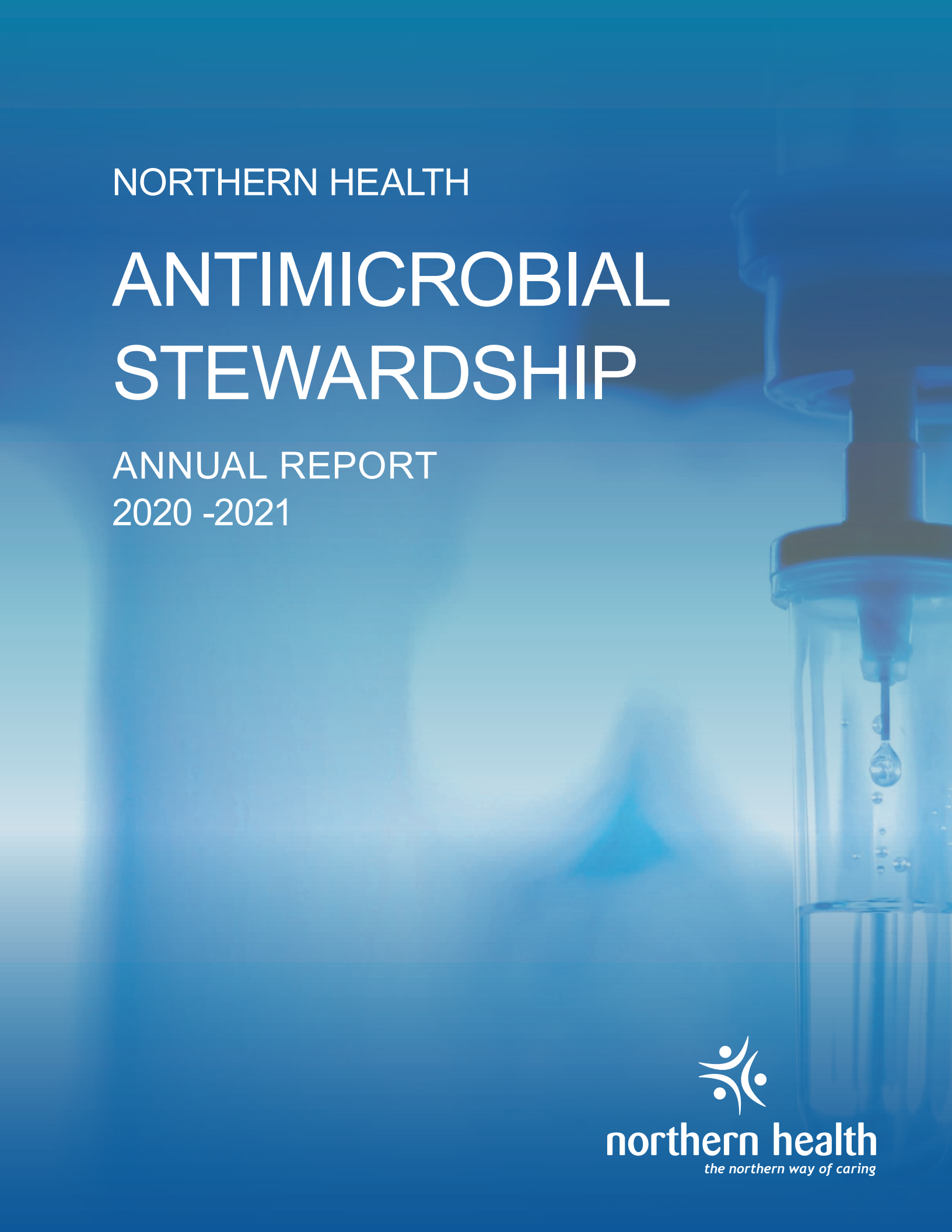
NORTHERN HEALTH

ANTIMICROBIAL STEWARDSHIP

ANNUAL REPORT
2020 -2021



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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 as important as creation of the report itself. 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 Alicia Rahier.

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.

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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

- We are in the process of converting our current clinical tool pocket-cards for empiric treatment and antimicrobial dosing on to the Firstline (formerly Spectrum) mobile health platform
- Prolonged duration intravenous antibiotics policy approved and implemented

Education initiatives

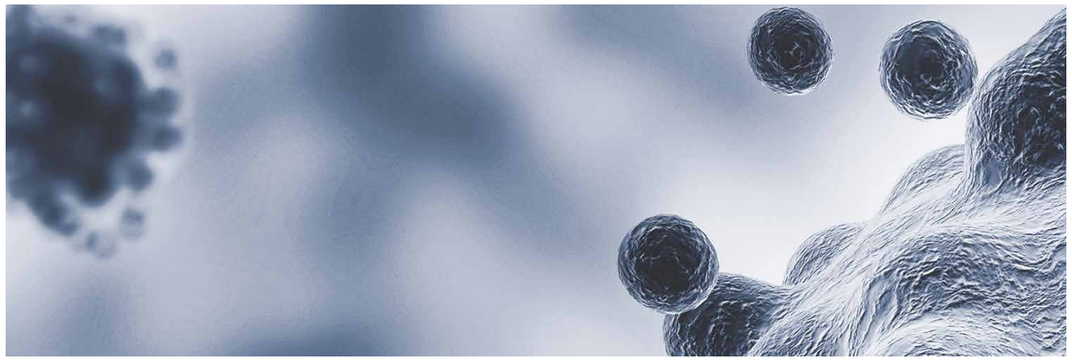
- Education session for prescribers (Gram positive bacteraemias, COVID-19 update) – Northern Doctor's Day (November 27, 2020)
- COVID Vaccine update – Medicine Grand Rounds (January 14, 2021)

Order set development

- Creation of a regional Clostridium Difficile order set (approved May 2020)
- Updates to order sets for febrile neutropenia and community acquired pneumonia in adults still underway

Research related projects

- In response to results from: 'Assessing the use of a standardized allergy history questionnaire in patients with a reported penicillin allergy' (completed May 2019), a re-design project is underway for the current Northern Health Allergy/Sensitivity Record as well as to update the policy for Allergy Documentation
- Informed by results from: 'A Gap Analysis of Outpatient Parenteral Antimicrobial Therapy Practices across Northern Health,' a regional project is underway to develop a standardized framework for community/outpatient IV services across the Health Authority.



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. Since we have been unable to produce this data for the past few years we have included data as far back as 2018/19. Our current year compared to 2019/20 showed large increases in usage (more than 10% in most of our Health Service Delivery Areas (HSDAs) and the University Hospital of Northern BC (UHNBC)). This can likely be explained by the effects of the pandemic as it surged to higher levels of infected/hospitalized patients in the fall of 2020. An increase in usage of ceftriaxone and azithromycin was seen consistently across all HSDAs and is not surprising given that they are recommended agents for suspected bacterial pneumonia secondary to COVID-19. With the exception of the Northeast, an increase in piperacillin-tazobactam and vancomycin use is seen, likely due to increase numbers of critically ill patients requiring escalation of therapy during the pandemic waves. With the effects of the pandemic tapering off, next fiscal year may be more of a true measure of typical antimicrobial usage across Northern Health (NH).

CLINICAL SERVICE/AUDIT & FEEDBACK

Throughout this fiscal year variations of Prospective Audit and Feedback (A&F) of antimicrobials have been continued (with mentorship from the Antimicrobial Stewardship (AMS) program coordinator at UHNBC) at NH sites with clinical pharmacist support.

Over the course of the 2020/21 fiscal year, our clinical pharmacists resolved over 10, 000 drug therapy problems (DTPs) total with 26.3% of these specific to antimicrobial therapies. There are a variety of types of antimicrobial therapy problems; the top three DTPs identified and resolved include:

1. New drug needed and initiated
2. Unnecessary antimicrobial discontinued
3. Dosage too low (includes need for extending duration)

CLINICAL TOOLS, STANDARDS & POLICIES

All-Staff Antimicrobial Stewardship webpage on OurNH and NH Physicians website (ongoing); technology advancements 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 tools, clinical practice standards, clinical memos or bulletins and other online resources from the OurNH Antimicrobial Stewardship page found under Clinical & Patient Care > Medications. 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.

At the end of this fiscal year funding was granted to obtain a license for a Northern Health specific module within the Firstline (formerly Spectrum) mobile health platform. The Program Coordinator is actively working with the Firstline team to input NH developed tools, clinical guidance, order sets and antibiogram data into this tool so that this information can be easily accessible anywhere, including at the bedside. This means that NH prescribers, pharmacists and nurses will be able to easily and quickly access NH created guidelines and antimicrobial/pathogen information from their mobile devices and computers.

Firstline Mobile Health (Firstline) is a mobile app that can be customized to deliver local antimicrobial stewardship and infectious diseases resources within any hospital or health system. Up to 50% of antimicrobial use in hospitals and community settings is unnecessary or inappropriate and contributes to the development of antimicrobial resistance, prolonged hospital stays, increased rates of *C. difficile* infection (CDI), increased healthcare costs and patient mortality. It has been shown that facility specific treatment guidelines and protocols facilitated by an antimicrobial stewardship program can lead to an increase in appropriate antimicrobial prescribing and therefore reduce antimicrobial usage, costs and adverse patient outcomes.

