

The Impact of Antibiotic Stewardship Measures and of COVID-19 on In-Hospital Use of Broad Spectrum Antimicrobials in St. John’s

Objective

To determine (a) rates of antimicrobial use (AMU) at the Health Sciences Centre (HSC) and at St. Clare’s Mercy Hospital (SCM) in 2019 and 2020, (b) whether COVID-19 was associated with changes in AMU, and (c) whether broad spectrum AMU rates improved in association with antibiotic stewardship.

Practice Points

1. Antimicrobial resistance causes 5,400 deaths and a loss of \$2 billion annually in Canada, and is increasing. Antimicrobial resistance is created by AMU.

NL has the highest rate of AMU in Canada. A large proportion of AMU is unnecessary and can be reduced without harming patient outcomes.

Antimicrobial stewardship reduces AMU by stopping unnecessary prescriptions, narrowing antimicrobial spectrum, and reducing treatment duration.

2. Ten per cent of AMU in Canada occurs in hospitals. AMU among inpatients in Canada is increasing. In 2018, Canadian hospitals purchased 652 Defined Daily Doses (DDD)/1,000 patient days.
3. Local inpatient antimicrobial stewardship interventions include the Spectrum™ decision support application, and prospective audit and feedback of prescriptions for broad spectrum antimicrobials (carbapenems and piperacillin/tazobactam) at day three of prescription.

Data (PI: Dr. P. Daley)

AMU was collected using Pyxis automated dispensing system for the HSC and for SCM from 1 Jan 2019 – 30 Dec 2020.

Although first cases of COVID-19 in EH were reported on 16 Mar 2020, for this analysis we consider the pre-COVID-19 period to be the first three months of 2020 and during COVID-19 the following nine months.

The Spectrum Decision support app was introduced in Feb 2019.

From 1 Feb to 22 Sept 2020, 373 written recommendations were made by infectious diseases physicians, as part of a program to reduce broad spectrum AMU.

Results

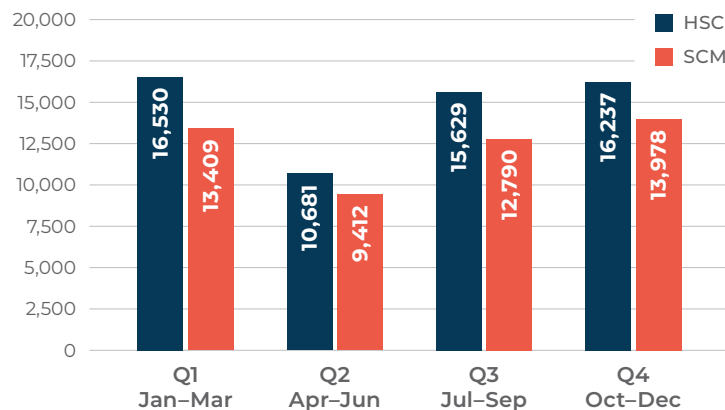


Figure 1. Patient Days/Quarter in 2020 at HSC and SCM

- During the first three months of COVID-19, patient days decreased by 35% at HSC and by 30% at SCM; during the second three months, the reductions were 5.5% and 4.6%, respectively.

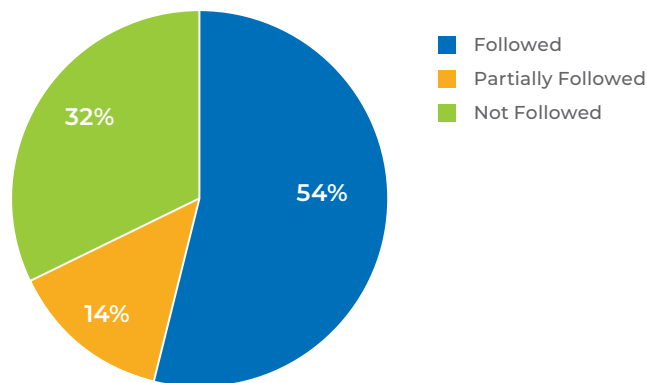


Figure 2. Adherence to Recommendations Made During Audit and Feedback for Broad Spectrum Antibiotics in 2020

- Of 373 prescriptions for piperacillin-tazobactam or carbapenems, 201 of recommendations were followed, 51 partially followed, and 121 were not followed.
- Any compliance with the audit and feedback reduced duration of target antibiotic treatment (piperacillin-tazobactam or carbapenems) from 6.2 to 2.5 days ($p < 0.001$).

