Antimicrobial Resistant Organism (ARO) Screening Compliance Protocol

Approved by Provincial Surveillance, Evaluation, Quality Improvement and Research (SEQIR Committee): July 18, 2024

Revised: July 25, 2024

Alberta Health Services
Infection Prevention & Control

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Introduction

Increasing antibiotic resistance is a global problem (Ventola 2015, World Health Organization 2015). Colonization or infection with antibiotic resistant organisms (AROs) can lead to clinical infections which can be difficult to manage due to lack of effective antibiotic options. In certain cases, these organisms can easily be passed between patients and staff through contact or shared environments (Ventola 2015). Of particular concern in Canadian hospitals are methicillin-resistant *Staphylococcus aureus* (MRSA), and carbapenemase-producing organisms (CPOs). Lengthier hospital stays, longer courses of treatment and other expenses attributable to antimicrobial resistance is estimated to cost the Canadian healthcare system about $1.4 billion a year (Council of Canadian Academies 2019).

Because of the significant burden caused by AROs, identification of colonized individuals and prevention of infections is a key component of infection prevention and control (IPC) programs. An ARO admission screening questionnaire can be applied to admitted patients to identify at-risk patients to (1) inform timely prevention strategies, (2) interrupt horizontal transmission (i.e., microbiological samples to identify carriers, hand hygiene, additional precautions/isolation), and (3) prevent progression to infection.

With the implementation of Connect Care, Alberta's provincial electronic medical record (EMR) system, and the inclusion of an electronic ARO screening questionnaire as a clinical decision support tool, there is an opportunity to routinely evaluate the ARO screening protocol across all acute care facilities.

Goal

To improve patient safety by preventing the transmission of AROs in acute care and acute tertiary rehabilitation care facilities through the efficient and accurate identification of patients with AROs.

Objectives

1. To determine the compliance with the ARO screening questionnaire on admission to acute care and acute tertiary rehabilitation care facilities in AHS and Covenant Health.
2. To use compliance results to inform and evaluate IPC interventions to improve ARO screening and decrease transmission of AROs between patients, healthcare workers, and the patient environment.
3. To establish quarterly and annual trends of ARO screening compliance over time.

Methodology

Settings and population

Inclusion Criteria

Individuals admitted to AHS and Covenant Health acute care and acute tertiary rehabilitation care facilities, where inpatient care is provided 24 hours/day, 7 days a week, where ARO screening occurs on any unit, and where Connect Care has been implemented (See Appendix A for list of facilities and Connect Care start dates).

Exclusion Criteria

- Mental health facilities[1]
- Continuing care facilities

- Patients initially admitted to addictions and mental health (AMH) units in acute care and in acute tertiary rehabilitation facilities.
- Newborns admitted to nurseries or the neonatal intensive care unit (NICU)[2].
- Newborns younger than two days of age on admission[2].
- Direct transfers between facilities where the ARO screening questionnaire was completed at the sending facility.
- Emergency Inpatients (EIP) if they are discharged home from the ED and not transferred to an inpatient unit.

Measures and definitions

***ARO Admission Screening Compliance*:** the proportion of included inpatient admissions with the ARO screening questionnaire completed in Connect Care for each facility under surveillance.

The completion of the ARO screening questionnaire is attached to a facility encounter (i.e., admission) and not to a specific unit at the facility.

Unit level ARO screening compliance will not be reported quarterly for each facility in the provincial report.

ARO screening compliance will be reported quarterly for each facility under surveillance. Compliance will be aggregated into categories (i.e., Zone, Provincial, Facility Type).

***Time from admission to completed ARO screening questionnaire*:** the time (in hours) between included inpatient admission admit date/time and when the first ARO screening questionnaire is completed at a facility under surveillance.

The average time to ARO screening compliance will be reported quarterly for each facility under surveillance and aggregated into categories (i.e., zone, provincial, facility type). Average time will be reported as means (± standard deviations) or medians (interquartile ranges).

Unit level average time to ARO screening compliance will not be reported.

***ARO admission screening actions*:** among inpatients with a completed ARO screening questionnaire, the proportion of expected actions (i.e., microbiological swab) that are completed.

Expected actions will be based on the triggered best practice advisory within 24 hours of the completed ARO screening questionnaire and based on the individual responses in the ARO screening questionnaire. Observed actions will be based on whether microbiological swabs were completed as expected within 24 hours of the triggered best practice advisory.

