Data Impact Challenge II Answer Submission Template

Question: What is the current antimicrobial consumption in a particular sector/unit/common condition? Are there particular outliers if we compare patient consumption, and what should we expect to see?

Team name and list of all team member names:
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Describing the Data and Analysis

Data Custodian Organization(s) and data sources: Data was provided by the Antimicrobial Stewardship Programs at Michael Garron Hospital, Niagara Health System, Mount Sinai Hospital, and University Health Network.

Michael Garron Hospital (MGH), formerly Toronto East General Hospital, is a 515-bed hospital in Toronto, Ontario with nearly 20,000 in-patients annually. Their antimicrobial stewardship program (ASP) started in 2010.

Niagara Health System (NHS) comprises of six sites totalling 722 beds across the Ontario Niagara region. In 2015, NHS had 182,273 in-patient days and 7,962 surgical in-patient cases. Their ASP started its first unit in 2010.

Mount Sinai Hospital (MSH) is a 3,535-bed hospital in Toronto, Ontario. In 2015, there were 169,532 inpatient admissions.

Toronto General Hospital (TGH) and Toronto Western Hospital (TWH) have 417 and 261 beds, respectively, and are two of the sites comprising University Health Network. Several of their units are part of the Mount Sinai Hospital-University Health Network Antimicrobial Stewardship program (MSH-UHN ASP), which started in 2009.

Description of intervention: All programs used prospective audit and feedback (PAAF) as the primary mode of ASP delivery providing PAAF at least twice weekly. Teams consisted of a specially trained pharmacist and an Infectious Diseases content expert. Feedback was provided to clinical teams to optimize antimicrobials either in person or through notes in the patient's electronic record.

List of Datasets Used (e.g. names of database and/or data origins): Defined Daily Dose (DDD) data is derived from consumption data in pharmacy databases: BDM Centricity (TGH and TWH), Cerner Pharmnet (MSH), and Meditech pharmacy database(NHS). Days Of Therapy (DOT) data is based on drug

administration data in electronic medication administration records (eMAR) from Cerner PowerChart (MGH).

Data timeframe: January 1 to December 31, 2015

Exclusions: Non-systemic antimicrobial drugs were not included. The hospitals involved track antimicrobial drugs that are at higher risk to cause antimicrobial resistance to develop.

Nature and Size of Cohort (e.g. geographic area covered, number of patients included, number of sites, etc.): A total of 272,028 patient days were included, covering all ICUs and medical/surgical units actively monitored by the respective ASPs.

Please provide a brief summary of the analysis methodology:

For our analysis, we chose to present consumption of the most recent calendar year (2015) for two types of units: Intensive Care Units (ICUs) and Medical/Surgical In-Patient Units (M/S-IPs). Each month is shown in order to highlight any seasonal fluctuations.

Defined Daily Dose (DDD)[1]: is the assumed average maintenance dose per day for a drug used for its main indication in adults as specified by the WHO. For this analysis, it is standardized to 1000 patient days (DDD/1000 patient days) to allow comparison between hospitals or services of different sizes. With the exception of MGH, all services used DDD/1000 patient days as the unit of measure for analysis.

Days of Therapy (DOT)[1]: 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. This is also standardized to 1000 patient days (DOT/1000 patient days) to allow comparison between hospitals or services of different sizes. The MGH has employed DOT/1000 patients as the unit of measure for consumption and therefore is separated from other hospitals that utilize DDD/1000 patient days.

Describing the Findings

Numerator and Denominator (as specified in the question definition).

- Numerator: Sum of Defined Daily Dose (DDD) or Days Of Therapy (DOT)
- Denominator: Sum of patient days / 1000

State the key statistics from your analysis:

- The antimicrobial consumption for the ICUs at TGH, TWH, MSH and NHS totalled 1074.5 DDDs/1000 Patient Days. Consumption for the MGH ICU for the first nine months was 825.9 DOTs/1000 Patient Days.
- The antimicrobial consumption for Medical and Surgical in-patient units at TGH, TWH, MSH and NHS totalled 447.1 DDDs/1000 Patient Days. Consumption for the MGH medical/surgical in-patient units for the first nine months was 403.4 DOTs/1000 Patient Days.