The NH AMS Program Leads are hopeful that this tool will benefit all clinicians within NH by mitigating the struggle with distribution of information and implementation of policies/ initiatives across our geographically vast health authority. Firstline can be downloaded for free and starting September 20/21, Northern Health will be available in the locations list.

Clinical tools pocket cards for antibiotic dosing and empiric treatment updates

The Empiric Treatment Guidelines for Common Infections in Adults has been updated to reflect some changes in practice, including minimizing use of fluoroquinolones where possible and aligning with the new *C. difficile* infection (CDI) order set. The updated document is available on the OurNH Antimicrobial Stewardship page as well as the NH Physicians' AMS page and will be transitioning over to the Firstline platform.

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 Medical Lead (Dr. Abu Hamour) conducted a few education sessions this past year. COVID vaccination update was held virtually during the medical education rounds, January 14, 2021. Dr. Hamour also presented a bacteraemia refresher and a COVID-19 update (what have we learned so far) at the Annual Northern Doctor's Day, November 27, 2020. These recorded sessions are available for viewing. Prescribers (at all sites) are encouraged to provide requests for topics and future education sessions to the AMS Program Coordinator who will work with sites to set up opportunities either regionally or site specific.

ORDER SET DEVELOPMENT

Approved - *Clostridium difficile (C. difficile) Infection in Adult Inpatients* regional NEW order set

A retrospective chart review done at the University Hospital of Northern BC UHNBC showed that there is a large variation in treatment strategies (including drug, route of admin and duration) within NH. Considering that *C. difficile* infection (CDI) 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 hypervirulant strain of *C. difficile* (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 *C. difficile* infection (CDI).

The mainstay of treatment for most severities is now vancomycin orally, with the exception of: first episode non-severe disease which recommends metronidazole orally first, and fulminant disease which recommends a combination of vancomycin orally and metronidazole IV. There is also the option in

non-severe first episode to change therapy from metronidazole to vancomycin orally if there is no improvement by day four. The order set also contains an order to stop all antidiarrheal and pro-motility agents including laxatives and 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 25, 2020.

Revision/Update – Community Acquired Pneumonia (CAP) in Adults

The AMS committee reviewed recently updated guidelines (IDSA 2019) and reviewed current use of the existing order set within NH. This review lead to revisions being made which include:

- Re-identifying severities as moderate versus severe
- Removed monotherapy moxifloxacin as third regimen for penicillin allergy – instead added cefuroxime IV to moderate severity as an alternative
- Doxycycline is now second line to azithromycin for moderate severity
- Added conjugate vaccine (Prevnar 13) and influenza vaccine
- Removed discharge criteria and added considerations for additional coverage for MRSA and pseudomonas.

Revision – Febrile Neutropenia in Adults

AMS committee is actively updating the order set for Febrile Neutropenia in Adults.

RESEARCH RELATED PROJECTS

Re-design of Allergy/Sensitivity Record

In response to results from a previous Pharmacy Resident research project: Assessing the use of a standardized allergy history questionnaire in patients with a reported penicillin allergy (completed May 2019), a re-design project is underway for the current NH Allergy/Sensitivity Record, including stake-holding opportunities, patient partner involvement and testing of the form prior to implementation. In addition to revising this form, updates to the policy for Allergy Documentation were also addressed including: updating terminology in definitions list, clarifying where in workflow this information is to be gathered and by whom; reinforcement of food allergies including how to capture and communicate; new links provided for more information to end users and reinforcement of avoiding use of free text.

Northern Health Guide to Intravenous Therapy in the Community Setting

Community Intravenous therapy has been a standard of care in many communities over a number of years in Northern Health. However, we have had no regional standardization of this service, nor dedicated clinical supports/expertise to guide this work. This was highlighted in the results from a previous Pharmacy Resident research project “A Gap Analysis of Outpatient Parenteral Antimicrobial Therapy Practices across Northern Health”. In May of 2020 a group of operational leaders and regional leaders came together to discuss this, and an environmental scan occurred which highlighted that in a couple of our larger communities, there was no formal IV therapy outpatient community program. There was a willingness to engage and develop this program at a local level, and a desire to have guidance for this service and recommendations for supplies, human resources, and educational requirements as a standard. There is also a piece of work that is specific to pharmaceutical services, ensuring appropriate orders, and procuring and ensuring medications available for community settings. The work is still underway and includes a guiding framework, eligibility/ screen tool and patient education items.

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

AUDIT & FEEDBACK RECOMMENDATIONS & RESOLUTION RATES

Throughout the 2020/21 fiscal year prospective audit and feedback of antimicrobials was carried out across NH through our clinical pharmacy service with support and mentorship from the AMS program coordinator at UHNBC. Through these antimicrobial reviews, pharmacists resolved over 10, 000 drug therapy problems (DTPs) overall with 26.3% of these specific to antimicrobial therapies. There are a variety of types of antimicrobial therapy problems; Figure 1 displays types of DTPs identified and resolved.

The top three DTPs identified and resolved include:

1. New drug needed and initiated
2. Unnecessary antimicrobial discontinued
3. Dosage too low (includes need for extending duration)

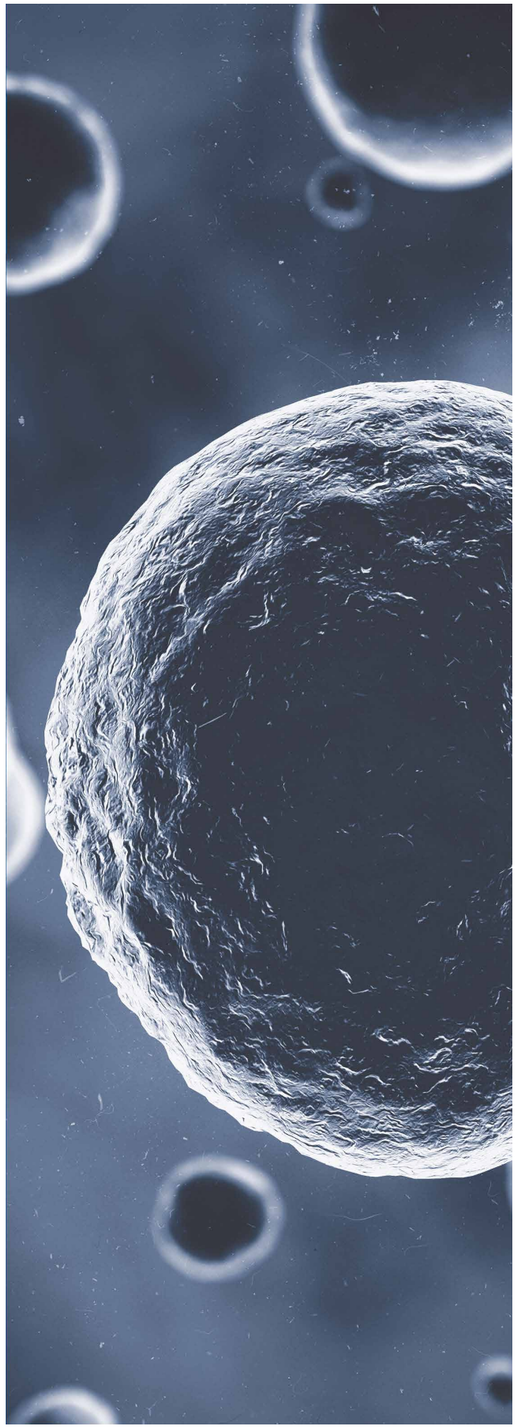
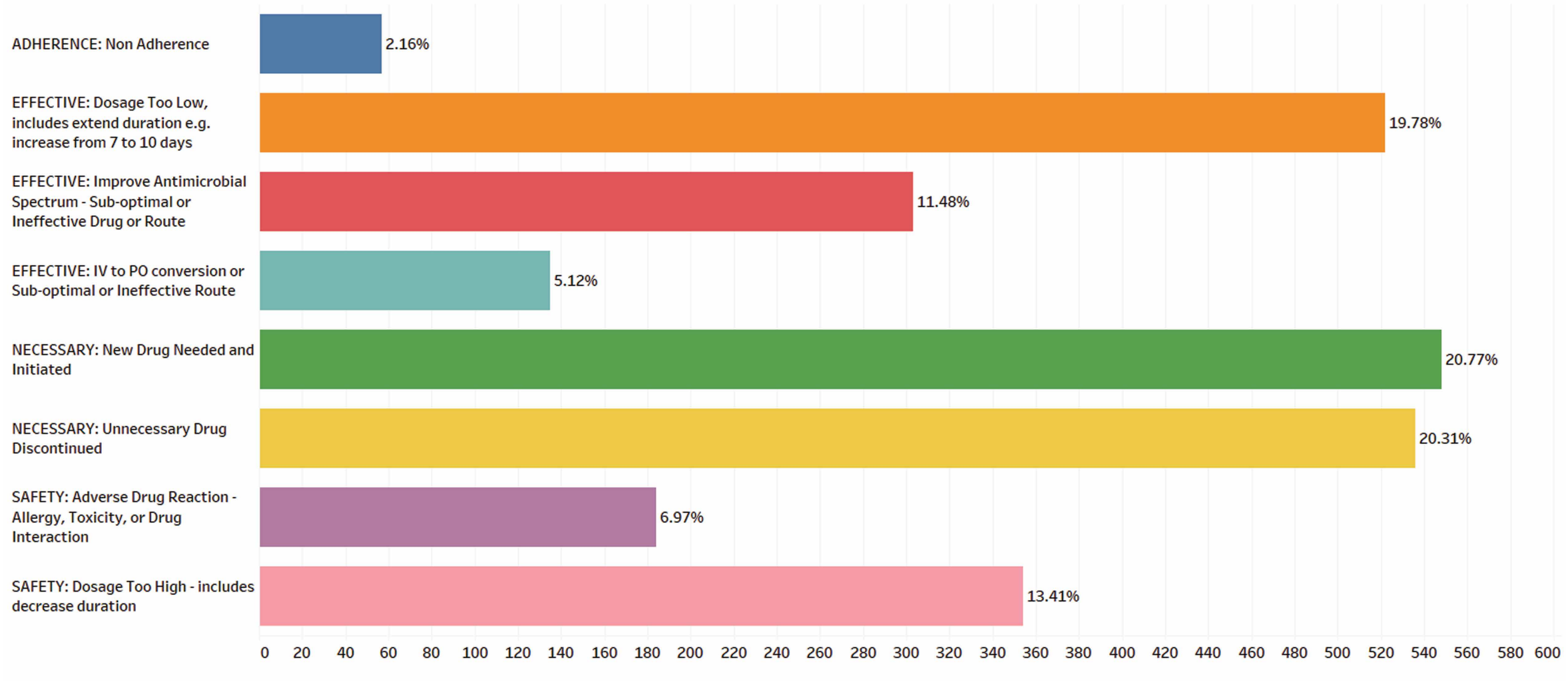


