

## TECHNICAL NOTES

# Ontario Antimicrobial Stewardship Program (ASP) Comparison Tool

## Background

In 2013, antimicrobial stewardship became an [Accreditation Canada Required Organizational Practice \(ROP\)](#) for facilities providing inpatient acute care, inpatient cancer, inpatient rehabilitation and complex continuing care services. In Ontario, accreditation of hospitals by Accreditation Canada is voluntary and conducted on a two- to four-year cycle depending on the [accreditation program](#).

To understand how the landscape of antimicrobial stewardship programs (ASP) has evolved since 2013, Public Health Ontario (PHO) conducted a survey of hospitals in Ontario in 2016 and in 2018. As part of each survey, hospital corporations were able to authorize the sharing of their information on the PHO website for the purpose of providing corporations a means to share information regarding their antimicrobial stewardship activities and insights into how ASPs are advancing in peer hospitals. In 2018, antimicrobial use (AMU) was requested from hospitals as part of this survey. The Ontario Antimicrobial Stewardship Program (ASP) Comparison Tool summarizes this data.

## Data Source

The 2018 PHO Ontario ASP Landscape Survey was a voluntary online survey, which was open for five weeks from September 25 to October 31, 2018. The survey was distributed to 127 hospital corporations, which represent all hospital corporations in Ontario, except for those that primarily deliver mental health or ambulatory services. Distribution was targeted to reach the individual most responsible for antimicrobial stewardship in each hospital/corporation, usually an ASP pharmacist or physician. The intent was to obtain one response per hospital/corporation unless the organization has multiple sites and wished to submit separate site-specific responses. Overall, the survey had a 55% response rate (70/127).

At the time of the 2018 survey, 87% (61/70) of responding corporations authorized PHO to share their ASP information and 92% (61/66) of hospitals that provided AMU data agreed to be identified on the PHO website. If the corporation did not participate in the 2018 survey, but previously provided authorization to share their information in 2016, the 2016 data is available on the PHO site. The representativeness of the data is anticipated to change over time, as organizations are able to decide to participate or withdraw their participation at any time.

## Data Limitations

All data with the exception of hospital type and Local Health Integration Network (LHIN) are self-reported. Due to the self-reported nature of this data, the presence or absence of a formalized ASP may not be synonymous with [Accreditation Canada's ROP criteria](#). For example, it is possible that a site reported not having a formalized ASP in this survey despite technically meeting the major and minor criteria of Accreditation Canada's Antimicrobial Stewardship ROP and vice-versa.

Data is generally reported at a hospital corporation level unless site-specific responses were provided. All information is provided on an “as-is” basis. PHO cannot and does not warrant or represent that the information is accurate, complete, reliable or current.

## Missing Data

The Ontario ASP Comparison Tool only contains information about hospitals/corporations that have responded to the Ontario ASP Landscape survey and authorized PHO to share their data. Therefore, no assumptions regarding the presence or absence of an ASP, strategies that are in place and the availability of AMU should be made about hospitals/corporations that are not listed within the tool. Hospitals/corporations can withdraw at any time. Any hospitals/corporations that would like to participate can contact [asp@oahpp.ca](mailto:asp@oahpp.ca).

## General/Standard Notes

### ASP Comparison

1. There are six data tabs:
  - a. **Program Structure** – This table compares structural elements of ASPs and provides contact information.
  - b. **Clinical** – This table compares the implementation status of clinical strategies\* at each hospital/corporation.
  - c. **Prescribing Guidance** – This table compares the implementation status of prescribing guidance strategies\* at each hospital/corporation.
  - d. **Microbiology** – This table compares the implementation status of microbiology-related strategies\* at each hospital/corporation.
  - e. **Formulary** - This table compares the implementation of formulary-related strategies\* at each hospital/corporation.
  - f. **Structural/Process** - This table compares the implementation of structural/process strategies\* at each hospital/corporation.

\*Definitions and details about each of the 32 strategies are available on [the PHO Antimicrobial Stewardship Strategies webpage](#).

2. Results can be filtered by:
  - a. Hospital/Corporation name
  - b. Ontario Hospital Association (OHA) hospital type (acute teaching, large community, small community, complex continuing care & rehabilitation)
  - c. LHIN
3. The comparison table can be sorted by clicking on any of the column headers. Clicking on the Hospital/Corporation name within the comparison table will open the Hospital/Corporation Profile.

### Antibiotic Use Comparison

Participating hospitals provided antibiotic use data at the hospital level. Antibiotic use data represents all antibacterial agents in the World Health Organization (WHO) Anatomic Therapeutic J01 classification. The denominator is inpatient days. The metric is expressed as Defined Daily Doses (DDDs) per 1000

patient days or Days of Therapy (DOTs) per 1000 patient days.