ARO screening questionnaire actions will be reported quarterly for each facility under surveillance and aggregated into categories (i.e., zone, provincial, facility type).

1. Villa Caritas is a Mental Health Facility in Covenant Health where ARO admission screening is conducted, and therefore it is included in the list of facilities with reported ARO admission screening compliance.
2. Screening practices among newborns, nurseries, and NICUs vary throughout the province (e.g., some NICUs admit through the community, while others do not); therefore, cannot reliably use admitting service or unit alone to exclude screening among newborns.

Approved: July 18,2024
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Calculations

Measure	Calculations
ARO Admission Screening Compliance	Number of completed ARO screening questionnaire x 100 Number of included inpatient admissions
Time to ARO Admission Screening	(First ARO screening questionnaire completion date/time) - (Included Inpatient Admission Date/time) in hours
ARO Screening Actions: Microbiological Swabs (MRSA, CPO)	MRSA and/or CPO swabs collected x 100 Number of inpatient admissions with completed ARO Screening Questionnaire and MRSA and/or CPO swabs expected based on triggered BPAs

Data sources and variables

All data will be extracted from Connect Care (EPIC) and will include encounter information, ARO screening questionnaire data, and microbiological swab orders.

Variables will include patient identifiers (PHN/ULI, Date of Birth), encounter identifiers, admission/discharge dates, admitting zone/facility/departments admission source (e.g., facilities transferred from), ARO screening questionnaire identifiers, date/time when ARO screening questionnaire completed, ARO screening questions and responses, patient location at the time ARO screening questionnaire is completed, best practice advisories and actions.

Limitations

Isolation terminology and workflows in Connect Care are complex. A patient can have an active isolation status for different reasons. Isolations can be added for many reasons outside of ARO admission screening, and the isolation best practice advisory from the ARO screening questionnaire will not appear if there is already an active isolation at the time the screening questionnaire is completed, and therefore it was not possible to determine if a patient with an active isolation status was on isolation because of ARO admission screening. We were unable to obtain data reliably linking patient isolation to the ARO admission screening questionnaire; therefore, compliance with isolation precautions initiated because of risks identified during ARO admission screening was not evaluated. This will be evaluated over time to assess whether isolation actions can be included in the reporting of the ARO screening questionnaire.

Compliance with admission screening swabs for MRSA/CPO may be underestimated if healthcare staff opt to not collect admission swabs because the patient had a swab collected in a pre-admission clinic prior to the admission, or if the patient is known positive for MRSA/CPO and it is not yet time to collect clearing swabs. There is some guidance in the system, through the swab best practice advisory, that allows the healthcare staff to choose not to collect a screening swab. However, it is difficult to assess whether this decision is based on a known positive result, or for another reason (i.e., didn't know, opted out). In a preliminary analysis, we assessed the impact of excluding observations of MRSA/CPO admission testing if the response was "YES" to the question "Is the patient known to have an antimicrobial resistant organism (ARO) such as MRSA or CPO?" in the ARO admission questionnaire. There was no change in the overall compliance when these observations were excluded. With no change to compliance and without clear criteria and rationale for excluding these observations, it was decided not to exclude them.

Completing the ARO admission questionnaire for each inpatient encounter is required; however, local variances in practice (e.g., which patients are assessed and when they are swabbed for MRSA/CPO) is not captured in provincial tools in Connect Care.

Connect Care was implemented at sites across multiple launches (see Appendix A) and therefore provincial ARO Screening compliance was incomplete until all sites were live and active on Connect Care.

Comparator rates

Internal measures are used as comparators. The internal measures will be based on historical values and trends for the province, facility, or zone from the previous fiscal year. No external measures are available for comparison.

Reporting

Communication and dissemination of surveillance reports is an integral part of surveillance, to inform IPC practice within AHS and Covenant Health facilities and provide support for interventions that improve the quality of patient care delivered. Responsibility for compiling, reporting, and disseminating data and reports is shared between the provincial IPC Surveillance and Standards team and the provincial IPC program. Formal reports are generated routinely (usually quarterly) using reconciled and validated data. The reports contain information on the facility, zone and provincial level and are presented to the provincial IPC Surveillance, Evaluation, Quality Improvement, and Research (SEQIR) Committee for approval. Operational reports are created by local ICPs or their designate from existing Connect Care system reports that may or may not provide facility-level information as they are likely created with real-time, as is data for individual patients.

