cadth

CADTH Health Technology Review Recommendation

Emergency Department Overcrowding in Canada

Expert Guidance

Key Messages

What Is the Issue?

- Emergency departments (EDs) across Canada are under strain and experiencing overcrowding, a situation that arises when the demand for health services in the ED exceeds the capacity of the health system — which includes the ED, hospital, and community — to provide quality care in a reasonable amount of time.

- ED overcrowding is contributing to a deteriorating standard of care as health care providers and staff become overworked and burned out, is putting health and lives at risk, and is placing additional strain on an already overwhelmed health care system.

What Did We Do?

- The CADTH Health Technology Expert Review Panel (HTERP) convened to develop objective, impartial, trusted pan-Canadian guidance to inform decisions about which evidence-informed solutions should be considered to help alleviate ED overcrowding in Canada.

What Is HTERP's Position on ED Overcrowding?

- ED overcrowding is a complex health system issue. EDs operate within hospitals and broader health and social systems, which means that accountability for causes, impacts, and solutions do not lie solely within the ED and its operations.

- Output factors (e.g., misalignment between acute care bed capacity within the hospital and population needs) and input factors (e.g., misalignment between care available in the community and population needs, including care outside of regular business hours) respectively, are the main contributors to ED overcrowding in Canada. Health system capacity is not aligned with, nor has kept pace with, the growing and changing health care needs of the population, which results in overcrowded EDs.

- Health systems will observe better results by implementing strategies that improve patient flow and focus on output and input factors relative to throughput factors.

What Is HTERP's Guidance to Help Alleviate ED Overcrowding?

- Interventions to alleviate overcrowding need to align with the main contributing factors to ED overcrowding in the particular context in which they will be implemented.

Key Messages

- Understanding the context in which ED overcrowding is occurring, with attention to bottlenecks to patient flow, should be the first step to identify evidence-informed solutions.

- Transparency and accountability should be key principles in ED, hospital, and health system operations. HTERP recommends identifying and ensuring clear roles, responsibilities, and reporting relationships embedded within an accountability framework for ED overcrowding across health system partners, including a commitment to act on data.

- Each province and territory should mandate consistent and comprehensive reporting by all hospitals to the Canadian Institute of Health Information's National Ambulatory Care Reporting System (NACRS) database.

- HTERP's guidance includes an Evidence Navigation Guide to support identification of evidence-informed interventions to help alleviate ED overcrowding.

The Problem: Emergency Department Overcrowding in Canada

Emergency departments (EDs) across Canada are under strain and experiencing overcrowding. Overcrowding in the ED arises when the demand for health services in the ED exceeds the capacity of the health system — which includes the ED, hospital, and community — to provide quality care in a reasonable amount of time.[1,2] People visit the ED for legitimate health care needs that cannot be met elsewhere, which results in ED overcrowding and an expanded scope of practice for ED clinicians and staff.

Recent data indicate that ED overcrowding is worsening across the country.[3] In fiscal year 2022–2023, the total number of ED visits and the number of ED visits per 1,000 population returned to prepandemic levels after a decrease in 2020–2021.[4] Over this same time period, the acuity of patients presenting to the ED, as measured by the Canadian Triage and Acuity Scale (CTAS) level, has been increasing. Although the overall proportion of patients assigned CTAS Level 1 (i.e., resuscitation required) is low (i.e., less than 1.3% of all ED visits in 2022–2023), it has been steadily increasing since 2010–2011. EDs are also experiencing higher proportions of patients assigned CTAS Levels 2 and 3 (i.e., urgent or emergent care requiring rapid intervention), and lower proportions of patients assigned CTAS Level 4 (i.e., less urgent care). The proportion of overall ED visits by adults aged 65 years and older has also increased, the proportion of patients being discharged after an ED visit has decreased, and median wait times for inpatient beds for admitted patients has increased. These statistics suggest that people are presenting to the ED with more complex health needs. Median ED length of stay, wait time to physician initial assessment, and the proportion of patients who have 'left without being seen' have also increased in recent years.[3]

From 2016 to 2023, Canada's population estimates increased 11.1% from nearly 36 million to approximately 40 million people, with permanent and temporary immigration being the main contributors to the observed growth.[5] From 2016 to 2021, the number of persons aged 65 years and older also rose 18.3% to 7.0 million.[5] These trends indicate a growing population with changing health care needs, and also an increasingly culturally diverse population. Administrative data indicate that the resources critical to support ED demand have remained stable and have not increased proportionally with population growth.[3] For example, the number of total hospital beds per 1,000 population and the number of long-term care beds per 1,000 population decreased from 2010 through 2021. In 2021, Canada ranked low compared with other Organisation for Economic Co-operation and Development (OECD) countries in the total number of hospital beds per 1,000 population and the number of long-term care beds per 1,000 population aged 65 years and older. Hospital occupancy rates remain high, with Canada ranking among the highest of OECD countries in acute care bed occupancy rates in 2021 and average acute care length of stay.[3]

ED overcrowding is contributing to a deteriorating standard of care as health care providers and staff become overworked and burned out, is putting patients' lives and health at risk when treatment needs within the ED exceed the resources and expand the scope of practice required to address them and is placing additional strain on an already overwhelmed health care system.

