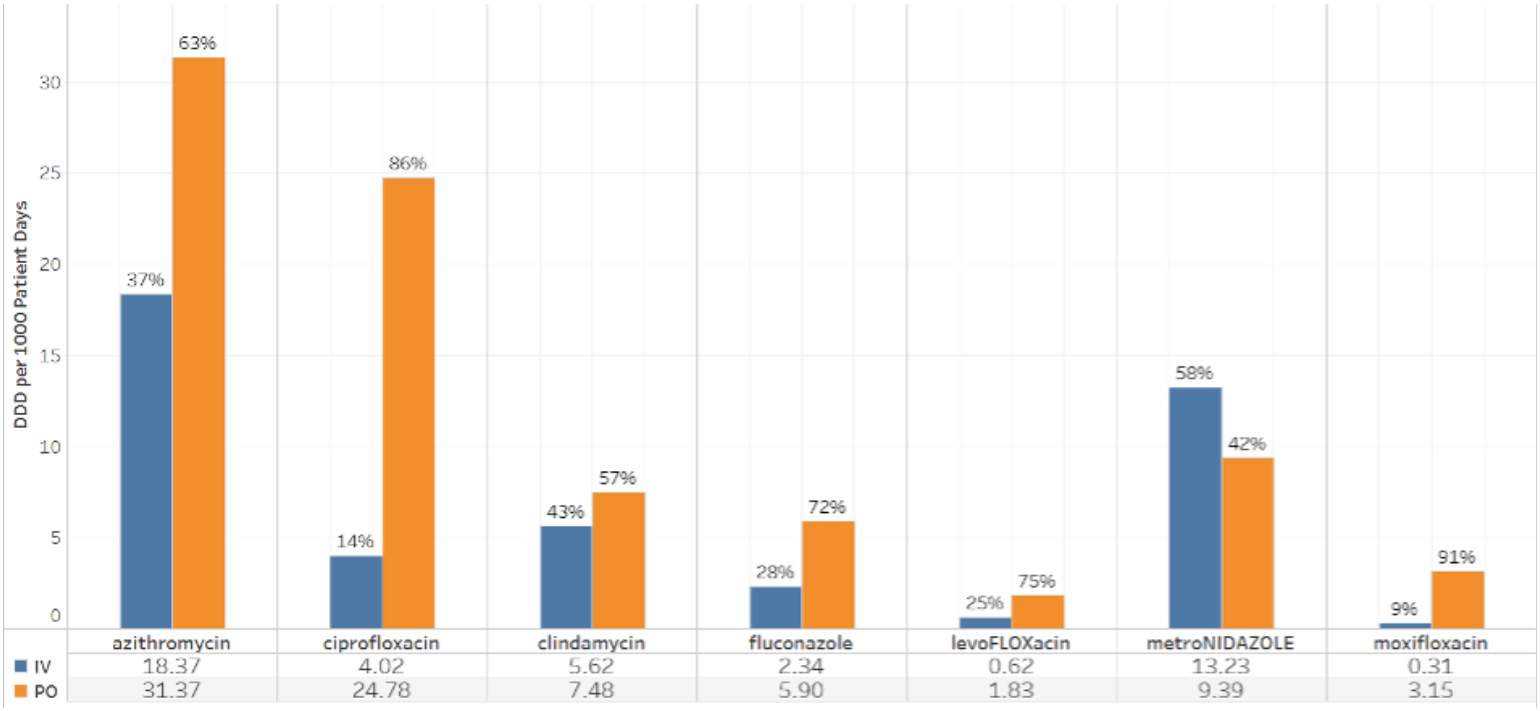
Figure 12 – High Bioequivalent Antimicrobials IV versus Oral for Northern Interior [excluding UHNBC] (DDD/1000 inpatient days), FY 2024/25