Data quality

The purpose of evaluating the quality of data is to ensure that ARO screening data are being monitored efficiently and effectively. The evaluation should involve the assessment of the program (i.e., the protocol, and reporting) and system (i.e., electronic medical record) attributes, including relevance, simplicity, flexibility, data quality, acceptability, consistency, representativeness, timeliness, and stability. Additionally, with the increasing use of technology, informatics concerns for surveillance systems need to be addressed. These include evaluating hardware and software, using a standard user interface, applying standard data formatting, and coding, performing quality checks, and adhering to confidentiality and security standards.

A standardized approach is used to reconcile and validate the data provincially.

Data quality working group

The IPC Surveillance Data Quality Working Group reports to the IPC Surveillance, Evaluation, Quality Improvement and Research Committee and is responsible to develop, review and update indicator protocols. The IPC Connect Care Subject Matter Experts and the Connect Care IPC group will consult with the Data Quality Working Group whenever there are changes to the ARO admission screening questionnaire so that this protocol can be updated. The IPC Connect Care Subject Matter Experts and the Connect Care IPC group will support the Data Quality Working Group in ensuring data quality and interpretation of the reports. Decisions from the Data Quality Working Group on specific protocol questions are communicated to provincial ICPs through the Data Quality Forum. These decisions will be supplemental to the protocol and will be incorporated into the protocol when revised.

Protocol revision history

Date	Details
February 28, 2023	First draft
May 30, 2023	Revisions and comments from ARO screening reporting working group
October 31, 2023	Further revisions from analysts based on data reporting process
January 12, 2024	Updating limitations related to Isolation data, removed Appendix B: Connect Care Data Tables and Variables (will be added to reporting SOP), editorial changes, removing comments
February 23, 2024	Updating exclusion criteria, clarifying definitions, and adding to the limitations based on discussions from DQWG.
May 1, 2024	Minor edits to limitations, added footnote for mental health facilities exclusion criteria.

Approved: July 18,2024
Revised: July 25, 2024.

References

Council of Canadian Academies. When Antibiotics Fail. Ottawa, ON: Council of Canadian Academies; 2019.

Ventola CL. The antibiotic resistance crisis: part 1: causes and threats. P T. 2015;40(4):277-83.

World Health Organization. Global action plan on antimicrobial resistance. Geneva, Switzerland: World Health Organization; 2015.

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Appendix A: List of facilities included and Connect Care implementation dates

Zone	Organization	Location	Facility Type	Connect Care Launch
Edmonton	AHS	Stollery Children's Hospital	Pediatric	Launch 1 - November 3, 2019
Edmonton	AHS	University of Alberta Hospital	Tertiary-Urban	Launch 1 - November 3, 2019
Edmonton	AHS	Mazankowski Alberta Heart Institute	Tertiary-Urban	Launch 1 – November 3, 2019
Edmonton	AHS	Devon General Hospital	Suburban/Rural	Launch 2 - October 24, 2020
Edmonton	AHS	Fort Saskatchewan Community Hospital	Suburban/Rural	Launch 2 - October 24, 2020
Edmonton	AHS	Leduc Community Hospital	Suburban/Rural	Launch 2 - October 24, 2020
Edmonton	AHS	Sturgeon Community Hospital	Regional	Launch 2 - October 24, 2020
Edmonton	AHS	Westview Health Centre	Suburban/Rural	Launch 2 - October 24, 2020
North	AHS	St. Theresa General Hospital	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Northwest Health Centre	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Beaverlodge Municipal Hospital	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Fox Creek Healthcare Centre	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Fairview Health Complex	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Grande Cache Community Health Complex	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	High Prairie Health Complex	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Manning Community Health Centre	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Sacred Heart Community Health Centre	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Peace River Community Health Centre	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Central Peace Health Complex	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Valleyview Health Centre	Suburban/Rural	Launch 3 - April 10, 2021
North	AHS	Grande Prairie Regional Hospital (formerly Queen Elizabeth II Hospital prior to 2022)	Regional	Launch 3 – April 10, 2021
Calgary	COV	Mineral Springs Hospitals	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	Alberta Children's Hospital	Pediatric	Launch 4 - May 28, 2022
Calgary	AHS	Peter Lougheed Centre	Large Urban	Launch 4 - May 28, 2022
Calgary	AHS	Oilfields General Hospital	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	Canmore General Hospital	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	Claresholm General Hospital	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	Didsbury District Health Services	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	High River General Hospital	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	Strathmore District Health Services	Suburban/Rural	Launch 4 - May 28, 2022
Calgary	AHS	Vulcan Community Health Centre	Suburban/Rural	Launch 4 - May 28, 2022
Edmonton	AHS	Glenrose Rehabilitation Hospital	Regional	Launch 4 - May 28, 2022
Edmonton	AHS	Royal Alexandra Hospital	Large Urban	Launch 4 - May 28, 2022
Central	COV	Our Lady of the Rosary Hospital	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Red Deer Regional Hospital Centre	Regional	Launch 5 – November 6, 2022
Calgary	AHS	Foothills Medical Centre	Tertiary-Urban	Launch 5 - November 6, 2022
Central	AHS	Coronation Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022

