NORTH DAKOTA

ANTIBIOTIC USE AND STEWARDSHIP REPORT

2024

NORTH Dakota Be Legendary. | Health & Human Services

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Introduction

Antimicrobial resistance is a significant public health threat. In the United States, over 2.8 million infections caused by resistant pathogens occur each year, resulting in over 35,000 deaths[1]. In July 2024, the CDC reported a combined 20% increase in six types of antibiotic-resistant hospital-acquired infections during the COVID-19 pandemic, with the rate of these infections remaining above pre-pandemic levels in 2022[1].

Accordingly, antimicrobial stewardship efforts, including data tracking systems, are essential in assessing the burden of resistance and developing strategies to combat it. This antimicrobial use and stewardship report for North Dakota aims to identify and analyze antimicrobial usage in the state. It serves as a guide for creating stewardship opportunities to improve antimicrobial prescribing, optimize patient safety, and prevent the emergence of resistance.

Antibiotic Use in Health Care

OUTPATIENT ANTIBIOTIC PRESCRIBING

North Dakota Health and Human Services has access to outpatient data from IVQIA™ via the CDC, Centers for Medicaid and Medicare (CMS) Part D Public Use Files, and North Dakota Medicaid. Data available thru the National Healthcare Safety Network (NHSN) is also analyzed.

IQVIA™ OUTPATIENT ANTIBIOTIC PRESCRIBING DATA

The Center for Disease Control (CDC) works with IQVIA™, a contract research organization, that tracks outpatient antibiotic prescriptions filled at community pharmacies to provide this information to states. This data does not include prescriptions filled at federal facilities. The information in this section details results from IQVIA™ data.

Since 2019, North Dakotans have continued to receive less outpatient prescriptions than the U.S. overall (Figure 1). From 2019 to 2020, there was a 21.5% decrease in the number of outpatient prescriptions in North Dakota, this is in line with the national trend, which saw a 20% decrease in the first year of the COVID 19 pandemic[2]. In four of the commonly used classes of antibiotics, there were double digit percentage reductions during 2020. However, since 2020, prescribing rates have continually increased every year with an 11.7% increase in 2022. Prescribing rates have not surpassed the pre-pandemic prescribing level (Figure 1) but are creeping closer each year[2]. In 2021, we saw increased prescriptions for cephalosporins (+7.7%) and penicillin (+12%), while fluoroquinolone prescriptions continued to decrease by 10%, and macrolides saw no difference in the number of outpatient prescriptions (Table 1 and Figure 2)[2]. Unfortunately, the pattern of decreased use in these classes did not continue in 2022. Fluroquinolone usage remained the same from 2021 to 2022, but cephalosporins, macrolides, and penicillin all had double digit increases in use (Table 1)[2]. At this time, we do not have a data source that can provide indications for outpatient prescriptions; thus, we are not able to assess appropriateness of these prescriptions and cannot speculate on the reasons for the changes in antibiotic prescribing rates.

Figure 1. Details the change in outpatient antibiotic prescriptions from 2019-2022.