1. Antibiotic Use Summary provides the following information:
  - a. Number of participating Hospitals/Corporations
  - b. Number of hospitals reporting DDD
  - c. Number of hospitals reporting DOT

(Note: A small number of hospitals provided both DDD and DOT)

2. Results are presented as unadjusted DDD or DOT.
3. Results can be filtered by the following:
  - a. Antibiotic Use Outcome (Defined Daily Dose [DDD] or Days of Therapy [DOT])
  - b. Hospital/Corporation Name
  - c. Local Health Integration Network/Region
4. Data are summarized visually in a dynamic bar chart, based on the hospitals selected from the filter. Hospital type and LHIN averages include an aggregate sum of all hospitals that provided data. Whereas individual hospital data will only appear for hospitals that agreed to be identified. Aggregate sum across hospital types and regions was weighted by patient days for each facility that provided data.
5. The comparison table can be sorted by clicking on the Hospital column header. Clicking on the Hospital/Corporation name within the comparison table will open the Hospital/Corporation Profile.
6. All antibiotic use data can be downloaded in CSV/Excel format by clicking link on top right of page.

### Hospital/Corporation Profiles

1. The profile displays detailed information about an individual hospital/corporation's ASP.
2. Clicking on the individual ASP strategies will open the corresponding PHO Antimicrobial Stewardship Strategy document in a new window.

## Metrics

**Defined Daily Dose (DDD)** is "the assumed average maintenance dose per day for a drug used for its main indication in adults," as specified by the [WHO](#). DDD are often standardized to 1,000 patient days (DDD/1,000 patient days) to allow comparison between hospitals or services of different sizes.

**Days of Therapy (DOT)** is the number of days that a patient receives an antimicrobial agent (regardless of dose). Any dose of an antibiotic that is received during a 24-hour period represents 1 DOT. The DOT for a given patient on multiple antibiotics will be the sum of DOT for each antibiotic that the patient is receiving. DOT is often standardized to 1,000 patient days (DOT/1,000 patient days) to allow comparison between hospitals or services of different sizes.

**Observed DDD or DOT** refers to hospital reported antibiotic use data.

## Risk Adjustment

**Expected DDD or DOT** refers to predicted antibiotic use based on characteristics of the facility's patient population. A negative binomial regression model was developed to identify factors associated with antibiotic use across participating facilities. Hospital data for all patients discharged in 2017 were extracted from the Discharge Abstract Database (DAD), National Rehabilitation Reporting System (NRS), Ontario Mental Health Reporting System (OMHRS) and Continuing Care Reporting System (CCRS).

Two separate models were developed for hospitals reporting DDDs and hospitals reporting DOTs. The following most important variables were included in the model:

- Proportion of visits that include an ICU stay (neonatal ICU visits were excluded)
- Proportion of patients less than 18 years of age
- Proportion of patients receiving rehabilitation, complex continuing care, and mental health medical services

**Observed vs. Expected Ratio** (O:E ratio) is the ratio of observed to expected antibiotic use for a specific hospital and is calculated by dividing the observed antibiotic use by the expected antibiotic use. For example, if a hospital's observed (actual) use is 500 DOT/1000 patient days, but its predicted use is 400 DOT/1000 patient days, the O:E ratio would be 1.25. The O:E ratio can be viewed by hovering over the observed data for each facility.

- O:E ratio > 1 indicates that a hospital's antibiotic use is higher than expected
- O:E ratio =1 indicates that a hospital's antibiotic use is similar to expected
- O:E ratio < 1 indicates that a hospital's antibiotic use is less than expected

Given that there is uncertainty in the expected antibiotic use, the O:E ratio includes a 95% confidence interval to account for this uncertainty. In situations where O:E ratio does not cross 1, this indicates the hospital's observed use differs significantly from expected. However, statistical significance should be interpreted with caution and does not necessarily equate to a clinically significant difference.

For more information on how these metrics are calculated, please visit [PHO's Metrics Examples](#) document.

### Data Sources

Inpatient Discharges (DAD), Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Extracted [November/2019].

Continuing Care Reporting System (CCRS), Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Extracted [December/2019].

Adult Mental Health (OMHRS), Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Extracted [December/2019].

Inpatient Rehabilitation (NRS), Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Extracted [December/2019]

## Disclaimer

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<https://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/AntimicrobialStewardshipProgram/Pages/ASPTool.aspx>.

## Public Health Ontario

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## Contact

For more information, please contact [asp@oahpp.ca](mailto:asp@oahpp.ca).

## Publication History

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