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Zone	Organization	Location	Facility Type	Connect Care Launch
Central	AHS	Drayton Valley Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Drumheller Health Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Hanna Health Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Innisfail Health Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Lacombe Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Olds Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Ponoka Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Red Deer Regional Hospital Centre	Regional	Launch 5 - November 6, 2022
Central	AHS	Rimbey Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Rocky Mountain House Health Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Stettler Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Myron Thompson Health Centre (previously Sundre Hospital and Care Centre prior to 2021)	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Three Hills Health Centre	Suburban/Rural	Launch 5 - November 6, 2022
Central	AHS	Wetaskiwin Hospital and Care Centre	Suburban/Rural	Launch 5 - November 6, 2022
Edmonton	AHS	Cross Cancer Institute	Regional	Launch 5 - November 6, 2022
Calgary	AHS	Rockyview General Hospital	Large Urban	Launch 6 – May 6, 2023
Calgary	AHS	South Health Campus	Large Urban	Launch 6 – May 6, 2023
Central	AHS	Daysland Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Hardisty Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	COV	Killam Health Care Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Lamont Health Care Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Provost Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	COV	St. Joseph's General Hospital	Suburban/Rural	Launch 6 – May 6, 2023
Central	COV	St. Mary's Hospital	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Tofield Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Two Hills Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Vermillion Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Viking Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Central	AHS	Wainwright Health Centre	Suburban/Rural	Launch 6 – May 6, 2023
Edmonton	COV	Grey Nuns Community Hospital	Large Urban	Launch 6 – May 6, 2023
Edmonton	COV	Misericordia Community Hospital	Large Urban	Launch 6 – May 6, 2023
Edmonton	COV	Villa Caritas	Suburban/Rural	Launch 6 – May 6, 2023
North	AHS	Athabasca Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Barrhead Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	COV	Bonnyville Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Boyle Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Cold Lake Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Edson Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Elk Point Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	George McDougall – Smoky Lake Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Hinton Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023

Zone	Organization	Location	Facility Type	Connect Care Launch
North	AHS	Mayerthorpe Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Northern Lights Regional Health Centre	Regional	Launch 7 – November 5, 2023
North	AHS	Redwater Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Seton – Jasper Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Slave Lake Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	St. Therese – St. Paul Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Swan Hills Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Wabasca-Desmarais Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Westlock Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	Whitecourt Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
North	AHS	William J. Cadzow – Lac La Biche Healthcare Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Bassano Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Big Country Hospital	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Bow Island Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Brooks Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Cardston Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Chinook Regional Hospital	Regional	Launch 7 – November 5, 2023
South	AHS	Crowsnest Pass Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Medicine Hat Regional Hospital	Regional	Launch 7 – November 5, 2023
South	AHS	Pincher Creek Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Raymond Health Centre	Suburban/Rural	Launch 7 – November 5, 2023
South	AHS	Taber Health Centre	Suburban/Rural	Launch 7 – November 5, 2023

Appendix B: Protocol specific definitions

Terms	Definitions
ARO admission screening questionnaire	
Best Practice Advisory (BPA)	Reminder questionnaires within the Epic electronic medical record system (i.e., Connect Care in Alberta) that provide clinical decision support. In this context, it informs the user whether a microbiological swab needs to be collected from the patient and/or isolation/additional precautions is needed. These BPAs may be active or passive. Microbiological swabs are passive, while initiating isolation is an active BPA.
Expected actions	Depending on the responses entered by the end-user in the ARO admission screening questionnaire, best practice advisory will alert the end-user on which action is needed (i.e., microbiological swab, or isolation).
Observed actions	Whether an expected action (i.e., microbiological swab, or isolation) is completed.

