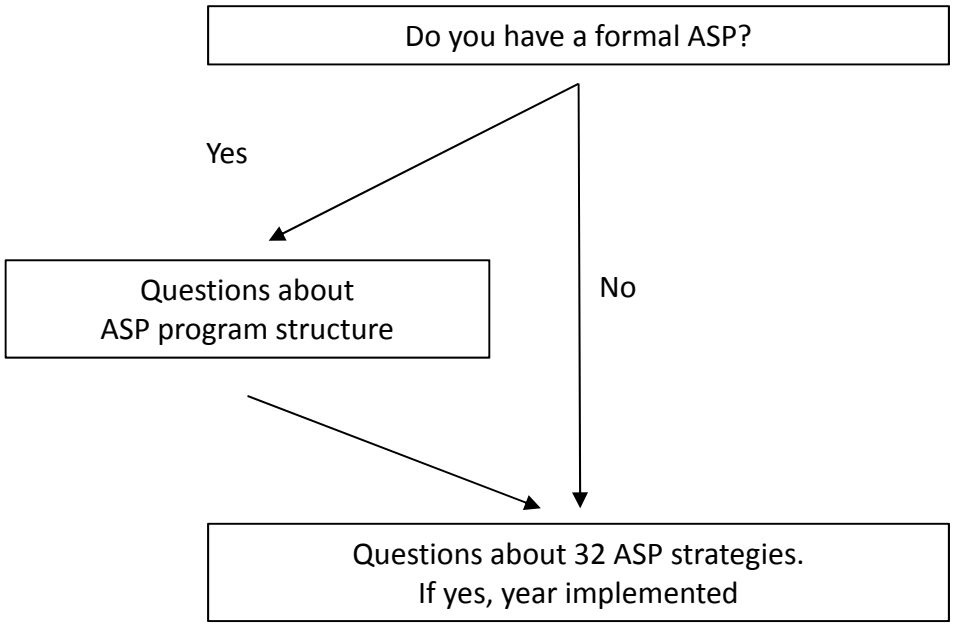
Appendix 1 (as supplied by the authors): Ontario hospital antimicrobial stewardship program survey structure and questionnaire

Adaptive question structure

Respondents who reported having a formal ASP were presented questions about program structure. All respondents were asked if their organization had implemented each of the 32 ASP strategies, as defined by Public Health Ontario ASP, since these activities can be implemented in the absence of a formal ASP. Year of implementation was then collected



Survey questions

About your organization

1. **Healthcare Corporation/Facility Name:** [freetext]

1a. Does your corporation/facility have more than 1 site?

- ☐ Yes
- ☐ No [Skip to Q.2]

1b. Do you wish to submit a site-specific survey response?

(There should only be one response from your organization unless you have multiple sites and wish to submit separate site-specific responses.)

- ☐ Yes – this response applies to the following site: [freetext]
- ☐ No – this response applies to the corporation

2. **Number of In-Patient Beds:** [freetext]

About your Antimicrobial Stewardship Program (ASP)

3. **Do you currently have a formal Antimicrobial Stewardship Program at your organization?**
(This could be with or without designated funding/resources)
   - ☐ Yes
   - ☐ We are in the process of implementing/planning to implement an ASP in the next 12 months

☐ No [Skip to Q.16]

Comments: [freetext]

3a. what year was your ASP formalized? [pick an option]

Options: 2016, 2015, 2014, 2013, 2012, 2011, 2010, 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, prior to 2001, not known

4. **Are there designated funding/resources for your ASP?**
   - ☐ Yes
   - ☐ No [Skip to Q.6]

5. **What is the amount of full time equivalent (FTE) dedicated to ASP for each of the following:**
   - ☐ Pharmacists - # of FTE: [freetext]
   - ☐ Physicians - # of FTE: [freetext]
   - ☐ Nurses - # of FTE: [freetext]
   - ☐ Infection control professionals - # of FTE: [freetext]
   - ☐ Information Technology professionals - # of FTE: [freetext]
   - ☐ Other (please specify): [freetext]

6. **The Physician champion/lead of your ASP is a(n) (choose one):**
   - ☐ Infectious Diseases specialist
   - ☐ Non-Infectious Diseases Physician (please specify): [freetext]
   - ☐ No Physician champion/lead