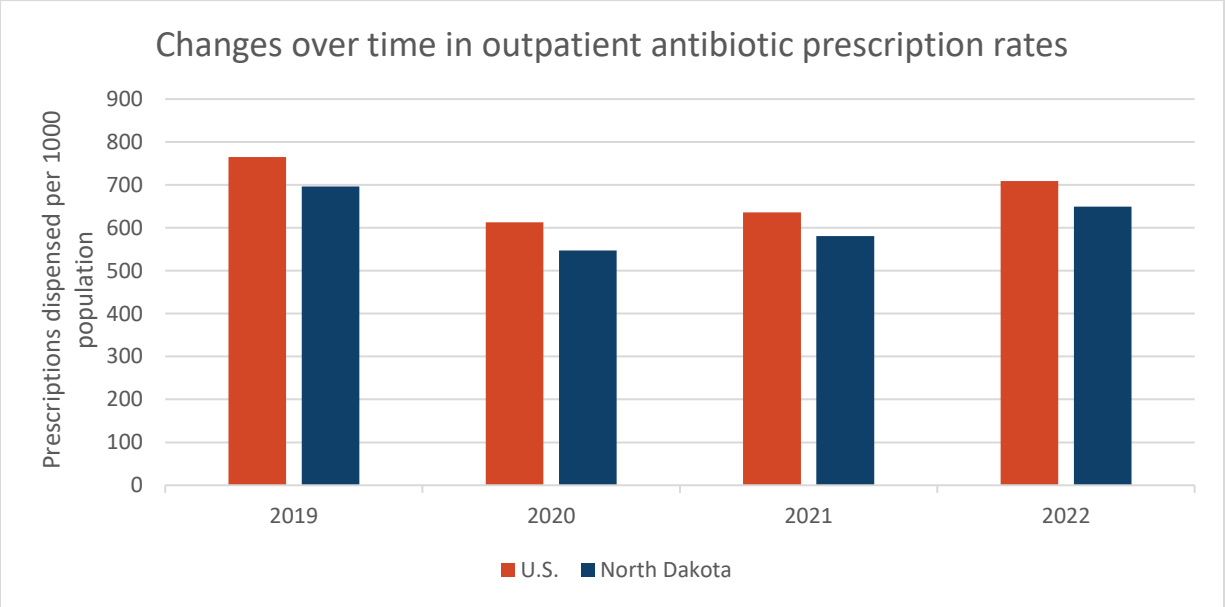
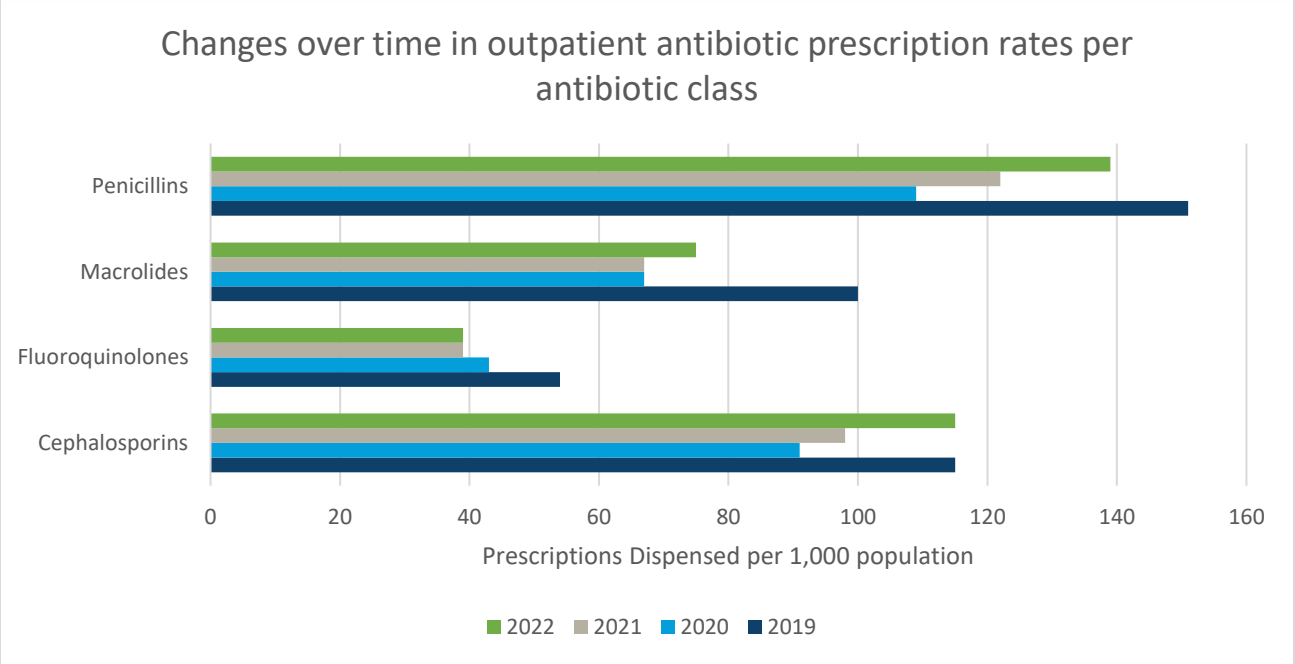


Table 1. North Dakota's outpatient antibiotic rate by drug class and percent changed compared to previous year.