Appendix C: General definitions

Terms	Definitions
Encounter types	Type of AHS/Covenant Health healthcare location or facility where the patient is located at the time of identification. The following encounter types are referred to in acute care surveillance protocols (Government of Alberta, 2008; Government of Alberta, 2020).
Continuing care	An integrated range of services supporting the health and wellbeing of individuals living in their own home, a supportive living or long-term care setting. Continuing care clients are not defined by age, diagnosis, or the length of time they may require service, but by their need for care.
Emergency	Emergency Departments take care of people that are very sick or injured on a priority basis by providing medical care, which may include assessment, treatment, stabilization to prepare people for transport to a higher level of care facility (if needed) and follow-up care, including referrals to a family doctor or specialist (if needed). This option can be used to capture outpatient encounters when a patient visited the emergency department at a facility and did not subsequently get transferred to an inpatient unit, but rather returned back to his/her home setting.
Inpatient acute care	Refers to a General Hospital**:** According to the *Hospitals Act*, a general hospital is defined as a "hospital providing diagnostic services and facilities for medical or surgical treatment in the acute phase for adults and children and obstetrical care" (Government of Alberta, 2020). General hospitals have several functional centres. Each functional centre is associated with in-patient, outpatient, or diagnostic and therapeutic services.
Inpatient mental health/rehab	A designated mental health facility providing diagnosis and treatment for mental illness and addiction in the acute phase for adults and children. Inpatient services refer to a person admitted to and assigned a bed in a facility by order of a physician for provision of diagnostic and/or treatment services. They would have a patient/group room in which inpatient services are provided within the patient's room or within a common group room within the designated mental health facility. AHS facility examples include Glenrose Rehabilitation Hospital, Centennial Centre for Mental Health and Brain Injury.
Patient admission	A person admitted to and assigned a bed in a hospital by the order of a physician, for the provision of diagnostic or treatment services or both. Includes any time in the emergency department where the patient is subsequently transferred to an inpatient unit. (Government of Alberta, 2020).
Emergency department inpatient days (EDIP)	As defined by AHS, denominators for provincial surveillance modules include these figures in the total patient-days. Includes the number of acute care inpatient patient-days utilized in the emergency department during the reporting period. The figures reflect the time from emergency department discharge (i.e. decision to admit) to emergency department departure for patients admitted to an acute care hospital. It is calculated as [(emergency department departure date and time – emergency department discharge date and time) ÷ 60 ÷ 24]. Figures exclude cases where the emergency department discharge date and time or emergency department departure date and time were not provided, or the value has a negative number.
Inpatient facility types	Type of AHS/Covenant Health healthcare location or facility where the patient is located at the time of identification. The following facility types are used to group facilities in reports. *Tertiary Hospitals:* serve a population of patients who have conditions such as cancer, organ-failure, severe cardio-pulmonary disease, and major trauma. Specialized services include bone

Terms	Definitions
	marrow and solid organ transplants, cardiac surgery, neurosurgery, spinal surgery, and renal dialysis. *Large Urban Hospitals:* serve a population of patients with moderate to severe conditions that require medical or surgical interventions. High risk medical interventions such as cardiovascular and vascular surgery, joint (hips, knees, and shoulders) replacements, and prostate surgery are performed. *Regional Hospitals:* provide medical and surgical services to populations in and surrounding the smaller cities. A broad range of procedures is provided and can be like that of the large urban hospitals. *Pediatric Hospitals:* provide similar medical and surgical services as tertiary hospitals to patients from birth to age 18 years. Specialized services include bone marrow and solid organ transplants, cardiac surgery, neurosurgery, spinal surgery, and renal dialysis. *Suburban/Rural Hospitals:* provide medical and surgical services to populations in and surrounding smaller cities. They typically have less than 100 inpatient beds and provide a variety of services in 24-hour emergency, acute care, obstetrics, surgery, respite care, palliative care, and rehabilitation.