The Response: Guidance From the CADTH Health Technology Expert Review Panel

The mandate of the CADTH Health Technology Expert Review Panel (HTERP) is advisory in nature and is to participate in the development of guidance or recommendations for CADTH projects on medical devices, diagnostic tests, and clinical interventions (inclusive of models and programs of care). Following a request from Alberta Health Services for objective, impartial, and trusted guidance, and because the pan-Canadian relevance of the issue, HTERP convened to develop pan-Canadian guidance in response to the decision problem informed by CADTH evidence:

> **What evidence-informed solutions should be considered to inform decision- and policy-making to effectively alleviate overcrowding of adult and pediatric ED services in urban, rural, and remote health care settings in Canada?**

The audience for HTERP's guidance is senior decision-makers responsible for developing and implementing Canada's federal, provincial, and territorial health policies and health systems, and the decision-making tables and teams who are tasked with advancing health system priorities. The audience includes federal, provincial, and territorial deputy ministers and assistant-deputy ministers of health, and other senior executives as well as executives at provincial and territorial health authorities, cancer agencies, or other provincial health agencies, hospitals, and health service delivery organizations.

HTERP Guidance Development Process

HTERP comprises 7 core members who serve for all topics under consideration during their term of office: chair, ethicist, health economist, patient member, 2 health care practitioners, and a health technology assessment specialist. In addition to these core members, HTERP also includes up to 5 expert members appointed to provide their expertise on a specific topic. To develop guidance to support solutions to alleviate ED overcrowding in Canada, HTERP appointed 3 members with expertise with ED care and administration, 1 member with lived experience of ED overcrowding, and 1 member with expertise in implementation science. The HTERP members are listed in [Appendix 1](#).

CADTH conducted a series of evidence and information reviews on the topic of ED overcrowding in Canada as an update to their 2006 publications.[6-9] To enhance the quality and relevance of this work, CADTH engaged a wide range of people with extensive personal and/or professional experience with ED care within the Canadian health system. Patients, family members, community members, and ED clinicians and