Rate is outpatient antibiotic prescriptions per 1,000 population

Drug Class	2019	2020 Rate (% change)	2021 Rate (% change)	2022 Rate (% change)
All Classes	696	547 (-21.4%)	581 (+6%)	649 (+11.7)
Cephalosporins	115	91 (-20.8%)	98 (+7.7%)	115 (+17.3%)
Fluoroquinolones	54	43 (-20.8%)	39 (-10%)	39 (0%)
Macrolides	100	67 (-33%)	67 (0%)	75 (+11.9)
Penicillin	151	109 (-27.8%)	122 (+12%)	139 (13.9%)

Figure 2: Displays the rate antibiotics where prescribed in North Dakota by antibiotic class



OUTPATIENT ANTIBIOTIC PRESCRIBING FOR MEDICARE BENEFICIARIES

This section summarizes the data from the CMS Medicare Part D Prescriber Public Use Files. These files contain information on prescription drugs provided to Medicare

beneficiaries enrolled in Part D, by physicians and other health care providers. The CMS Medicare Part D files does have a two-year lag period; thus, the most recent data is from 2022. These files show the number of prescribers that have written prescriptions for Medicare beneficiaries, total number of prescriptions, geographic information, prescriber specialty, among other data. In Table 2, data is summarized for high and low volume prescribers in North Dakota for calendar year 2022[3]. The number of Medicare providers increased by 48 providers (2%) in 2022 vs 2021. This also increased the number of antibiotics prescribed to 131,017 which equates to a 10.7% increase in the number of antibiotics prescribed in 2022 to Medicare Part D participants[3]. Both the CDC and medical literature consider high volume prescribers as those that are in the top 10% of total antibiotics prescribed per prescriber[4,5]. In 2022, North Dakota had 189 prescribers in our top 10%, who wrote for 46,702 prescriptions or 36% of the total antibiotic scripts for Medicare Part D beneficiaries.

Table 2. Summary of North Dakota Medicare Beneficiaries antibiotic prescribing in 2022, including all, high, and low-volume prescribers.

Antibiotic Prescribing for North Dakota Beneficiaries	All prescribers who prescribed at least one antibiotic	High Volume Prescribers	Low-Volume Prescribers
Number of prescribers	1893	189	1704
Number of prescription claims (% of total volume)	131,017	46,702 (36%)	84,315 (64%)

When breaking down prescription claims by the specialty of the prescriber, nurse practitioners (NP) had the most prescription claims, followed by family practice providers, physician assistants, and internal medicine providers. Interestingly only 9% of NP's are high-volume prescribers, but they account for almost one-third of all the prescription claims made by NPs. Another interesting point, is out of the family practice providers 18% of providers wrote for half of the antibiotic prescription claims (Table 3)[3]. This data highlights which specialties are writing for antibiotics, but its limitation is that it does not speak to if antibiotics are prescribed appropriately. The data is also limited by the inability to adjust for volume of Medicaid beneficiaries per practice setting.

Although, the data does help determine who is writing for antibiotics and provides specialties antimicrobial stewardship efforts can focus on.

Table 3 High-volume prescribers by specialties in 2022

Specialty	All prescribers claims (n=131,017)	High Volume Prescribers Claims (n=46,702)	% of Claims by High Volume prescribers	Number of high-volume prescribers/Number of prescribers
Family Practice	28,090	14,521	51.7%	55/305 (18%)
Nurse Practitioners	34,737	10,170	29.3%	46/507 (9.1%)
Physician Assistants	16,483	5031	30.5%	22/227 (9.7%)
Internal Medicine	10,062	4963	49.3%	22/113 (19.5%)
Urology	3392	2881	84.9%	9/16 (56.3%)
Others	38,253	9136	23.9%	35/726 (4.8%)

