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Research Brief

Resourcing for hospital antibiotic stewardship programs is associated with higher participation in antimicrobial use tracking: a cross-sectional study

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Background

Measuring outcomes is a core element of hospital antimicrobial stewardship programs (ASPs). Antimicrobial use (AMU) is an important metric to determine the extent to which ASPs meet their objectives. Further, sharing these utilization data with prescribers and hospital leadership is necessary to motivate improvements in prescribing and secure adequate program resources.

Reporting AMU data to central organizations (eg, regional and national public health departments) helps to describe the broader regional trends in AMU and facilitate inter-facility benchmarking. Although acute care and critical access hospital submission of AMU is now mandatory according to the US Centers for Medicare and Medicaid Services, reporting remains voluntary in many other countries.[1] Without a mandate for reporting, there is a risk of inequitable participation whereby only hospitals with the most resources are able to collect, measure, and compare their AMU to other facilities.

Hospital ASP resourcing varies significantly,[2] and the presence of designated funding and resources is associated with lower overall[3] and targeted broad-spectrum use.[4] It is expected that antimicrobial tracking and reporting would also be affected by limited program staffing. Due to variations in ASP funding and resourcing, specific hospital types or regions may be better positioned to collect AMU data and report centrally for benchmarking.

To identify areas where support is needed, our objective was to evaluate the facility-level factors that are associated with voluntary participation in the submission of AMU data.

Methods

Setting

We performed a cross-sectional study using data from a provincewide survey in Ontario, Canada.

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Data Sources and Participants: Hospital AMU data were collected via voluntary submission as part of the Ontario ASP Landscape survey, administered from October to December 2023. This survey is sent every 2–3 years to ASPs in all acute care, complex continuing care, rehabilitation, and inpatient oncology hospitals in the province. Survey questions include data on program structure, strategies, and AMU. As part of the survey, AMU data requested include total systematic antibiotic (WHO ATC Class J01)[5] hospitalwide defined daily doses and/or days of therapy with a separate denominator for patient days. More detail on the survey is provided in previous publications.[2]

Outcome

The main outcome was (partial or complete) submission of AMU data for the requested period of 2020 to 2022, which was a binary outcome (ie, AMU submission or no AMU submission). Because non-participants in the survey did not submit AMU data, these hospitals were classified as no AMU submission.

Variables

Hospitals were classified by type (small, medium, and large community, teaching, or complex continuing care/rehabilitation) and region (Toronto, Central, West, East, North-West, North-East) as defined by the Ontario Ministry of Health.[6] We prepared a sub-analysis for only the hospitals that completed the survey (whether or not they submitted AMU data) and classified the presence or absence of resources for the ASP based on the response to the question: "Are there designated funding/resources for your ASP?"

Statistical Analysis

We performed logistic regression to evaluate the association between hospital type and region with AMU submission. Each analysis was performed with a single explanatory variable and then adjusted for the additional variable, region, or hospital type. The sub-analysis evaluating resourcing was adjusted for hospital type. Analyses were carried out in R version 4.4.0.

Table 1. Hospital antimicrobial stewardship program (ASP) characteristics and submission of antimicrobial use (AMU) data

Hospital characteristic	Hospitals providing AMU data, n (%)	Unadjusted OR (95% CI)	Adjusted OR* (95% CI)
Hospital type n = number of eligible hospitals			
Teaching (n = 25)	18 (72.0%)	3.74 (1.17–11.96)	3.93 (1.19–13.01)
Large community (n = 42)	26 (61.9%)	2.36 (0.88–6.35)	2.08 (0.71–6.12)
Medium community (n = 35)	16 (45.7%)	1.22 (0.44–3.38)	1.17 (0.38–3.57)
Complex continuing care/rehabilitation (n = 27)	11 (40.7%)	Ref	Ref
Small community (n = 73)	8 (11.0%)	0.18 (0.06–0.52)	0.27 (0.08–0.87)
Region n = number of eligible hospitals			
East (n = 44)	17 (38.6%)	0.39 (0.13–1.13)	0.58 (0.18–1.91)
North-East (n = 29)	3 (10.3%)	0.07 (0.02–0.31)	0.22 (0.04–1.13)
North-West (n = 15)	1 (6.7%)	0.04 (0–0.40)	0.15 (0.15–1.69)
Central (n = 21)	13 (61.9%)	Ref	Ref
Toronto (n = 27)	15 (55.6%)	0.77 (0.24–2.46)	0.79 (0.21–3.02)
West (n = 66)	30 (45.4%)	0.51 (0.19–1.40)	0.80 (0.26–2.46)
Funding/resources for ASP (sub-analysis) n = number of hospitals responding to survey			
Yes (n = 91)	64 (70.3%)	4.58 (2.12–9.88)	3.66 (1.24–10.80)
No (n = 44)	15 (34.1%)	Ref	Ref

*Hospital type – adjusted for region; region – adjusted for hospital type; funding/resourcing – adjusted for hospital type.