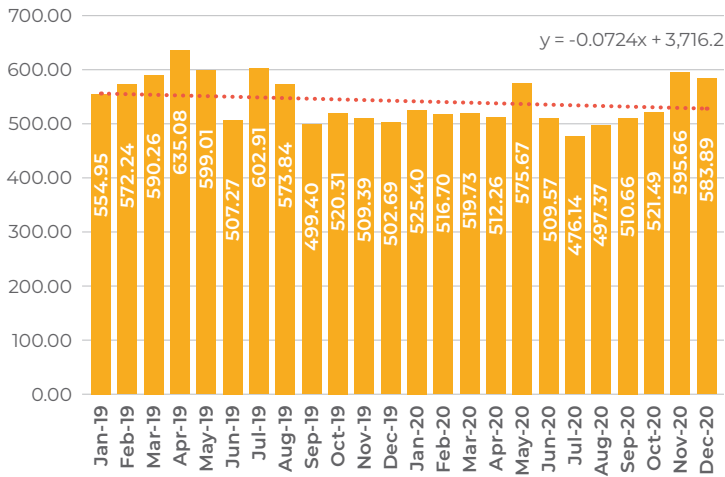


Figure 3. DDD/1,000 Patient Days of All AMU for Both HSC and SCM for 2019 and 2020

- DDD/1,000 patient days for all AMU in the St. John’s hospitals was 555.6 in 2019 and 528.7 in 2020, a 4.8% reduction.

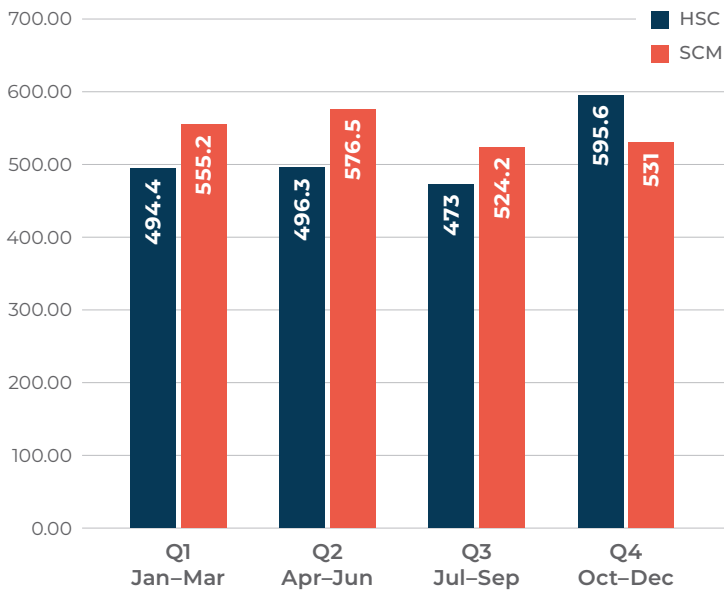


Figure 4. DDD/1,000 Patient Days of All AMU at HSC and SCM Separately for Each Quarter in 2020

- COVID-19 had little impact on total AMU rate: Q1 – 524.8 vs. Q2 – 536.4.
- AMU rate was higher at SCM than at HSC during 2020 (546.7 vs. 514.8).