ANTIBIOTIC ADMINISTRATION IN HOSPITALS

NHSN's Antimicrobial Use (AU) Option is used by the CDC to track antimicrobial use in hospitals. In 2024, it became a requirement for hospitals, who partake in CMS's Promoting Interoperability Program, to report their antimicrobial use to NHSN[6]. Within NHSN, hospitals are able to review usage for the whole facility or individual mapped locations within their facilities. The AU module also allows comparison of antimicrobial usage via the standardized antibiotic administration ratio (SAAR). The SAAR is a metric for comparing observed to predicted days of antimicrobial therapy, which is derived by comparing the facility administration rate to a baseline or "expected" administration rate generated from a national dataset. It is adjusted for factors that may affect antibiotic prescribing such as care unit type, teaching hospital status, and pediatric vs adult care. The interpretation of a SAAR value depends on if it is greater or less than one. If the SAAR value is less than one, it indicates fewer antimicrobials were administered than expected, while if the SAAR value is greater than one, there was more antimicrobials administered than expected. The SAAR values allow facilities to compare themselves to similar facilities and to pinpoint units that may be targets for stewardship activities.

The requirement to share AU with NHSN has helped increase the number of facilities reporting at least one month of data from twelve in 2022 to sixteen in 2023. Unfortunately, due to the low number of facilities reporting, NHSN does not have enough data to calculate a Median SAAR value for North Dakota; thus, North Dakota's median SAAR value is unable to be compared to other states and limits the ability to use this metric to guide statewide stewardship efforts. Although, facilities that are reporting to NHSN may compare their SAAR number nationally to other facilities of similar size. SAAR data for the hospitals reporting to NHSN in 2023 is listed in Table 4. The limitation to the SAAR data in this table is it cannot be compared hospital to hospital as bed size ranges from 20 beds to over 350 beds. Facility type is also different (critical access hospitals vs acute care hospitals).

Table 4: 2023 SAAR numbers for hospitals

Facility	2023 SAAR Value
Statewide (16 total hospitals)	0.928
Hospital 1	0.851
Hospital 2	1.01
Hospital 3	0.989
Hospital 4	0.969
Hospital 5	0.875
Hospital 6	0.953
Hospital 7	1.351
Hospital 8	1.293
Hospital 9	0.768
Hospital 10	0.627
Hospital 11	0.962
Hospital 12	0.901
Hospital 13	1.097
Hospital 14	1.006
Hospital 15	0.732
Hospital 16	0.297

** Data was retrieved from NHSN database in September 2024. Access to this data is made possible thru a data use agreement that allows us to look at overall trends and provide data to hospitals if requested. **