Figure 1: Antimicrobial Drug Therapy Problem (DTP) Types Resolved in FY 2020/21



Data source: Northern Health online Drug Therapy Problem tracker.

Graph prepared by: Planning & Performance Analyst for Medication Management.

OUTCOME & PROCESS MEASURES

ANTIMICROBIAL UTILIZATION & COSTS ACROSS NH

Antibiotic 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 antibiotics, allowing comparisons to be made across different facilities or patient groups (excluding pediatric populations). Table 1 is a summary of the change in usage of all antimicrobials (antibiotics, antifungals and antivirals) compared across fiscal years. Since we have been unable to produce this data for the past few years we have included data as far back as 2018/19. Our current year compared to 2019/20 showed large increases in usage (more than 10% in most of our Health Service Delivery Areas (HSDAs) including UHNBC). This can likely be explained by the effects of the pandemic as it surged to higher levels of infected/ hospitalized patients in the fall of 2020. With the effects of the pandemic tapering off, next fiscal year may be a more accurate picture of typical antimicrobial usage across Northern Health.

In order to investigate where the increases are happening across the health authority we have divided the information from Table 1 further to show individual drug usage in each HSDA as well as all of NH, see Figures 2 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). The increase in usage of ceftriaxone and azithromycin consistently across all HSDAs is not surprising given that they are recommended agents for suspected bacterial pneumonia secondary to COVID-19. With the exception of the Northeast, an increase in piperacillin-tazobactam and vancomycin use is seen, likely due to increase numbers of critically ill patients with extended hospital stays requiring escalation of therapy during the pandemic waves. This could also explain the increase seen in carbapenem use in all HSDAs. In the upcoming next couple of fiscal years with the pandemic status declining the use of these antimicrobials should also come back to match previous years at which point focus can be then be applied to any spikes in use or agents of concern (e.g. broad-spectrum agents etc.).

Table 1: Total Antimicrobial Utilization Year to Year Comparison (DDD/1000 patient days)

HSDA Grouping	FY2019/20 compared to FY2018/19	FY2020/21 compared to FY2019/20
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: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Table prepared by: Planning & Performance 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 are compared per HSDA using the DDD per 1000 patient-days, see Figures 7 to 11. Ideally we would want to see a preference for use of oral agents from this group of therapies. Although this is true for most agents in all HSDAs there are a few mentionable exceptions. Metronidazole IV was used more often in most HSDAs (nearly 50/50 in the Northwest). Considering it is often paired with ciprofloxacin for GI related sources, it is very interesting that oral ciprofloxacin was used preferentially in all HSDAs. Metronidazole is 100% bioavailable therefore if the GI tract is functioning there is very little need for the IV formulation in most cases. Similar arguments can be made with clindamycin where the IV formulation appeared to be preferred (with exception of the Northwest) or used equally as often as the oral formulation despite having 90% bioavailability. There of course may be exceptions to the general rule of IV to PO conversion principles (i.e., necrotizing fasciitis) which is one of the limitations of our current data system in that clinical reasons for use are not easily identified at this time. Azithromycin IV was shown to have higher use compared to oral formulation everywhere except the Northwest. This antimicrobial falls into a category of it's own with respect to defining bioavailability. Azithromycin has a strong affinity for tissue compared to serum and therefore studies to measure bioavailability using serum levels result in a low reported percentage (~37%) however tissue sampling studies show that there are high levels, equivalent to IV dosing, achieved with oral dosing. For this reason the oral formulation should be considered in most cases.

ANTIMICROBIAL COSTS

In the 2019/20 fiscal year, Northern Health experienced an increase in drug costs in all sectors with the exception of Complex Care (Hospital Act beds). The largest increase seems to be attributable to acute inpatient care. Historically antimicrobial costs have remained stable proportionally compared to the total antimicrobial costs at less than 20%. Last fiscal despite a 14% increase in antimicrobial costs, the proportion of total drug cost (which had increased by ~30%) attributable to antimicrobials was only 15% (see Figure 12). Of the top 30 contributing drugs with highest cost, only four were antimicrobials, two of which are high cost per unit items – daptomycin and ertapenem which are traditionally in the higher end of the budget spent in previous years. It appears that the budget increase is largely due to increased use of medications in the critical care setting such as enoxaparin, methylprednisolone, opioid analgesics and propofol.

COVID-19 & VACCINES

The AMS program leads continue to participate in review and distribution of information regarding the management of COVID-19 infected patients within our Health Authority.

Vaccines have been one of the biggest success stories in modern medicine. Thanks to vaccines, we have been able to control and eradicate numerous infectious diseases around the world. We can all help add COVID-19 to the list by getting vaccinated. Vaccines themselves don't save lives, but being vaccinated does and as healthcare providers the general public rely on our information, guidance and encouragement to take this step.

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.