7. **The Pharmacist champion/lead of your ASP has (choose one):**
   - ☐ Training or education in Infectious Diseases or antimicrobial stewardship (e.g. MAD-ID, Accreditation Canada Antimicrobial Stewardship in Hospitals: Online course, other specialized infectious disease training etc.)
   - ☐ No training or education in Infectious Diseases or antimicrobial stewardship (e.g. MAD-ID, Accreditation Canada Antimicrobial Stewardship in Hospitals: Online course, other specialized infectious disease training etc.)
   - ☐ No Pharmacist champion/lead

8. **There is an Antimicrobial Stewardship Committee (ASC) at your organization.** *(The name of this committee will be organization dependent but this refers to a multidisciplinary committee that oversees and advises on ASP activities and ensures alignment with organizational direction.)*
   - ☐ Yes
   - ☐ No (skip to Q.12)

9. **The Antimicrobial Stewardship Committee (ASC) at your organization includes the following (check all that apply):**
   - ☐ Pharmacist(s)
   - ☐ Physician(s)
   - ☐ Nurse(s)
   - ☐ Hospital Administrator(s)
   - ☐ Microbiology (laboratory) representative(s)(e.g. Microbiologist, Lab technologist etc.)
   - ☐ Infection control representative(s)
   - ☐ Information Technology representative(s)
   - ☐ Quality improvement/Patient safety representative(s)
   - ☐ Other (please specify): [freetext]

Options: 1-3 times per year, 4-6 times per year, 7-9 times per year, more than 10 times per year

10. How often does the ASC meet? [pick an option]

11. Where does the ASC directly report to?

- ☐ Pharmacy & Therapeutics Committee
- ☐ Medical Advisory Committee
- ☐ Senior Administration
- ☐ Quality and/or Risk Management Program
- ☐ Other (please specify): [freetext]

12. Has your ASP developed guidance documents to help direct program development?
(These may include a vision/mission statement, program charter, program logic model, or strategic plan documents)

- ☐ Yes
- ☐ No

13. Your ASP collects information and/or reports on the following (check all that apply):

- ☐ Days of Therapy (DOT)
    - If yes, specify software used to obtain this data:
        - ☐ GE Centricity
        - ☐ Epic
        - ☐ Allscripts/SCM
        - ☐ Cerner
        - ☐ Meditech
        - ☐ Other (please specify): [free text]
- ☐ Defined Daily Doses (DDD)
    - If yes, specify software used to obtain this data:
        - ☐ GE Centricity
        - ☐ Epic
        - ☐ Allscripts/SCM
        - ☐ Cerner
        - ☐ Meditech
        - ☐ Other (please specify): [free text]
- ☐ Length of therapy (LOT)
    - If yes, specify software used to obtain this data:
        - ☐ GE Centricity
        - ☐ Epic
        - ☐ Allscripts/SCM
        - ☐ Cerner
        - ☐ Meditech
        - ☐ Other (please specify): [free text]
- ☐ Antimicrobial Expenditures
- ☐ ASP Intervention types
- ☐ ASP Intervention acceptance rates
- ☐ Length of stay (in areas/services targeted for ASP interventions)
- ☐ Re-admission rates (in areas/services targeted for ASP interventions)
- ☐ Rates of *C. difficile* infection

- ☐ Rates of antimicrobial resistance/antibiogram

14. Where are these metrics reported to (check all that apply)?

- ☐ Patient Care Units
- ☐ Department/Division Heads
- ☐ Pharmacy & Therapeutics Committee
- ☐ Medical Advisory Committee
- ☐ Senior Administration
- ☐ Quality and/or Risk Management Program
- ☐ Other (please specify): [freetext]

15. Is appropriate antimicrobial use a part of your organization's Quality Improvement Plan and/or a strategic goal/priority?

- ☐ Yes **15 a**. It was incorporated in: [pick an option]
- ☐ No

Options: 2016, 2015, 2014, 2013, prior to 2013, not known

About Antimicrobial Stewardship activities at your organization

The next series of questions relate to antimicrobial stewardship activities at your organization and are defined and categorized based on PHO's 32 ASP Strategies. Please note organizations may be performing these activities in the absence of a formalized ASP; and organizations may not be performing some or all of these activities in the presence of a formalized ASP.