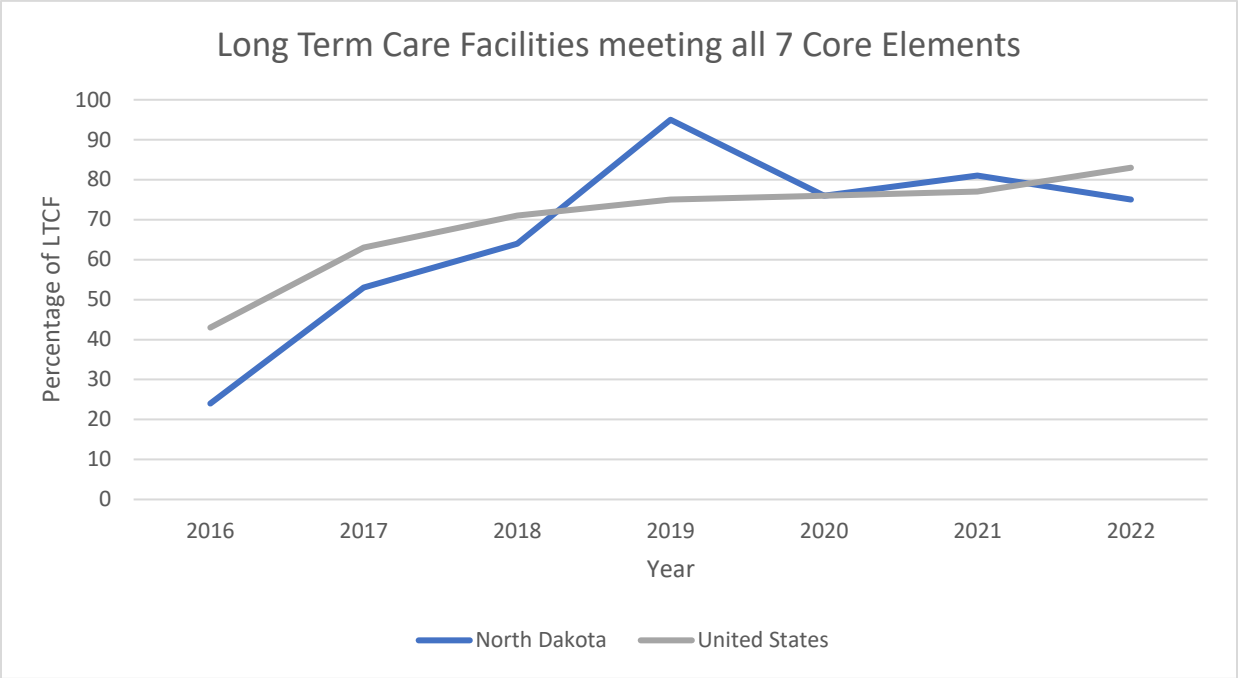
Antibiotic Stewardship

NURSING HOME CORE ELEMENTS OF ANTIBIOTIC STEWARDSHIP

The CDC recommends nursing homes take steps to improve antibiotic prescribing and decrease inappropriate antibiotic use. Studies have shown that 40-75% of antibiotics prescribed in nursing homes may not be needed or are inappropriately prescribed[7]. With an estimated 70% of residents in a nursing home receiving one or more antibiotics when followed over a year[7], increasing stewardship in this setting will help reduce adverse events, prevent emergence of resistance, and most importantly potentially have better outcomes for the residents.

Long Term Care Facilities (LTCF) are able to report core element uptake in their facilities through NHSN. Participation varies by state and the year, thus data in Figure 3 may not represent all LTCFs in United States, but it does provide an estimate of the uptake of Core Elements in LTCFs. In 2016, when the core elements were developed, only 24% of LTCFs in North Dakota reported that they met all seven of the elements, well below the national average. In the years since, we have seen great improvement rising above the national average in 2018 and peaking at 95% in 2019. But since this time, focus has been away from stewardship due to strains the pandemic put on LTCFs thus currently only 75% of LTCFs meet the core elements which is 8% behind the national average[8]. HHS is helping LTCFs refocus on antibiotic stewardship. In 2023, educational webinars, staff education, and educational games were created to put attention back on antimicrobial stewardship.

Figure 3 Percentage of Long-Term Care Facilities self-reporting core element participation