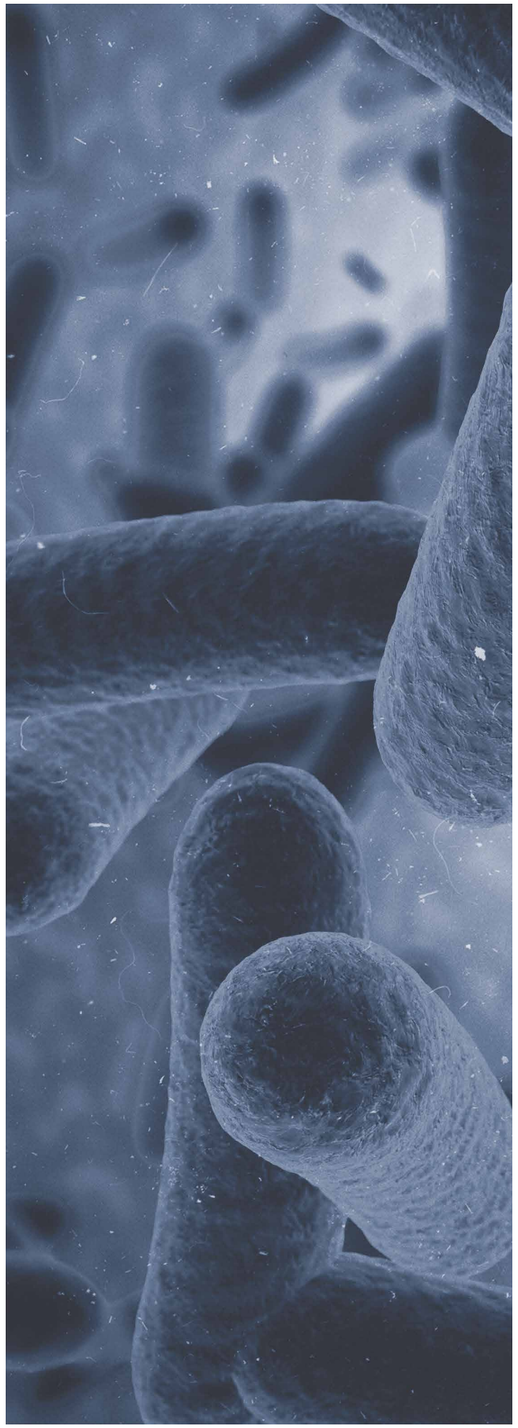
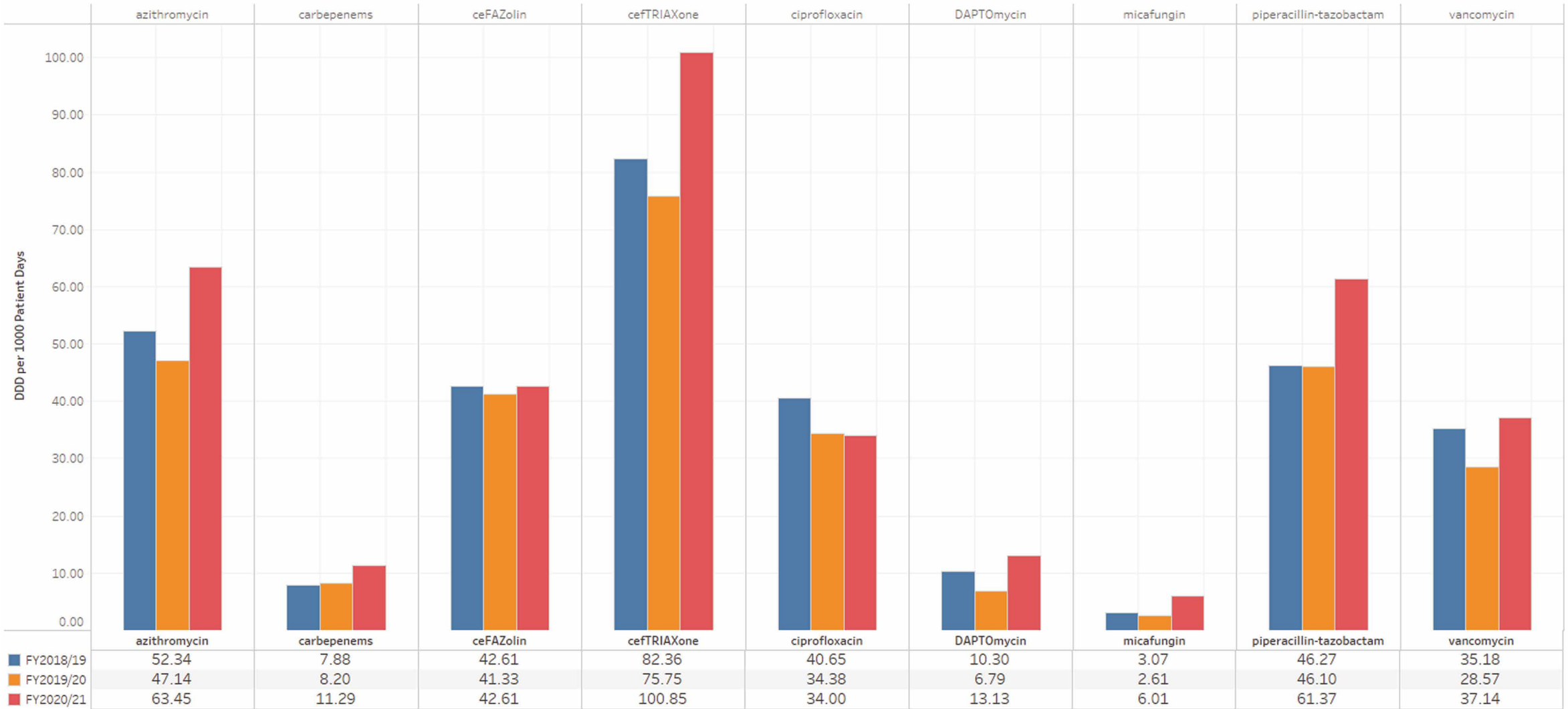


Figure 2: Targeted Antimicrobial Utilization for all NH (DDD/1000 inpatient days)

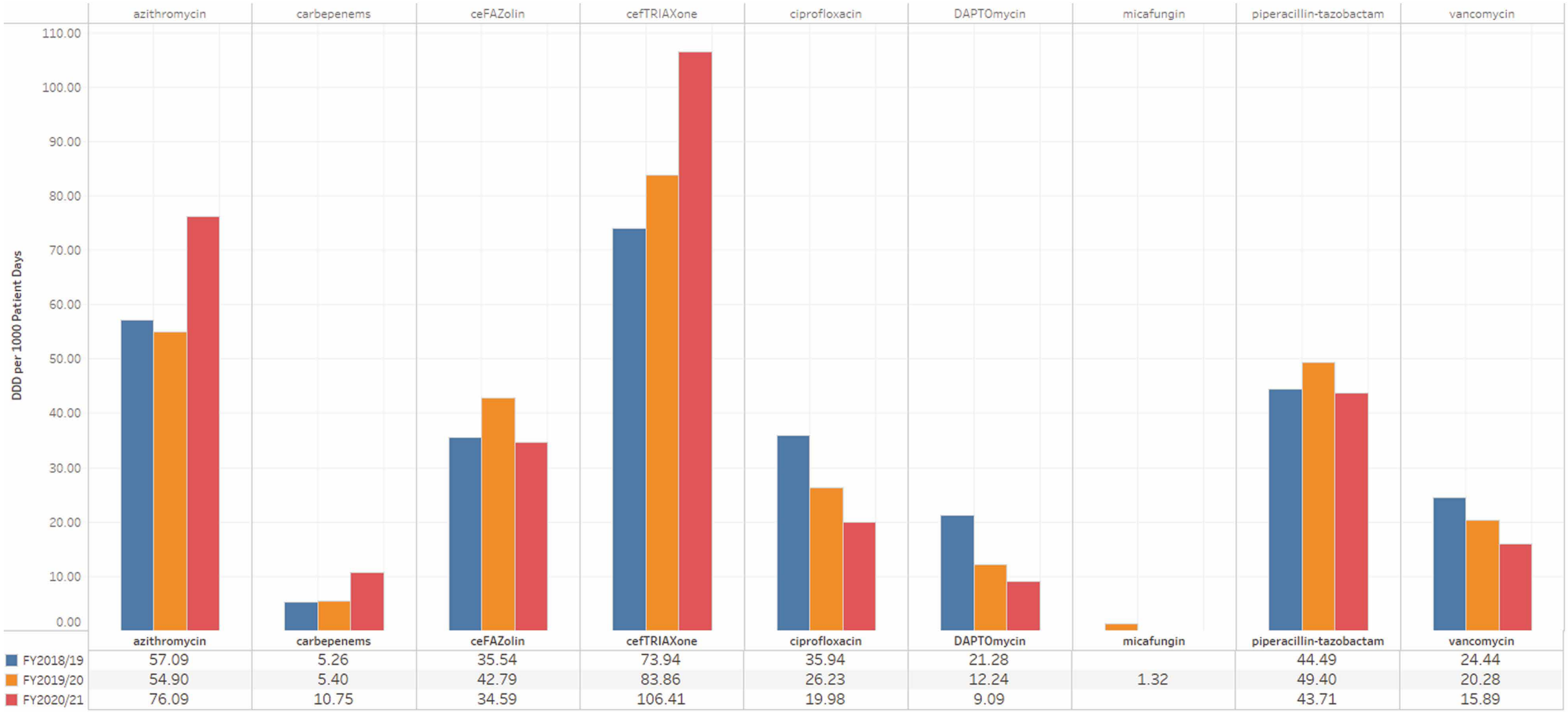


	azithromycin	carbepenems	ceFAZolin	cefTRIAXone	ciprofloxacin	DAPTOmycin	micafungin	piperacillin-tazobactam	vancomycin
FY2018/19	52.34	7.88	42.61	82.36	40.65	10.30	3.07	46.27	35.18
FY2019/20	47.14	8.20	41.33	75.75	34.38	6.79	2.61	46.10	28.57
FY2020/21	63.45	11.29	42.61	100.85	34.00	13.13	6.01	61.37	37.14

Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

Figure 3: Targeted Antimicrobial Utilization for Northeast (DDD/1000 inpatient days)