16. Your organization has implemented the following Formulary-Related Strategies:
(Since these strategies are not necessarily mutually exclusive, please identify the strategies that best describe the specific activities that your organization has **systematically implemented and is a regular practice** or are planning to implement in the next 12 months.)

a. Formulary automatic substitution/therapeutic interchange policies
(The process whereby an order for a specific antimicrobial regimen is automatically changed or substituted according to preapproved procedures and conditions, without needing to consult the prescriber.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

Options: 2016, 2015, 2014, 2013, prior to 2013, not known

Note: the options for *when* strategy implementation occurred are the same from Q16 to 20.

b. **Formulary review/streamlining**
(Formulary review and streamlining involves limiting the number of antimicrobials available on the formulary. This usually involves selecting one or two representative antimicrobials from each class and eliminating agents with duplicate spectrums of activity)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

c. **Formulary restriction**
(Restricted dispensing of targeted antimicrobials on the hospital's formulary, according to approved criteria. The use of restricted antimicrobials may be limited to certain indications, prescribers, services, patient populations or a combination of these.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

d. **Formulary restriction with preauthorization**
(Preapproval of restricted antimicrobials before or shortly after dispensing the drug to ensure adherence to organizational criteria.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

Comments about your organization's Formulary-Related Strategies: [freetext]

17. Your organization has implemented the following <u>Structural/Process Strategies</u>:
(Since these strategies are not necessarily mutually exclusive, please identify the strategies that best describe the specific activities that your organization has **systematically implemented and is a regular practice** or are planning to implement in the next 12 months.)

a. Automatic stop orders
(Automatically applied stop dates for antimicrobial orders when the duration of therapy is not specified. Can be individualized for specific antimicrobial classes, routes of administration and/or indications. This is synonymous with "hard stop" dates.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

b. Checklists
(A list of items or actions used for assessing and optimizing antimicrobial therapy)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

c. General antimicrobial order forms
(Forms used to single out and highlight prescriptions for anti-infectives as a way of improving specific or overall antimicrobial use.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

d. Drug use evaluation/medication use evaluation
(Audits of practice or prescribing which may include prescriptions of selected agents, management of certain common infections or assessment of compliance with organizational guidelines. Can be used to identify target areas for antimicrobial stewardship programs and assess the effects of stewardship interventions or education.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

e. Improved antimicrobial documentation

(Approaches for promoting adequate documentation of important aspects of antimicrobial prescribing to facilitate communication and decision-making within the health care team. This can be facilitated by computerized physician order entry systems; by requiring physicians to document certain information before finalizing an order)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

f. Surgical antibiotic prophylaxis optimization

(An audit of quality indicators for surgical antibiotic prophylaxis to identify areas that need improvement.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

g. Systematic antibiotic allergy verification

(Clarification and clear documentation of allergy status to help optimize the selection of antimicrobials. A more advanced implementation of this strategy may include a penicillin skin testing program.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

Comments about your organization's Structural/Process Strategies: [freetext]

Your organization has implemented the following <u>Clinical Strategies</u>:

(Since these strategies are not necessarily mutually exclusive, please identify the strategies that best describe the specific activities that your organization has **systematically implemented and is a regular practice** or are planning to implement in the next 12 months.)

a. Dose optimization

(Review and individualization of antimicrobial dosing based on the characteristics of the patient, drug, and infection.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

b. Scheduled antimicrobial reassessments ("antibiotic time-outs")

(An antibiotic 'time out' prompts a reassessment of the continuing need and choice of antibiotics when the clinical picture is clearer and more diagnostic information is available.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

c. Targeted review of patients with *Clostridium difficile* infection

(Targeted review of patients with Clostridium difficile infection to ensure appropriate management, improve outcomes and reduce the risk of transmission.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months

- ☐ There are currently no plans to implement this strategy

d. Targeted review of redundant therapy or therapeutic duplication

(Identification and intervention for patients prescribed potentially redundant/duplicative therapy (i.e., antimicrobials with an overlapping spectrum of activity. Examples include review of individual patient medication profiles for potentially redundant therapy at the time of pharmacy order entry or generating reports to identify patients who have been prescribed potentially redundant therapy).