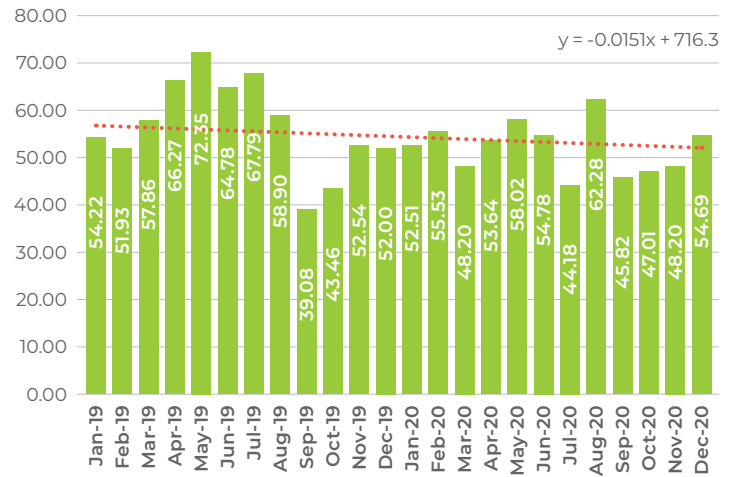


Figure 5. DDD/1,000 Patient Days of Piperacillin-Tazobactam at Both HSC and SCM for 2019 and 2020

- DDD/1,000 patient days for piperacillin-tazobactam in 2019 was 56.77, compared to 52.07 in 2020, a reduction of 8%.

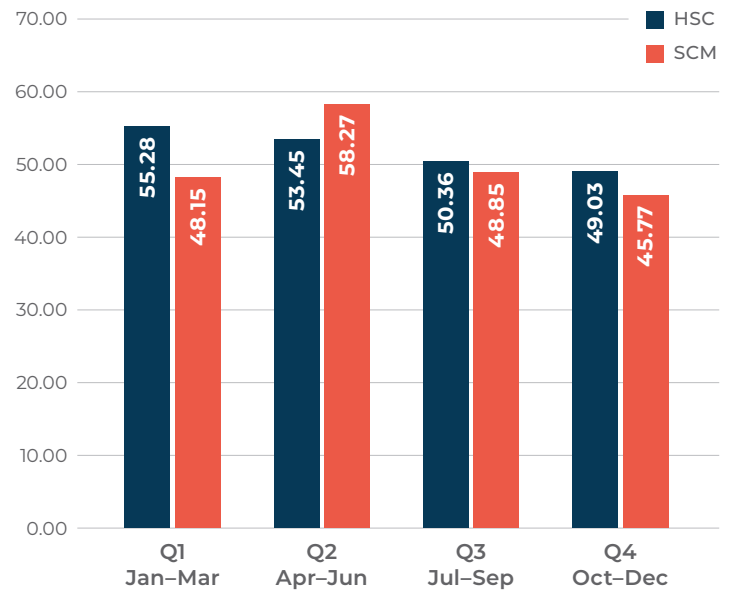


Figure 6. DDD/1,000 Patient Days of Piperacillin-Tazobactam for HSC and SCM Separately for Each Quarter of 2020

- Piperacillin-tazobactam rate went up in the first three months of COVID-19: Q1 rate 51.72 vs. Q2 rate 55.86.
- DDD for piperacillin-tazobactam was 50.26 at SCM and 52.03 at HSC in 2020.

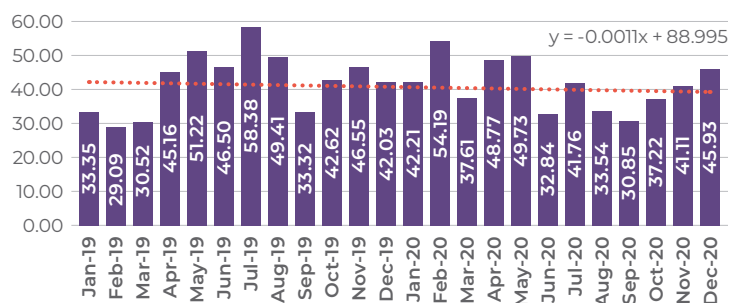


Figure 7. DDD/1,000 Patient Days of Glycopeptides at Both HSC and SCM for 2019 and 2020

- The DDD for glycopeptides was 42.34 in 2019 and 39.06 in 2020, a reduction of 7.7%.