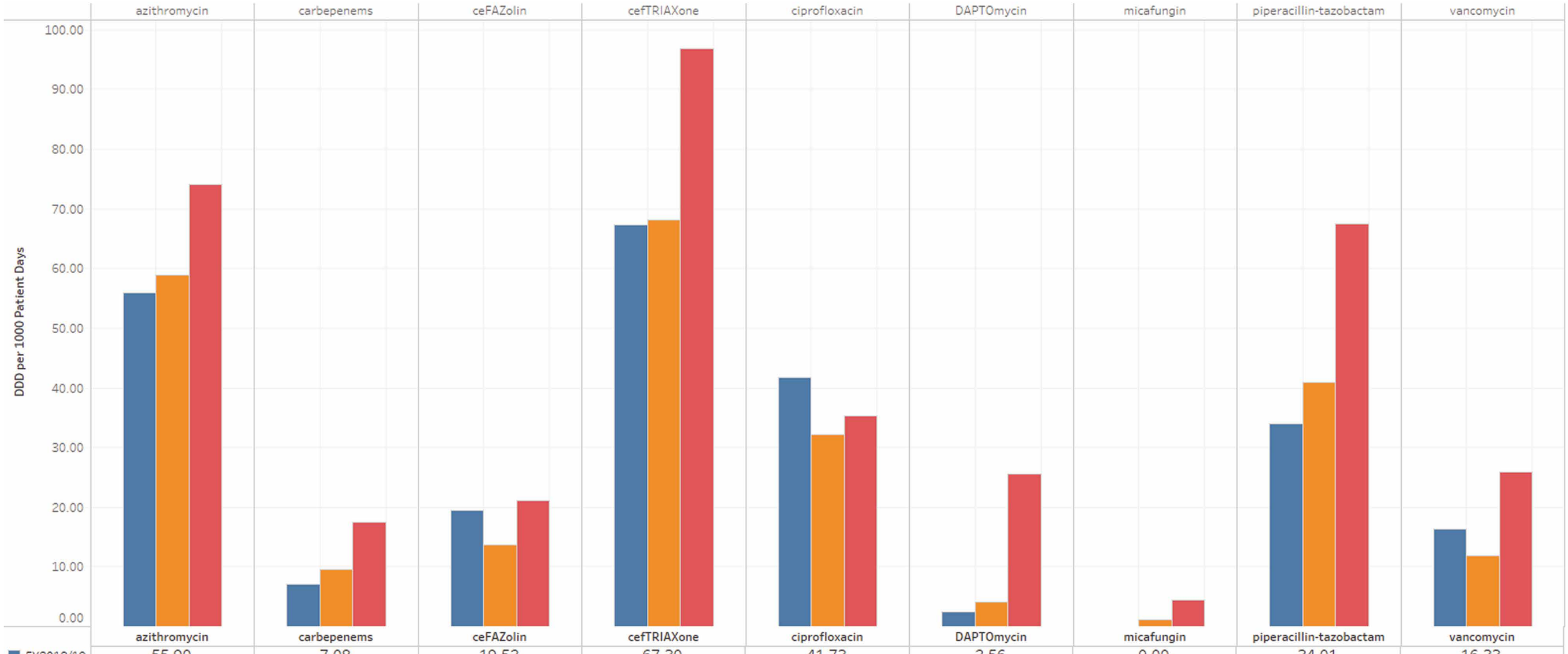


	azithromycin	carbepenems	ceFAZolin	cefTRIAXone	ciprofloxacin	DAPTOmycin	micafungin	piperacillin-tazobactam	vancomycin
FY2018/19	57.09	5.26	35.54	73.94	35.94	21.28		44.49	24.44
FY2019/20	54.90	5.40	42.79	83.86	26.23	12.24	1.32	49.40	20.28
FY2020/21	76.09	10.75	34.59	106.41	19.98	9.09		43.71	15.89

Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

Figure 4: Targeted Antimicrobial Utilization for Northern Interior [excluding UHNBC] (DDD/1000 inpatient days)

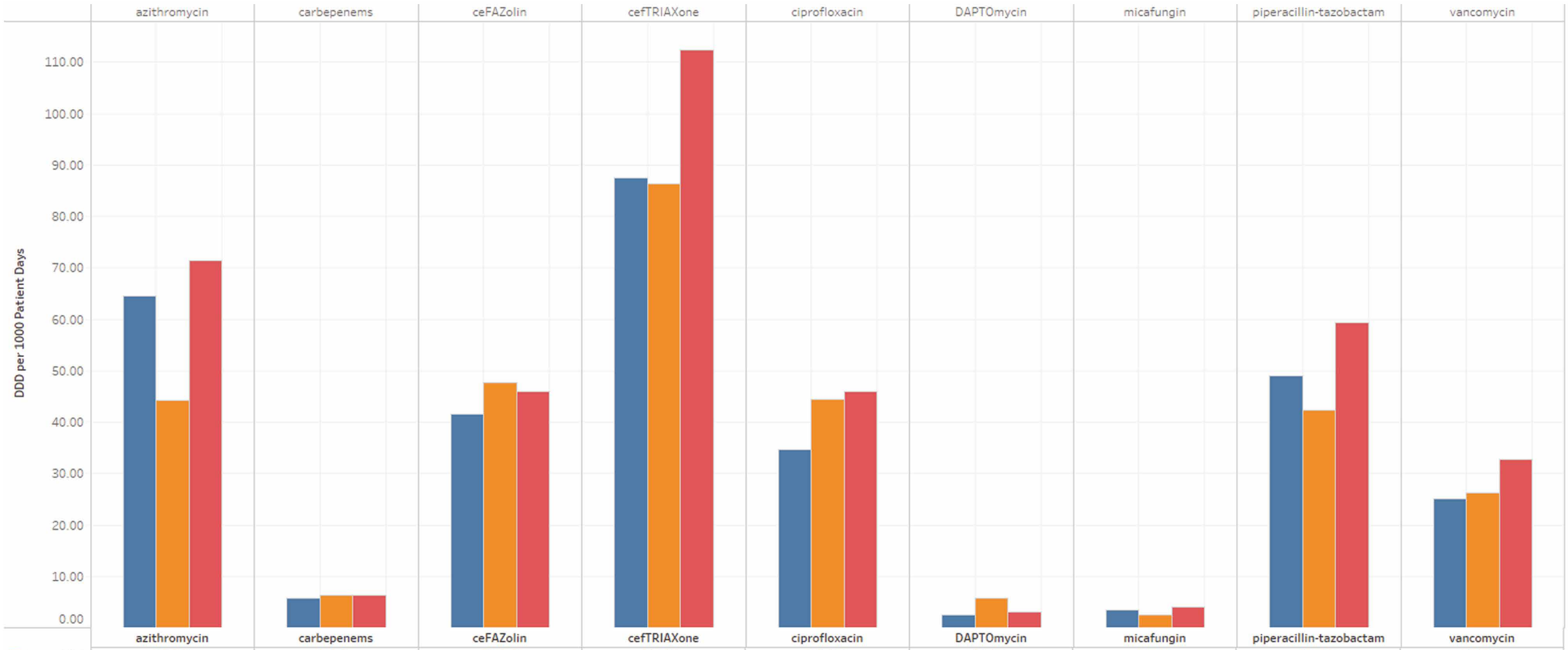


	azithromycin	carbepenems	ceFAZolin	cefTRIAXone	ciprofloxacin	DAPTOmycin	micafungin	piperacillin-tazobactam	vancomycin
FY2018/19	55.90	7.08	19.52	67.30	41.73	2.56	0.00	34.01	16.33
FY2019/20	58.94	9.57	13.67	68.09	32.18	4.14	1.22	40.89	11.86
FY2020/21	74.03	17.44	21.15	96.79	35.35	25.54	4.49	67.50	25.96

Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

Figure 5: Targeted Antimicrobial Utilization for Northwest (DDD/1000 inpatient days)