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

e. Therapeutic drug monitoring (with feedback)

(Measurement and interpretation of serum drug concentrations to maximize efficacy and minimize toxicity. For example, formalized pharmacist consultation for patients on aminoglycosides and vancomycin.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

f. De-escalation and streamlining

(Changing broad-spectrum or multiple antimicrobials to narrow or targeted therapy, or discontinuing antimicrobials based on culture and susceptibility results.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

g. Identification of inappropriate pathogen/antimicrobial combinations ("bug-drug mismatch")

(Identification and modification of therapy in patients with positive cultures who are receiving ineffective therapy.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

h. Preventing treatment of non-infectious conditions

(Stewardship interventions that target specific situations when antimicrobials are not indicated but frequently prescribed, to help decrease unnecessary antimicrobial therapy for non-infectious conditions such as asymptomatic bacteriuria or acute exacerbation of COPD)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

i. Prospective audit with intervention and feedback

(Formal assessment of antimicrobial therapy by trained individuals, who make recommendations to the prescribing service in real time when therapy is considered suboptimal.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

j. Targeted review of patients with bacteremia/fungemia

(Review of positive blood cultures to assess empiric therapy for appropriateness, as well as de-escalation once culture and susceptibility results are available.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

Comments about your organization's Clinical Strategies: [freetext]

Your organization has implemented the following Prescribing Guidance Strategies:
(Since these strategies are not necessarily mutually exclusive, please identify the strategies that best describe the specific activities that your organization has **systematically implemented and is a regular practice** or are planning to implement in the next 12 months.)

a. Intravenous to oral conversion
(Promoting the use of oral antimicrobial agents instead of intravenous administration when clinically indicated.)
- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

b. Disease-specific treatment guidelines/pathways/algorithms and/or associated order forms
(Evidence-based practice recommendations that incorporate local resistance patterns and organization-specific formulary antimicrobials into a guideline, treatment pathway, algorithm and/or order form.)
- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

c. Empiric antibiotic prescribing guidelines
(Multidisciplinary, evidence-based recommendations using local susceptibility data to standardize and improve the selection of initial therapy for common infectious diseases.)
- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

d. Prescriber education
(Education (formal or informal) to inform and engage prescribers and other health care professionals in stewardship activities and to improve antimicrobial use.)
- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

e. Facilitation of appropriate and timely antimicrobial administration in severe sepsis/septic shock
(Interventions to facilitate prompt administration of appropriate antimicrobials and improve outcomes (including mortality) in patients with severe sepsis and septic shock.)
- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

f. Clinical decision support systems/computerized physician order entry
(Technological applications that assist the clinician in selecting and ordering tests and therapy. They can also be used to communicate information and generate reports.)
- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

Comments about your organization's Prescribing Guidance Strategies: [freetext]

18. Your organization has implemented the following Microbiology-related strategies:

(Since these strategies are not necessarily mutually exclusive, please identify the strategies that best describe the specific activities that your organization has **systematically implemented and is a regular practice** or are planning to implement in the next 12 months.)

a. Antibiograms

(A summary of the cumulative susceptibility of bacterial isolates to formulary antibiotics in a given organization or region. Its main functions are to guide choice of empiric therapy and track resistance patterns.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

b. Cascading microbiology susceptibility reporting

(The selective suppression of an organism's susceptibility to broader-spectrum or more expensive secondary agents when it is susceptible to preferred primary agents.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

c. Promotion of timely and appropriate microbiologic sampling

(Strategies implemented to promote the appropriate and timely collection of cultures, ideally before antimicrobials are started, to help direct therapy and avoid unnecessary prescribing.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

d. Improved diagnostics

(Improved diagnostics can aid in the diagnosis of infections and the identification of causative microorganisms. Examples include rapid diagnostic methods such as PCR or MALDI-TOF or serum biomarker such as procalcitonin.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

e. Strategic microbiology results reporting

(The use of strategic and selective culture and susceptibility reporting and inclusion of interpretive comments to help clinicians better understand culture results and direct appropriate and cost-effective antimicrobial prescribing.)

- ☐ We have implemented this strategy in: [pick an option]
- ☐ We are implementing/planning to implement this strategy in the next 12 months
- ☐ There are currently no plans to implement this strategy

Comments about your organization's Microbiology-related Strategies: [freetext]

19. Please briefly describe any other ASP activities you have implemented or are planning to implement in the next 12 months: [freetext]