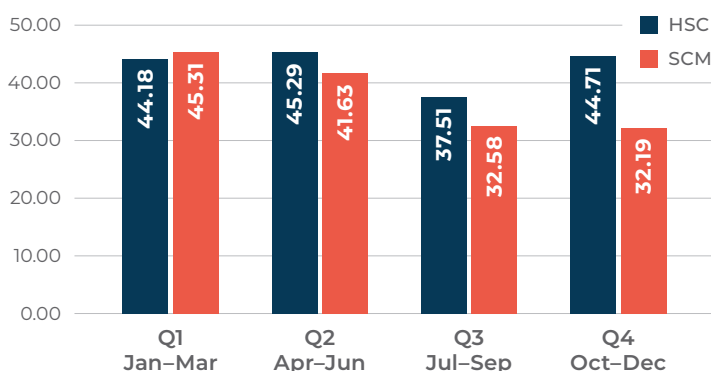


Figure 8. DDD of Glycopeptides for HSC and SCM Separately in Each Quarter of 2020

- During COVID-19, there was little impact on glycopeptide rate: Q1-44.75 vs. Q2-43.46.
- Use of glycopeptides was 13.2% higher at HSC, compared to SCM (DDD/1,000 patient days was 37.93 vs. 42.92).

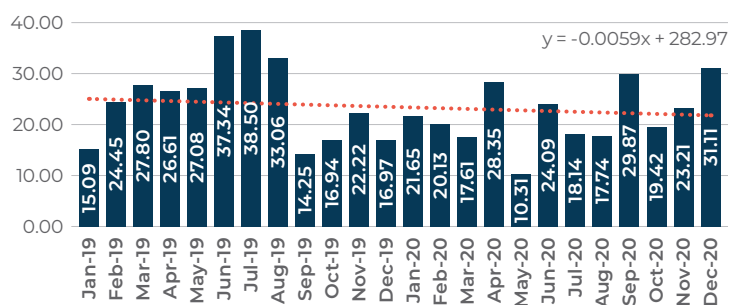


Figure 9. DDD/1,000 Patient Days of Carbapenems at Both HSC and SCM for 2019 and 2020

- DDD/1,000 patient days for carbapenems in 2019 was 25.03, and in 2020 it was 21.80, a reduction of 12.9%.

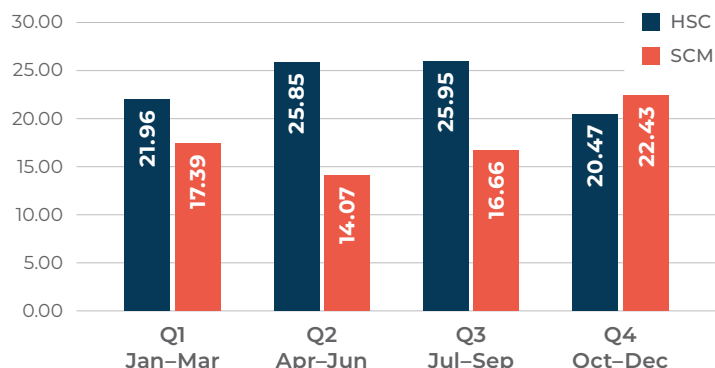


Figure 10. DDD/1,000 Patient Days of Carbapenems in HSC and SCM Separately in Each Quarter of 2020

- During COVID-19, there was little impact on carbapenem rate: Q1-19.68 vs. Q2-19.96.
- Carbapenem use was 33.6% higher at HSC than at SCM (17.64 vs. 23.56).

Conclusions

- Despite COVID-19 with the consequent reduction of in-hospital patient days and disproportionate reduction in surgery, there was little impact on total or broad spectrum AMU rate.
- Audit and feedback on broad spectrum antibiotic use resulted in adherence to recommendations made by infectious disease physicians in two of every three prescriptions and a consequent reduction in duration of piperacillin-tazobactam/carbapenems use.
- Comparing 2020 to 2019, total AMU rate was reduced by 4.8%, with bigger reductions in broad spectrum AMU (piperacillin-tazobactam, glycopeptide and carbapenems reductions of 8%, 7.7% and 12.9%, respectively).
- Comparing SCM to HSC in 2020, total AMU rate was higher but rates of broad spectrum antibiotics were lower. Rates of piperacillin-tazobactam were just 3.5% higher at HSC, but rates for glycopeptides were 13.2% higher and for carbapenems 33.6% higher. Whether these differences reflect a different patient mix is uncertain.