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

← Return to Article

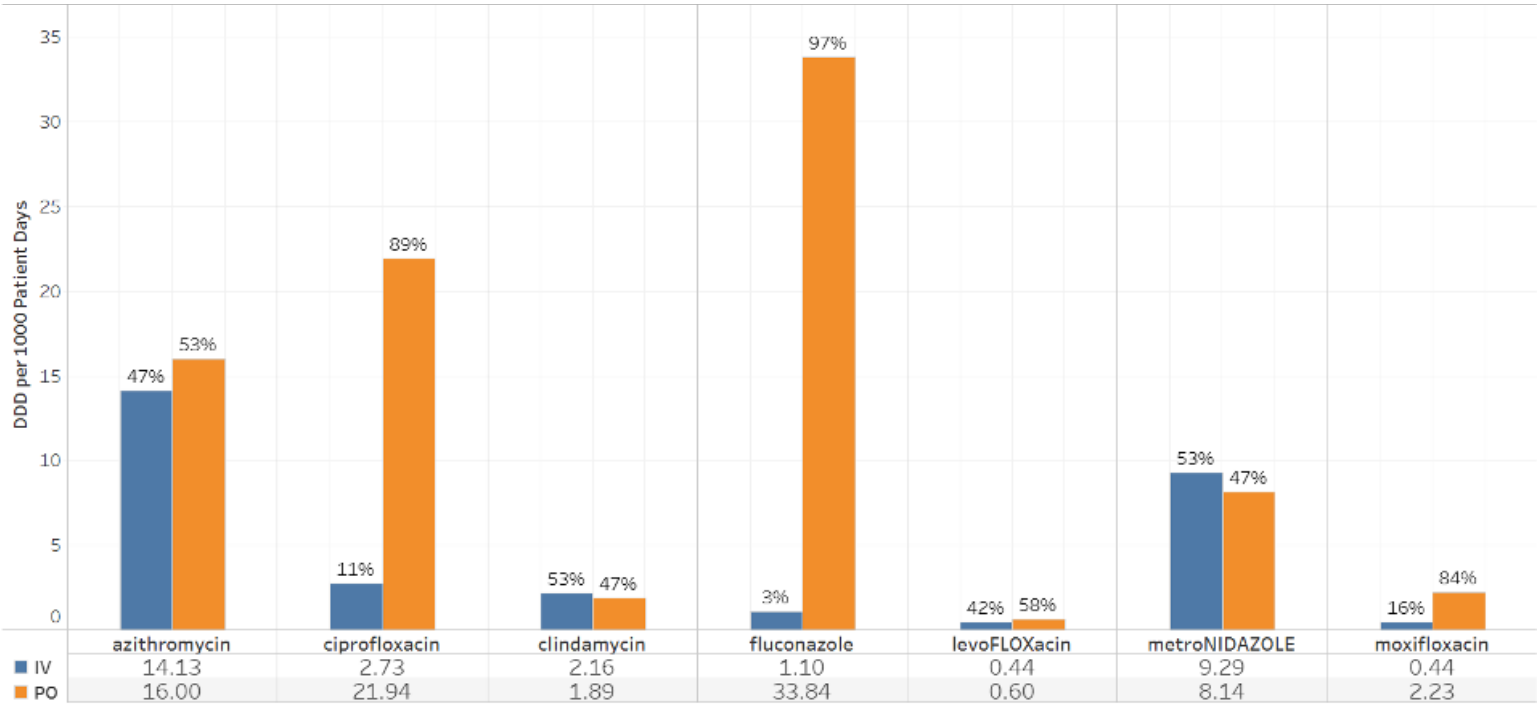
Figure 13 – High Bioequivalent Antimicrobials IV versus Oral for Northwest (DDD/1000 inpatient days), FY 2024/25