Summary of findings including any key limitations or interpretation issues (may also include figures/tables)
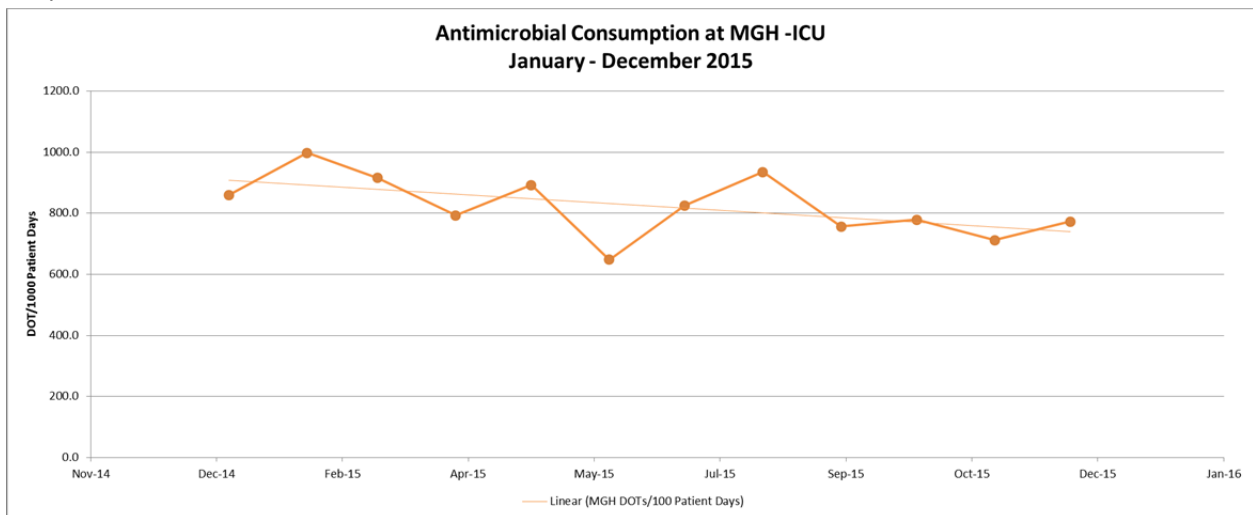
- Graph 1 represents antimicrobial consumption for ICU; for most of the year three sites (TGH, TWH and MSH) continue on their steady path. There was a notable spike during the 7th month from TWH and during the 11th month for MSH and TGH, while NHS consumption remained stable.
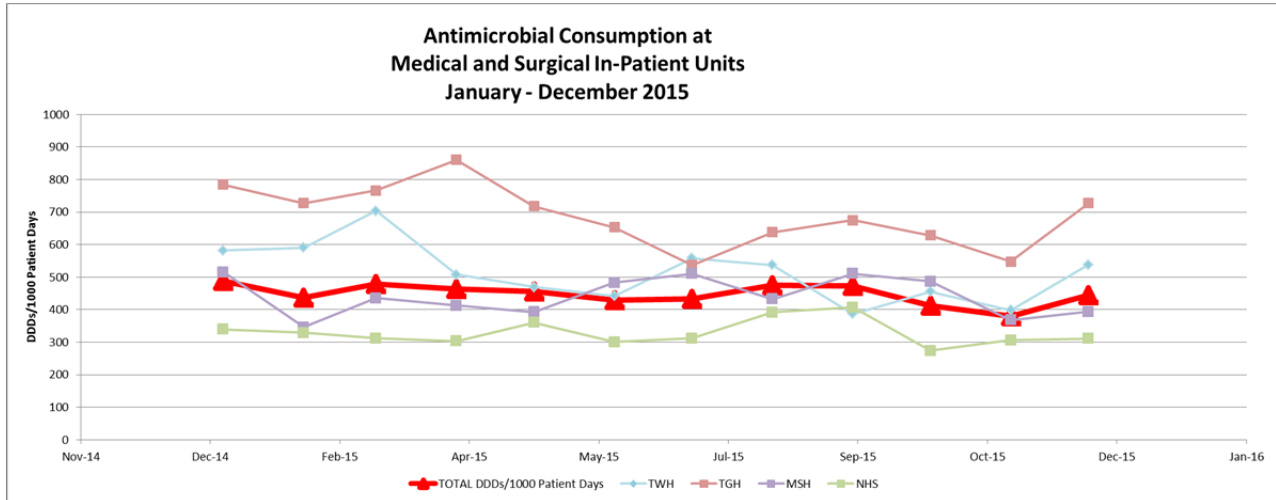
Graph 1:
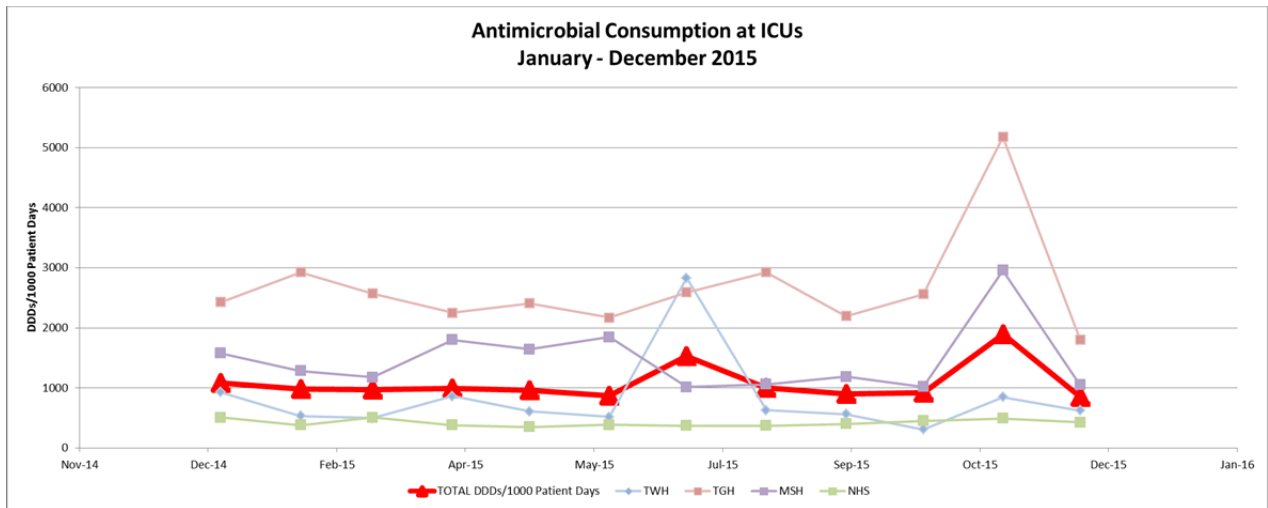
- Graph 2 represents antimicrobial consumption for ICU at MGH measured in DOT/1000 patient days that shows a relatively stable consumption trend.
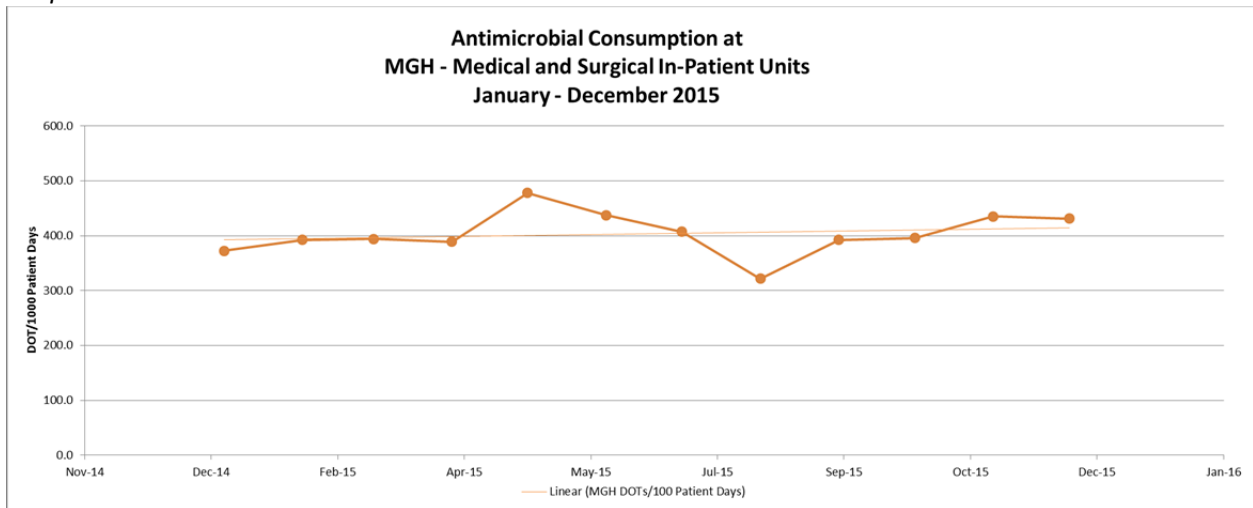
Graph 2:

- Graph 3 represents antimicrobial consumption for GIM; for most of the year all three sites (TGH, TWH and MSH) continue on their steady path, during the 2nd and 3rd month of the year there was a noticeable difference MSH and the other two units; MSH had lower antimicrobial consumption. Overall, medical/surgical units do not experience the spikes in consumption observed in ICUs.

Graph 3:

- Graph 4 represents antimicrobial consumption for GIM at MGH measured in DOT/1000 patient days that shows a relatively stable consumption trend.

Graph 4:

Additional analysis or insight that goes beyond what was asked in the question.

- Fluctuations for each hospital do not follow the same trends, which may suggest antimicrobial usage is more dependent on the patient demographics or localized factors for a specific site, rather than a global, seasonal variation.

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- Local antimicrobial resistance patterns (antibiograms) should also be taken into account as they may affect choice of antimicrobial when prescribing to patients.

Implications of this analysis for policy.

- When establishing standards and best practices for antimicrobial utilization, local variation in demographics will be a factor that should be accounted for.
- Whereas these sites were able to provide DDD/1000 patient days or DOT consumption metrics, there is variability around the province in hospitals having readily accessible and reportable antimicrobial metrics. Setting up processes for obtaining antimicrobial consumption data requires time and dedicated resources. Mandating reporting of antimicrobial consumption metrics will help address this issue, and could be the impetus for hospitals to set in place processes , which can ultimately inform us about antimicrobial resistance.

Reference:

1.) Antimicrobial Stewardship Programs (ASPs) - Metrics Examples (Public Health Ontario). Link: http://www.publichealthontario.ca/en/eRepository/ASP%20Metric%20examples.pdf.