staff were engaged as expert consultants, peer reviewers, and HTERP members. Others participated in multistakeholder dialogue sessions. Five CADTH reports have been published that address the following:
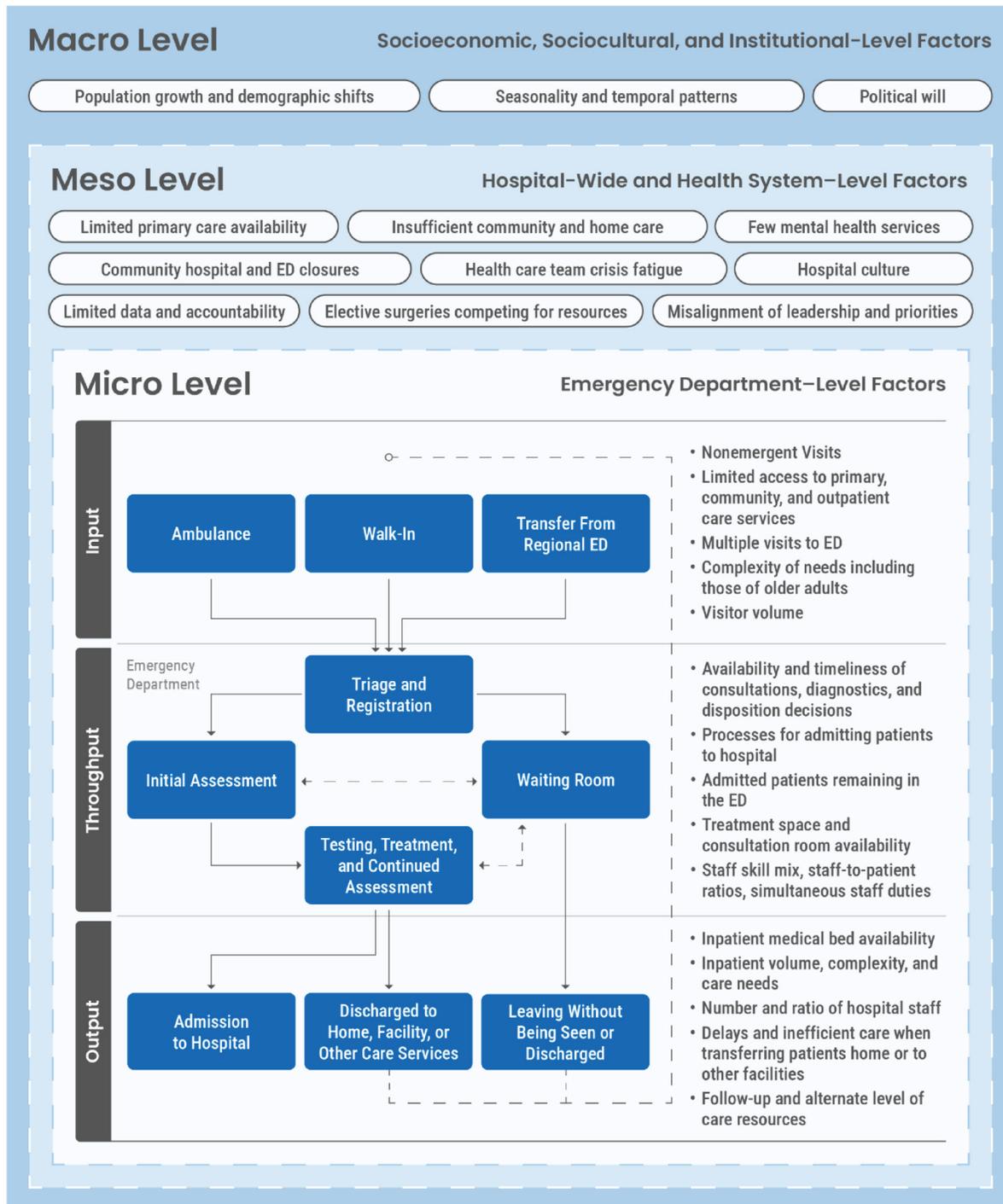
- factors contributing to ED overcrowding in Canada and interventions that have been studied for their impact on alleviating ED overcrowding[10]
- the impact ED overcrowding has on quality of care and patient safety (i.e., the risks of overcrowding), health professional learner experiences, and staff well-being[11]
- demographic and utilization patterns of patients accessing EDs in Canada[3]
- new and emerging interventions to alleviate ED overcrowding[12]
- a summary of CADTH's multistakeholder dialogue sessions.[13]

HTERP used these CADTH reports to inform their deliberations and to develop this guidance for addressing the decision problem. HTERP members reviewed and discussed the evidence and information, considered stakeholder and expert input, and developed guidance through a series of meetings between March and September 2023. A draft version of this guidance was available for broad stakeholder and public feedback from October 19 to November 5, 2023. The feedback that was received is reflected in this final version.

HTERP's Position on ED Overcrowding

- Anyone who needs immediate medical attention should present to the ED if there is no alternative to receive urgent care in a timely manner.
- ED overcrowding is a complex health system issue and not a problem for which sole accountability for the causes, impacts, and solutions lies solely within the ED and its operations. EDs operate within hospitals and broader health and social systems that contribute to experiences of, and potential solutions to, overcrowding. As a complex health system issue, ED overcrowding occurs due to several interconnected, interdependent factors across micro level, meso level, and macro level contexts. There is no singular cause, nor singular solution. Figure 1 presents a conceptual model of patient flow through the ED within the broader health care system.
- Some people are more vulnerable to the impacts of ED overcrowding, at least in part due to existing social and structural inequities, such as social isolation, poverty, limited agency to self-advocate, mental health emergencies, lack of access to primary care, substance use, and lack of access to safe and secure housing. Solutions to help alleviate overcrowding need to be developed and implemented with consideration of such inequities and should aim to reduce them not exacerbate them.

Figure 1: Patient Flow Through the Emergency Department Within the Broader Health Care System

Macro Level — Socioeconomic, Sociocultural, and Institutional-Level Factors

- Population growth and demographic shifts
- Seasonality and temporal patterns
- Political will

Meso Level — Hospital-Wide and Health System–Level Factors

- Limited primary care availability
- Insufficient community and home care
- Few mental health services
- Community hospital and ED closures
- Health care team crisis fatigue
- Hospital culture
- Limited data and accountability
- Elective surgeries competing for resources
- Misalignment of leadership and priorities

Micro Level — Emergency Department–Level Factors

Input
- Ambulance
- Walk-In
- Transfer From Regional ED

- Nonemergent Visits
- Limited access to primary, community, and outpatient care services
- Multiple visits to ED
- Complexity of needs including those of older adults
- Visitor volume

Throughput

Emergency Department
- Triage and Registration
- Initial Assessment
- Waiting Room
- Testing, Treatment, and Continued Assessment