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

← Return to Article

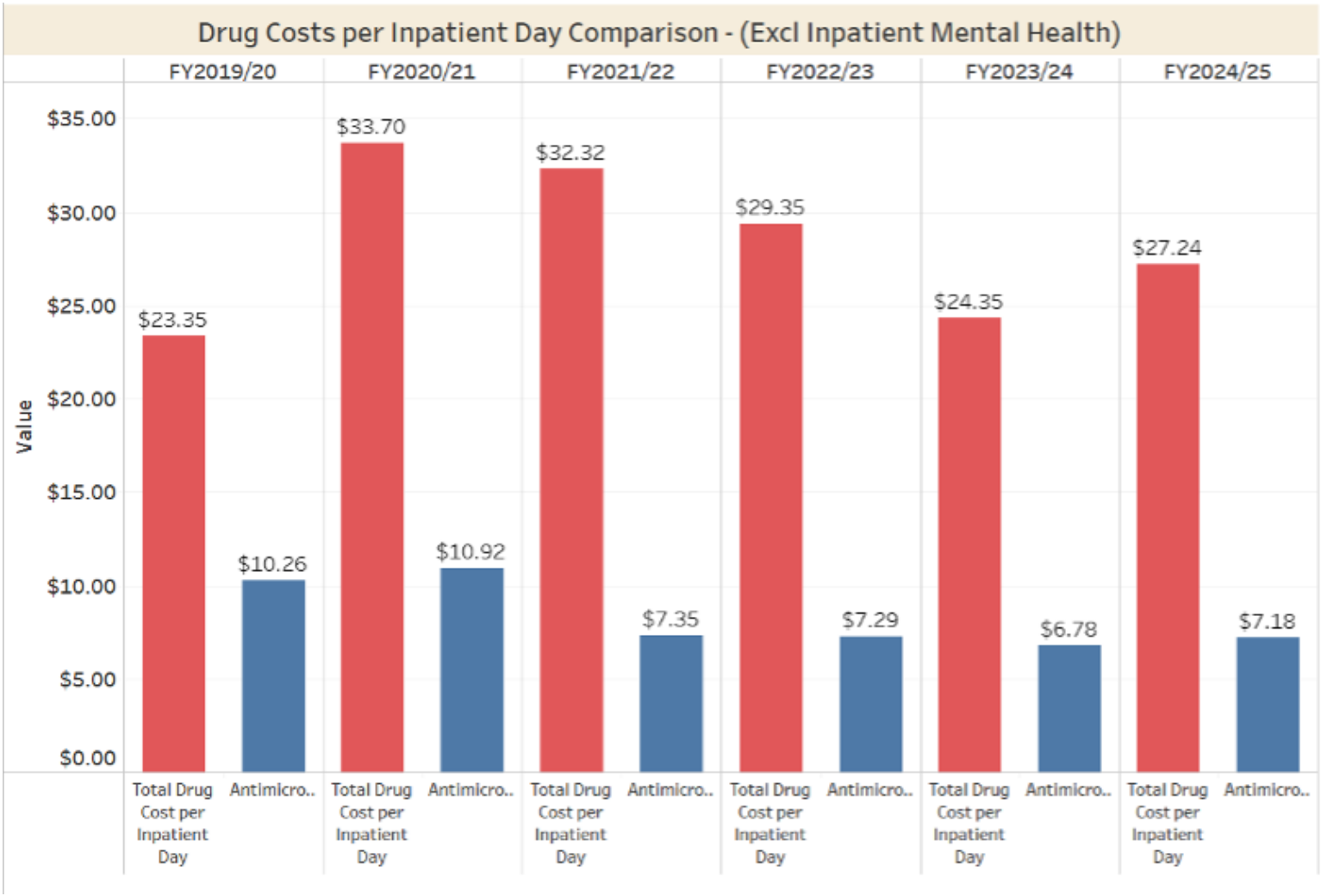
Figure 14 – High Bioequivalent Antimicrobials IV versus Oral for UHNBC (DDD/1000 inpatient days), FY 2024/25



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

← Return to Article

Figure 15 – Drug Costs per Inpatient Day Total vs. Antimicrobials



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

← Return to Article

Table 1 – Penicillin Allergy De-Labeling Clinic Patient Outcomes and Demographics

Demographic	de-labeled Female	Male	de-labeled Total	referred to allergist Female	labeled allergic Female	Grand Total
16-45	31	2	33	1	1	35
2024	21	1	22		1	23
2025	10	1	11	1		12
45-65	1		1			1
2024	1		1			1
46-65	20	6	26			26
2024	16	6	22			22
2025	4		4			4
65+	17	10	27			27
2024	14	9	23			23
2025	3	1	4			4
Grand Total	69	18	87	1	1	89

Data Source: Penicillin Allergy De-Labeling Clinic Pharmacist data spreadsheet
Table prepared by: Penicillin Allergy De-Labeling Clinic Pharmacist

← Return to Article

Table 2 – Total Antimicrobial Utilization Year to Year Comparison (DDD/1000 patient days)

HSDA Grouping	FY2022/23 compared to FY2021/22	FY2023/24 compared to FY2022/23	FY2024/25 compared to FY2023/24
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 and Supply Chain
Table prepared by: Clinical Outcomes Analyst for Medication Management

← Return to Article

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