Results

Of 224 facilities in the province, 202 were eligible for participation in the survey, and 135 (67%) responded to the survey. Hospital types participating in the survey included large community (n = 38, 28%), small community (n = 30, 22%), medium community (n = 24, 18%), academic/teaching (n = 24, 18%) and complex continuing care/rehabilitation (CCC/rehab) (n = 19, 14%). Of survey participants, 91 (67%) indicated that their hospital had designated funding and/or resources for their program, and 79 (58%) participants provided AMU data.

Out of all the hospitals eligible for participation, there was a significant difference in the odds of AMU submission based on the hospital type. Teaching hospitals had the highest participation (72.0%, ORadj 3.93; 95% CI, 1.19–13.01, compared to CCC/rehab), whereas small community hospitals had the lowest participation (11.0%, ORadj 0.27; 95% CI, 0.08–0.87, compared to CCC/rehab). Region, on the other hand, was not associated with differences in AMU submission after accounting for hospital type. Among hospitals participating in the survey, hospital ASPs with self-reported funding/resources for their program had greater odds of submitting AMU data, even after accounting for hospital type (70.3% vs 34.1%, ORadj 3.66; 95% CI, 1.24–10.80). See Table 1 for ASP characteristics and submission of AMU data.

Discussion

We found that smaller hospitals and those with a lack of ASP resources were less likely to submit AMU data to participate in provincial tracking and benchmarking. This finding is not surprising given that key barriers to the collection of AMU data include lack of protected time and information technology support, which are often challenges in facilities without adequate resourcing.[7]

This study adds to the growing body of literature supporting the importance of adequate ASP resourcing in controlling antibiotic overuse,[3,8] reducing targeted broad-spectrum antibiotic prescribing,[4] and now to facilitate participation in core activities of tracking and reporting AMU data.

A key limitation of this study is its cross-sectional design and therefore lack of ability to identify a causal link between program resourcing and AMU tracking. Not all hospitals participated in the survey, so we cannot determine the ASP resourcing of non-participants. Likewise, non-participants may have been tracking AMU internally but not reporting centrally. Additionally, there may be other reasons for lack of participation, including that hospitals are undergoing electronic health record upgrades or lack of expertise in collecting and calculating AMU data, even if resourcing is adequate. Although the period for requested data spans the COVID-19 pandemic, submission was in late 2023, beyond the end of this public health emergency. Nevertheless, these findings should be confirmed with longitudinal analyses well beyond the pandemic period. This study does not evaluate the success of ASPs, but rather a key component necessary to improve AMU, of which many others exist (IT infrastructure, training and education, leadership support, use of evidence-based ASP strategies). Future analyses should consider such factors, which themselves may be impacted by program resourcing. Additional efforts to define and quantify program resourcing may assist with more precise comparisons across hospitals (eg, utilize full-time equivalent to bed ratios, assess resourcing for different ASP team roles including physicians and pharmacists).

These findings may help ASPs and decision-makers by quantifying the benefits of ASP resourcing and identifying characteristics of programs that may need additional support to track and report ASP outcomes.

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References

1. US Centers for Disease Control and Prevention, National Healthcare Safety Network. CMS Requirements [Internet]. Atlanta (GA); 2024 [cited 2024 Dec 24]. Available from: https://www.cdc.gov/nhsn/cms/index.html
2. Leung V, Quirk J, Muir S, Daneman N, Schwartz KL, Langford BJ. A cross-sectional study of hospital antimicrobial stewardship programmes in the COVID-19 era. *JAC-Antimicrobial Resistance*. 2022;5:dlac134
3. Langford BJ, Wu JH, Brown KA, Wang X, Leung V, Tan C, *et al.* Assessing the impact of antibiotic stewardship program elements on antibiotic use across acute-care hospitals: an observational study. *InfectControl HospEpidemiol*. 2018;39: 941–6
4. Tu M, Shi ZH, Leung V, Brown KA, Schwartz KL, Daneman N, *et al.* Hospital antimicrobial stewardship funding and resourcing impact on broad-spectrum antibiotic use: a cross-sectional study. 2025;4(1): e223. doi: 10.1017/ash.2024.461
5. World Health Organization Collaborating Centre for Drug Statistics Methodology. ATC/DDD Index 2024 [Internet]. [cited 2024 Dec 24]. Available from: https://www.whocc.no/atc_ddd_index/
6. Ontario Ministry of Health. Ministry reports: Master Numbering System [Internet]. 2024. Available from: https://www.ontario.ca/page/ministry-reports-master-numbering-system
7. Langford B, Wu J, Lo J, Leung V, Daneman N, Schwartz K, *et al.* Pilot study of an online hospital antibiotic use tracking and reporting system. *Official Journal of the Association of Medical Microbiology and Infectious Disease Canada*. 2019;4(4): 233–40. doi: 10.3138/jammi.2019-0011
8. Doernberg SB, Abbo LM, Burdette SD, Fishman NO, Goodman EL, Kravitz GR, *et al.* Essential Resources and Strategies for Antibiotic Stewardship Programs in the Acute Care Setting. *Clinl Infect Dis*. 2018;67: 1168–74

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