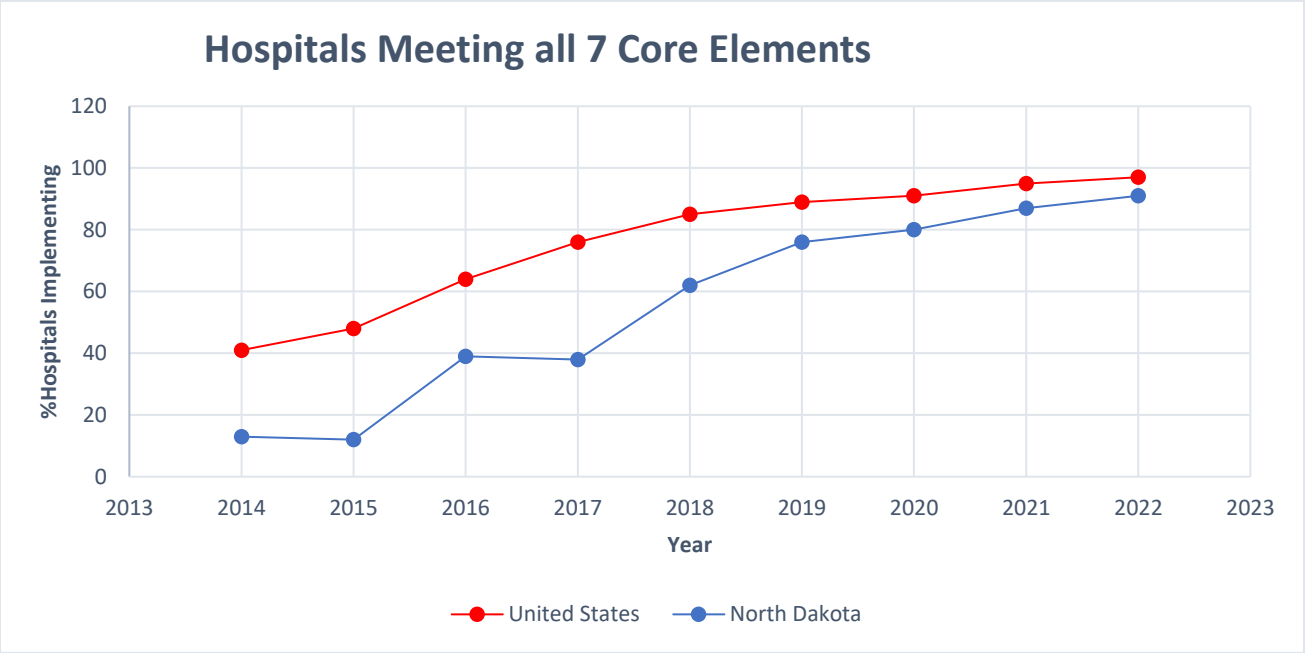


HOSPITAL CORE ELEMENTS OF ANTIBIOTIC STEWARDSHIP

Inappropriate antibiotic use in hospitals plays a significant role in the development of antibiotic resistance. Studies indicate that approximately 30% of antibiotic use in U.S. acute care hospitals is unnecessary or suboptimal[9,10]. In addition, around 20% of hospitalized patients experience serious adverse effects from antibiotics, placing many patients at risk for adverse events without any benefit[11]. Even patients who are not receiving antibiotics can be affected by the spread of resistant organisms and Clostridioides difficile infection within the hospital.