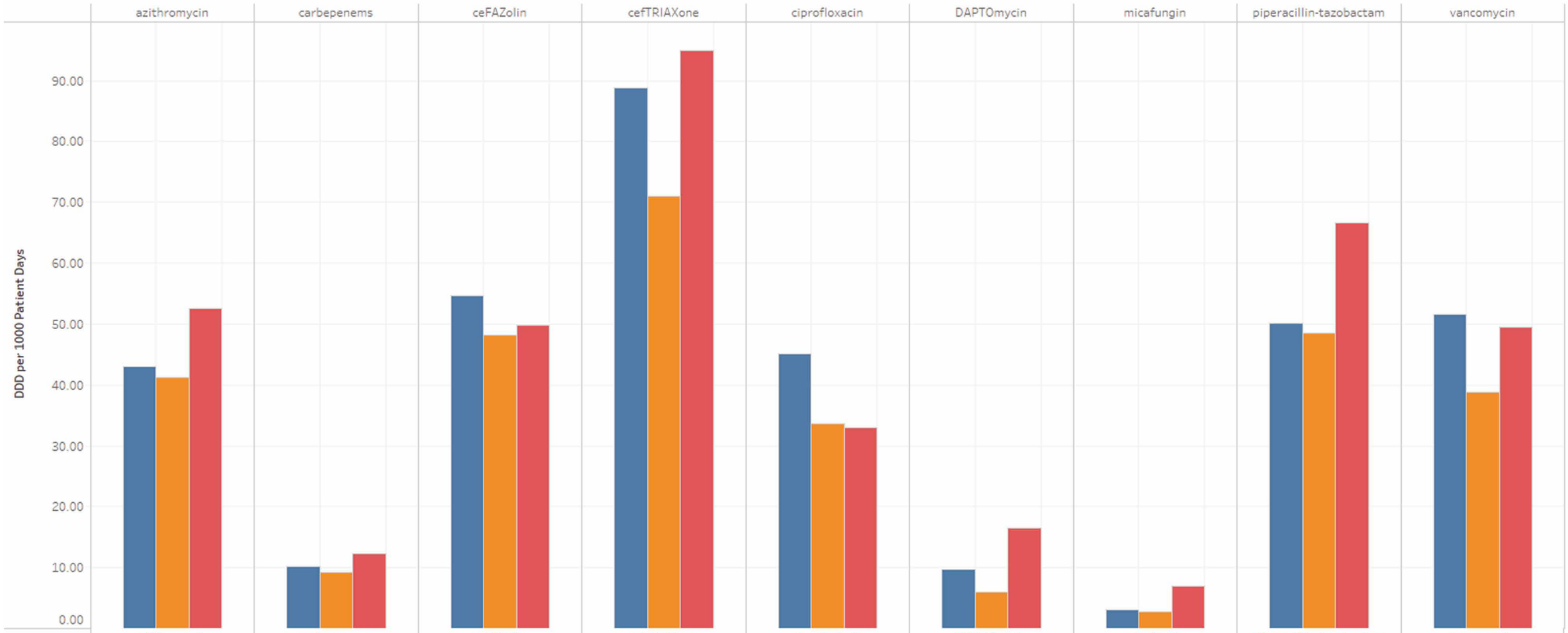


	azithromycin	carbepenems	ceFAZolin	cefTRIAXone	ciprofloxacin	DAPTOmycin	micafungin	piperacillin-tazobactam	vancomycin
FY2018/19	64.52	5.73	41.54	87.51	34.63	2.48	3.37	49.05	25.02
FY2019/20	44.13	6.41	47.65	86.33	44.44	5.65	2.51	42.36	26.29
FY2020/21	71.39	6.38	46.03	112.32	46.03	3.03	4.03	59.44	32.72

Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

Figure 6: Targeted Antimicrobial Utilization for UHNBC (DDD/1000 inpatient days)

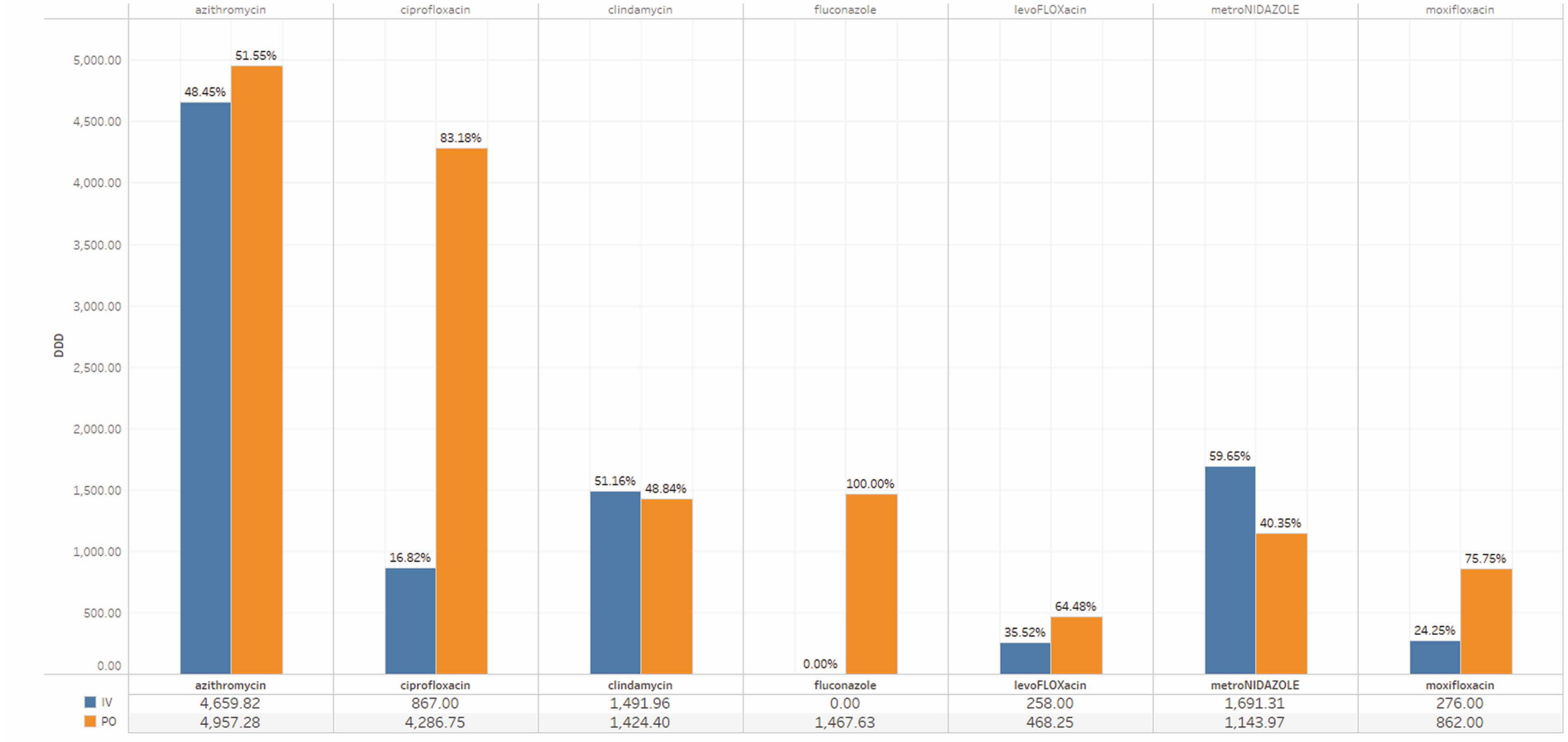


	azithromycin	carbepenems	ceFAZolin	cefTRIAXone	ciprofloxacin	DAPTOmycin	micafungin	piperacillin-tazobactam	vancomycin
FY2018/19	42.98	10.20	54.66	88.81	45.15	9.76	3.09	50.19	51.67
FY2019/20	41.27	9.28	48.27	70.94	33.70	6.00	2.73	48.49	38.81
FY2020/21	52.60	12.32	49.77	94.89	33.05	16.42	6.97	66.63	49.54

Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

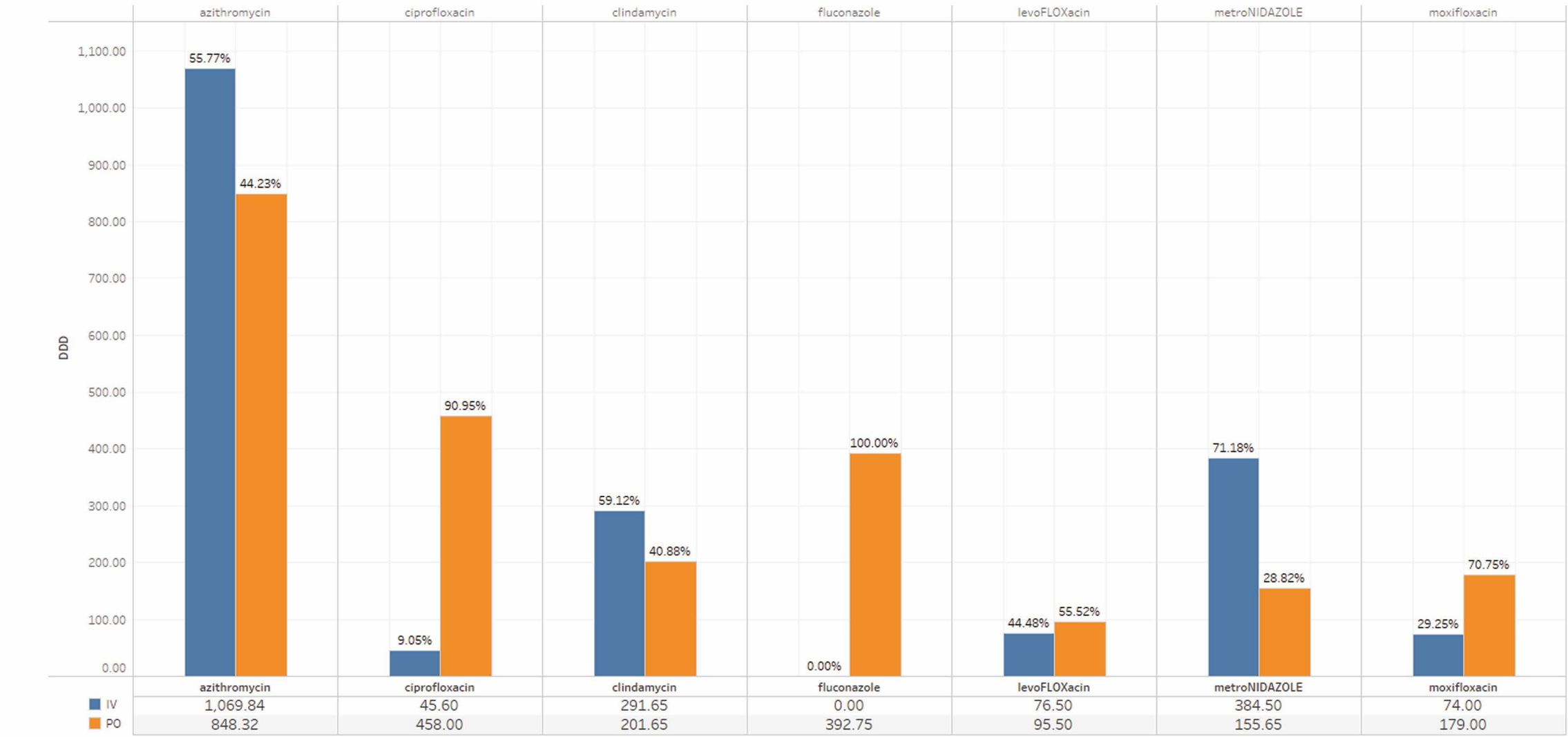
Figure 7: High Bioequivalent Antimicrobials IV versus Oral for all NH (DDD/1000 inpatient days) FY 2020/21



Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

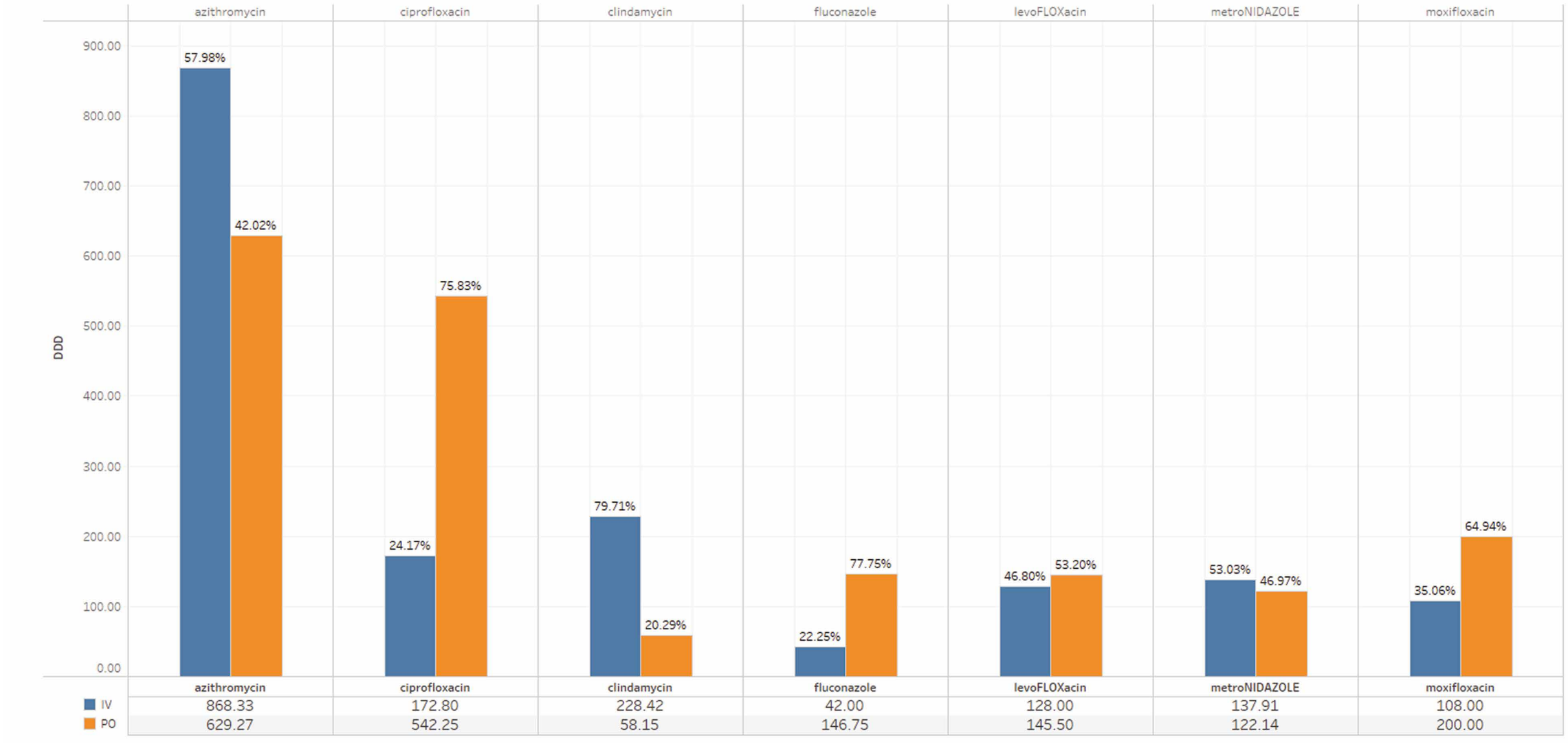
Figure 8: High Bioequivalent Antimicrobials IV versus Oral for Northeast (DDD/1000 inpatient days) FY 2020/21



Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

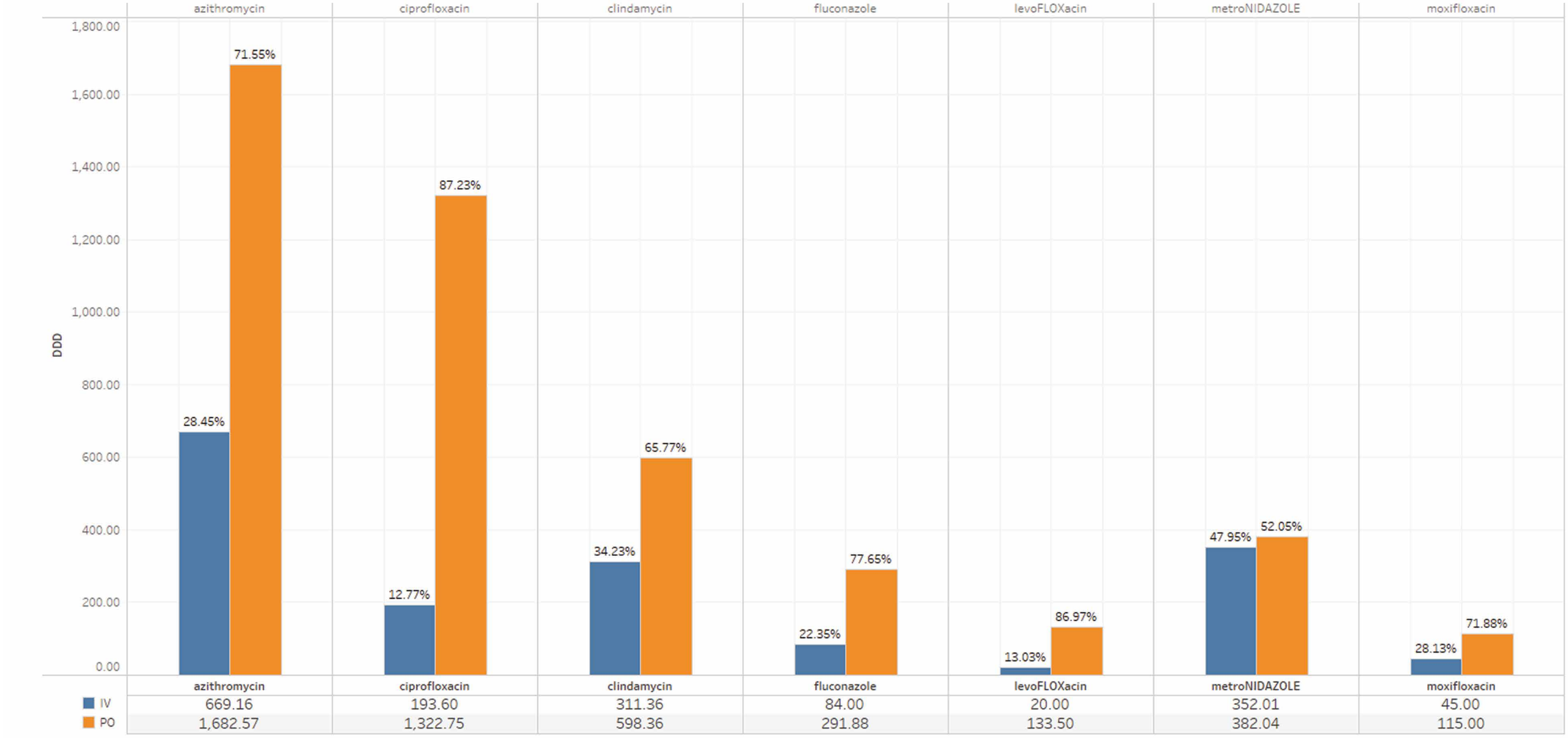
Figure 9: High Bioequivalent Antimicrobials IV versus Oral for Northern Interior [excluding UHNBC] (DDD/1000 inpatient days) FY 2020/21



Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

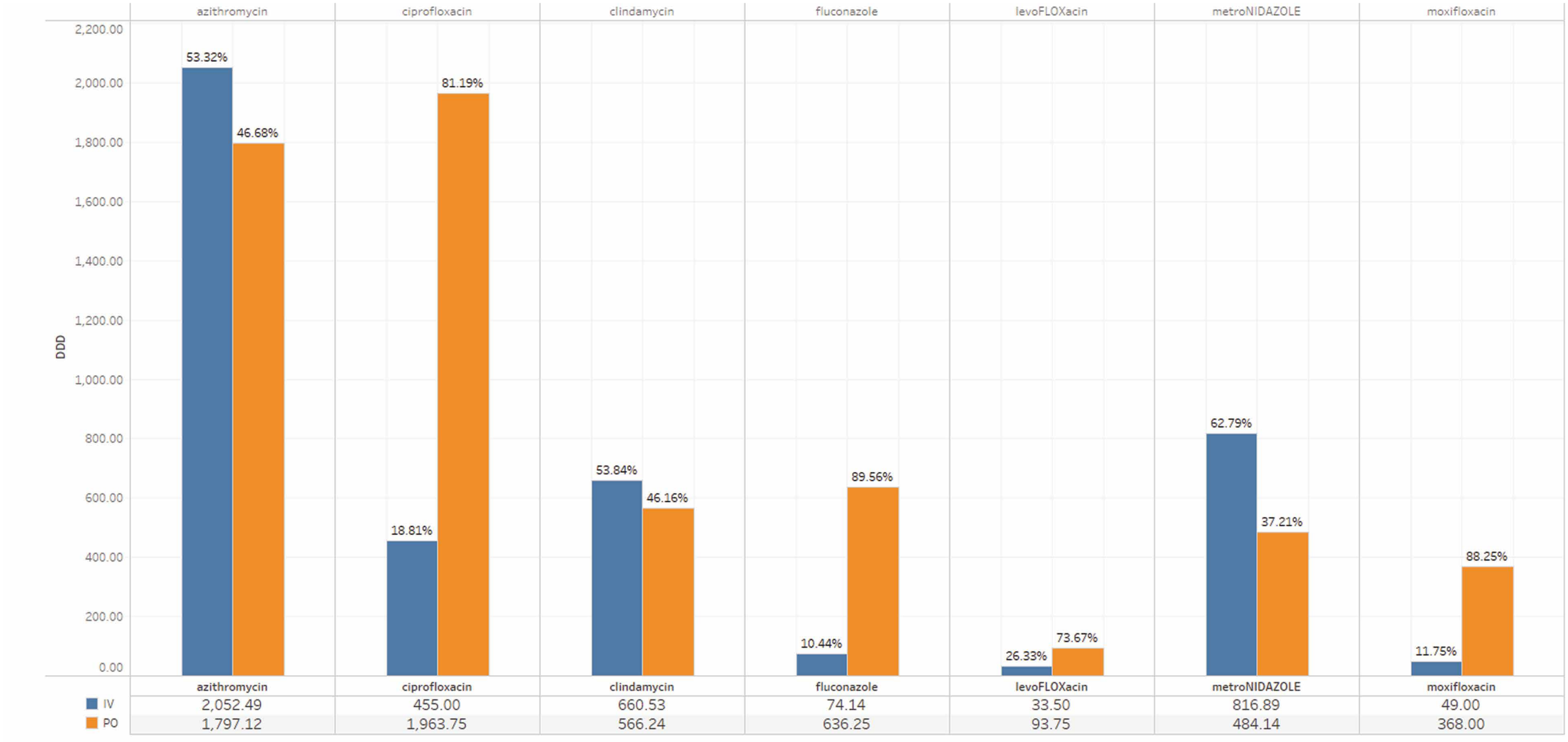
Figure 10: High Bioequivalent Antimicrobials IV versus Oral for Northwest (DDD/1000 inpatient days) FY 2020/21



Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

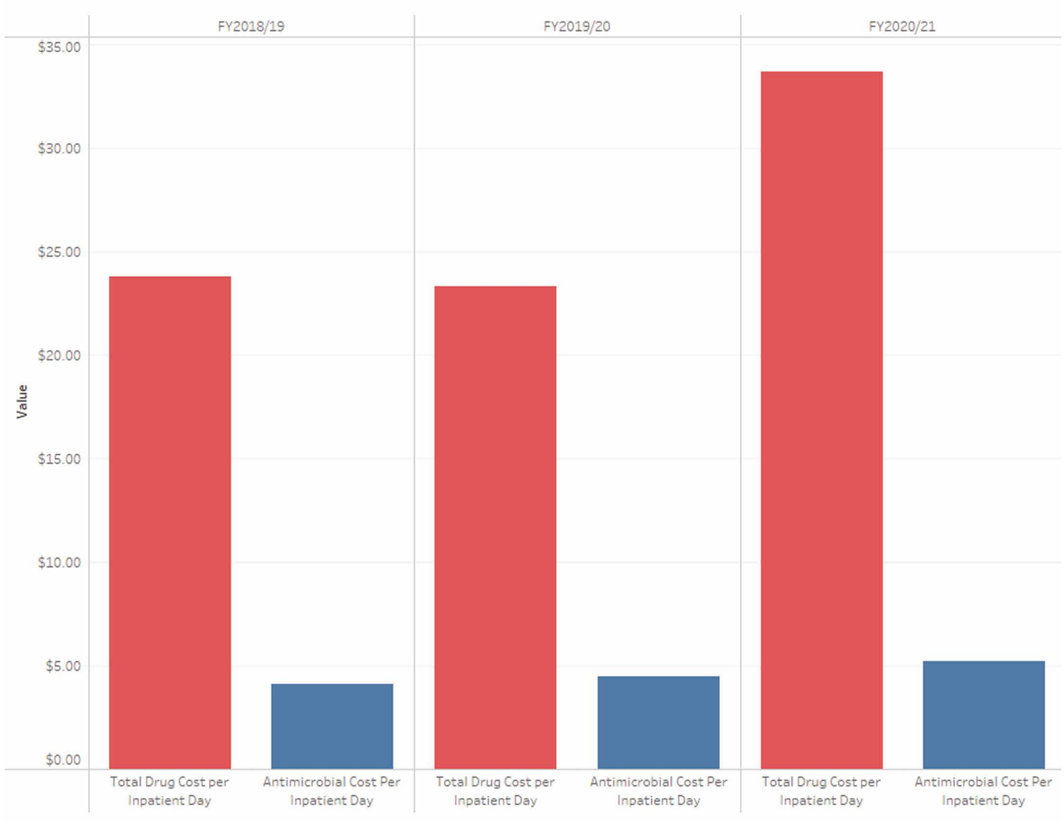
Figure 11: High Bioequivalent Antimicrobials IV versus Oral for UHNBC (DDD/1000 inpatient days) FY 2020/21



Data source: Discern Analytics/AMS Supply Chain (GL) Ward Issues and Credits; AMS Product Dispenses & Selectable Facilities DDD.

Graph prepared by: Planning & Performance Analyst for Medication Management.

Figure 12: Drug Costs per Inpatient Day Total versus Antimicrobials



Data source: Cerner database.

Graph prepared by: Planning & Performance Analyst for Medication Management.

ANTIMICROBIAL STEWARDSHIP PROGRAM TEAM MEMBERS

AMS PROGRAM COORDINATOR (PHARMACIST LEAD)

- Alicia Rahier

AMS PROGRAM/ INFECTION PREVENTION & CONTROL MEDICAL LEAD

- Abu Hamour (NH Infectious Disease Specialist)

AMS SUBCOMMITTEE MEMBERS

- Amy Nunley (Clinical Pharmacy Specialist - NI, currently on leave)
- Andrew Lowe (Pharmacy Manager/Clinical Pharmacist - NE)
- Barb Falkner (Professional Practice Lead Pharmacist)
- Barret Barr (Clinical Pharmacy Specialist - NI, covering for Amy Nunley until end of leave)
- Carey-Anne Lawson (IT - CIS Pharmacist)
- Marlo Lipsett (Regional Clinical Pharmacist)
- Alissa King (Quality Resource Technologist Microbiology, currently on leave)
- Thomas Chen (Quality Resource Technologist Microbiology, covering for Alissa King)
- Debora Giese (CIC - Certified Infection Control - NW)
- Gordon Ling (Clinical Pharmacist - NW)
- Ryan Doerksen (Medication Use Management Pharmacist)
- 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 - Wound, Ostomy & Continence - NI)
- Sandra Vestvik (Chief of Staff MD, BVDH - NW)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