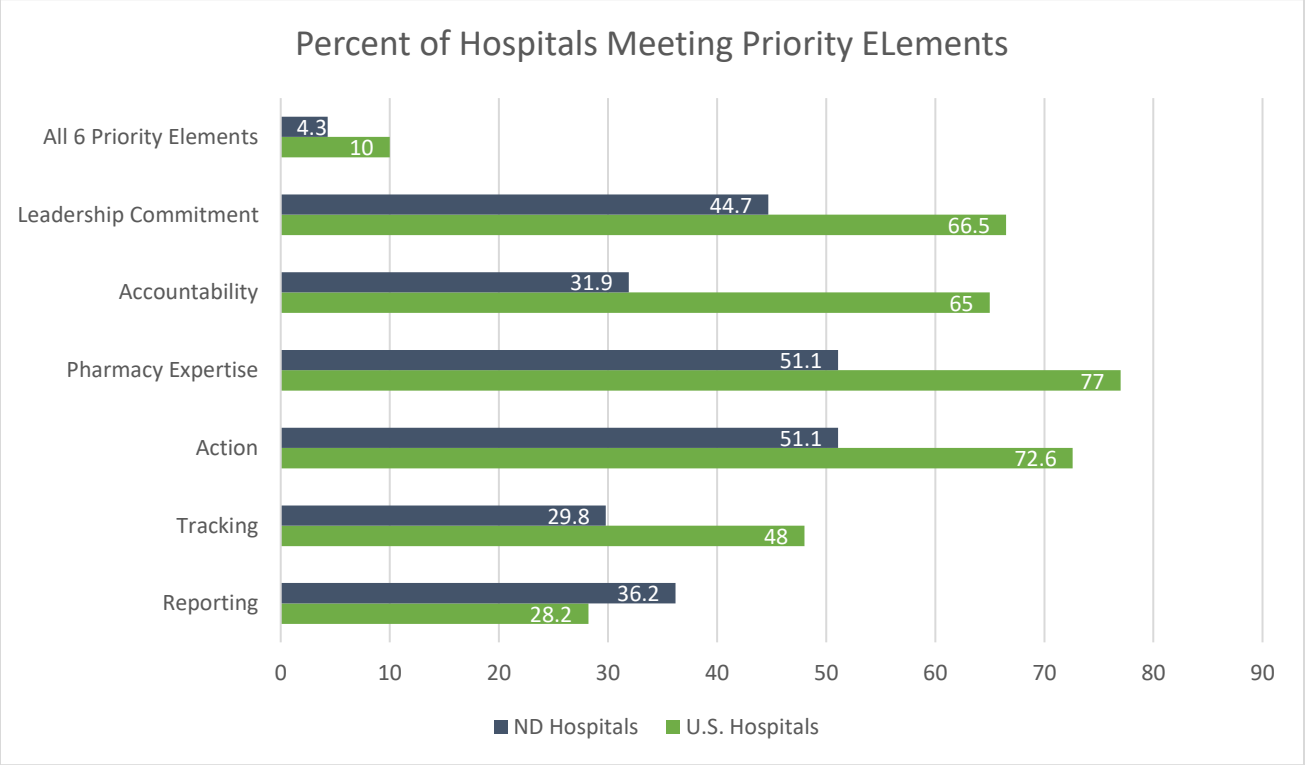
Since 2014 when the CDC developed the seven Core Elements of Antibiotic Stewardship for Hospitals, North Dakota has greatly increased the number of hospitals meeting all seven core elements. In 2022, 91% of the 47 hospitals in North Dakota reported on NHSN's annual survey that they were meeting all of the Core Elements (Figure 4)[8]. North Dakota is still trailing the national average of 97% of hospitals meeting all core elements, but 100% of North Dakota hospitals are meeting the Education element.

Figure 4. Summarizes the number of hospitals meeting the seven Core Elements of Antibiotic Stewardship



To further strengthen antimicrobial stewardship program efforts, the CDC established hospital-specific Priority Elements in 2022, derived from six of the seven Core Elements. In North Dakota, 4.3% of acute care hospitals, only two facilities, reported implementation of all Priority Elements in 2022 (Figure 5). In comparison, 10% of acute care hospitals nationwide have met all six elements[8]. This highlights a promising opportunity for growth of antimicrobial stewardship programs, with the potential to enhance patient outcomes.

Figure 5. Summarizes the percentage of hospitals in North Dakota meeting the Priority Elements of Antibiotic Stewardship



HEALTH DEPARTMENT CORE ELEMENTS OF ANTIBIOTIC STEWARDSHIP

Since the creation of the Core Elements of Antibiotic Stewardship for Health Departments, NDDHHS has been committed to implementing each of the elements. Leadership has committed funds to support antimicrobial stewardship initiatives in North Dakota, which includes continuing with an antimicrobial stewardship lead who is accountable for the program as well as the pharmacy expertise. This program has taken action to create the North Dakota Antimicrobial Stewardship Collaboration, which includes pharmacists and infectious disease physicians from acute care hospitals in the state who are now partnering on stewardship initiatives and share resources to collaboratively improve antimicrobial use within the state.

As for tracking and reporting, HHS stewardship group is now providing SAAR reports to all facilities that report at least one month of antimicrobial use data in NHSN during the time frame of each quarterly report. This has been an excellent source of data that facilities can use to share with their facility's antimicrobial stewardship teams and leadership groups.

For education, this year the HHS stewardship group created "The Antimicrobial Stewardship Game", which is available on the HHS Infection Prevention webpage for facilities to easily access and use as an educational tool for staff. The antimicrobial stewardship lead has done educational sessions at several skilled nursing facilities in the state utilizing this tool. HHS also created both paper and digital brochures to educate patients, families, and health care workers on antimicrobial stewardship and urinary track infections. The digital brochures are available in English and Spanish. They have been delivered to many long-term care facilities throughout North Dakota for use. Educational webinars have been given at numerous health care conferences again this year and a four-part webinar series "Urban to Rural Partners: Working Together on Antimicrobial Stewardship" offering free continuing education credits for nurses and pharmacists has been completed. The webinar series is available on NDSU's Center for Collaboration and Advancement in Pharmacy's website. This website also has links to short videos called "Antibiotic Answers", which is a collection of videos answering questions regarding antibiotics. Also, this year funding was provided to 18 pharmacists to complete the Society of Infectious Disease Antimicrobial Stewardship certification program, which requires the participant to initiate a stewardship project at a facility within the state.

HHS is continuing to highlight the strong antimicrobial stewardship work by facilities through the North Dakota Honor Roll. In 2023, we had eight hospitals and 11 nursing homes be awarded honor roll status. We are hoping to expand our honor roll this year to really highlight the antimicrobial stewardship work going on across the state.

OPPORTUNITIES FOR STEWARDSHIP GROWTH

Even with the great work being done within North Dakota on stewardship, we strive to continue to make antimicrobial use even better. Areas both the state and facilities can improve upon are:

State level:

- Increasing technical assistance to facilities with data entry into NHSN
- Providing educational opportunities to high volume prescribers and encourage facilities to provide feedback to antimicrobial prescribers
- Obtaining quantitative and qualitative data on all outpatient antimicrobial prescriptions to explore prescribing in relation to diagnosis and health equity.
- Disseminating educational materials to increase the public's and health care professionals' awareness of responsible antimicrobial use

Facility level:

- Identifying a target to reduce antimicrobial use (i.e., reducing prescriptions for asymptomatic bacteriuria, reducing fluoroquinolone use, appropriate duration of antibiotics for community acquired pneumonia)
- Promote collaboration and communication with antibiotic stewardship teams and participate in collaboratives to share information and best practices with other facilities
- Provide feedback to providers on antimicrobial prescribing highlighting priority conditions

Summary

Improving antibiotic prescribing is a national priority to help prevent the emergence of resistance. By utilizing prescribing data from CMS's Medicare Part D prescribing files and IQVIA™, HHS is able to develop targeted stewardship interventions within the state and track if interventions are changing the number of prescriptions written. Unfortunately, these databases do not give the indication for antibiotics which is a major limitation for targeted stewardship interventions.

HHS's commitment to antimicrobial stewardship through the SIDP certification course has improved the uptake of the core elements of antimicrobial stewardship in both hospitals and LTCFs in the state over the years. We have gone from 13% of hospitals meeting all core elements in 2014 to 91% self-reporting all elements are being met in 2022, with 100% meeting the education element[8]. HHS will continue to work with facilities to achieve 100% of North Dakota's hospitals meeting all core elements, but has also transitioned to focusing on going beyond the core elements to implementing the priority elements in all hospitals. North Dakota is lagging the nation in all of the priority elements.

Even though in North Dakota we are seeing more providers writing for more antibiotics and we are lagging the nation in priority elements, we need to recognize there are limitations to the data in this report. First, there may be errors and/or biases due to self-reporting. While respondents to NHSN Annual Hospital Survey are encouraged to consult facility experts, the accuracy of response may have been influenced by the level of local antimicrobial stewardship expertise in the facilities. The accuracy of antimicrobial stewardship self-report has not been accessed in North Dakota. Secondly, the data does not indicate the quality or scope of reported antimicrobial stewardship practices. HHS

will continue to work with facilities to assure high quality and effective antimicrobial stewardship in North Dakota.

The department will use the information from this report to support increases in the prevalence of hospitals adopting the priority core elements of antimicrobial stewardship. The goal in North Dakota is to have all hospitals implement all core elements of antimicrobial stewardship and greatly increase the number of hospitals that have implemented all priority elements in the coming year. Antibiotic use data is essential to successful stewardship programs. HHS will continue to evaluate mechanisms for supporting collection, interpretation, and application of antibiotic use data through NHSN's Antibiotic Use and Resistance Module and collaboration with partners within the state.

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