- Availability and timeliness of consultations, diagnostics, and disposition decisions
- Processes for admitting patients to hospital
- Admitted patients remaining in the ED
- Treatment space and consultation room availability
- Staff skill mix, staff-to-patient ratios, simultaneous staff duties

Output
- Admission to Hospital
- Discharged to Home, Facility, or Other Care Services
- Leaving Without Being Seen or Discharged

- Inpatient medical bed availability
- Inpatient volume, complexity, and care needs
- Number and ratio of hospital staff
- Delays and inefficient care when transferring patients home or to other facilities
- Follow-up and alternate level of care resources

Contributing Factors to ED Overcrowding in Canada

- Attention to, and accountability for, the efficient flow of patients through their pathway of care, from arrival at the ED to discharge from the ED or hospital, is essential for identifying solutions to alleviate overcrowding. Factors that interrupt the flow of patients and contribute to ED overcrowding can be categorized as input, throughput, output, and contextual and systems factors. Many factors that can contribute to ED overcrowding have been identified and published in the scientific literature.[10] Some are more relevant in the Canadian context than others, some are not relevant at all, and some may be more relevant or less relevant when considered at a specific local level.
  - **Input factors** influence the need for ED services and relate to access to the ED (e.g., limited availability of health services outside the ED)
  - **Throughput factors** relate to flow through the emergency department (e.g., consultation, testing, and decision delays)
  - **Output factors** focus on patient disposition after the ED, such as to inpatient care, outpatient care, or home (e.g., access block)
  - **Contextual and systems factors** are outside the input-throughput-output categories (e.g., meso and macro factors such as health care team crisis fatigue, population growth, and demographic shifts)

The Importance of Input and Output Factors to ED Overcrowding in Canada

- HTERP identifies *output* factors, followed by *input* factors, as the main contributors to ED overcrowding and impeding patient flow in Canada. Health system capacity is not aligned with, nor has kept pace with, the growing and changing health care needs of the population. The effects are observed as overcrowded EDs. Specifically, HTERP identifies the following in priority order as the most relevant factors contributing to overcrowding across EDs in Canada:
  - **Misalignment between acute care bed capacity within the hospital and population needs (an output factor):** Limited acute care bed capacity results in patients boarding in the ED. Boarding is the need to hold patients in the ED after they have been admitted to the hospital because acute care (i.e., inpatient) beds are not available, which reduces the capacity to care for other patients in the ED.
  - **Misalignment between the number of long-term care beds within the community and population needs (an output factor):** High proportions of admitted patients who need alternate levels of care and who are unable to be discharged from the ED or hospital further contribute to access block. Access block refers to the situation where patients are unable to gain access to appropriate health care resources (e.g., alternate level of care spaces) due to limited capacity.
  - **Misalignment between care available in the community and population needs, including care outside of regular business hours (an input factor and an output factor):** People seek health services from EDs in Canada for a host of legitimate reasons beyond the need for emergency care in the absence of other options, including urgent care, access to diagnostic testing or specialists,

primary care, and postoperative follow-up. As Canada's population grows and shifts, so have health care needs.

- Although attention to ED throughput factors is critical for managing ED overcrowding, HTERP asserts that as a complex system issue, health systems will observe a higher impact on alleviating ED overcrowding by implementing interventions and strategies that improve patient flow and that focus on **output** and **input** factors relative to **throughput** factors.

Evidence-Informed Solutions to Alleviate Overcrowding

- HTERP advises considering the complex nature of ED overcrowding within the broader health system when interpreting evidence on the effectiveness of interventions to help alleviate overcrowding. Interventions can be categorized as:
  - **Input interventions** related to the need for ED services and how and whether patients access the ED (e.g., enhanced access to nonemergent care outside of the ED, surge management and prediction)
  - **Throughput interventions** are implemented within the ED (e.g., nurse-initiated interventions, matching staffing to arrival patterns)
  - **Output interventions** related to leaving the ED for inpatient care, outpatient care, or home (e.g., care coordination and transition strategies, aligning acute care bed capacity within hospitals)
  - **Interventions related to systems and contextual factors outside of the ED** (e.g., 7-day per week or 16-hours per day hospitals, shared accountability frameworks across all health system partners)
  - **Multicomponent interventions** that combine 2 or more interventions.
- CADTH's evidence reports indicate that numerous interventions have been, and are being, developed and implemented to help alleviate ED overcrowding, including input, throughput, and output interventions as well as interventions outside the ED. A large body of research summarizes outcomes of and experiences with many, but not all, of these interventions.[10] Although there are limited data on the effectiveness of interventions implemented in a Canadian context, there are numerous examples of innovative interventions being implemented to support reduction in overcrowding in EDs across Canada.[12]
- Due to the complex nature of overcrowding, implementing interventions is context dependent. If published evidence demonstrates limited or no impact on ED overcrowding outcomes, this does not preclude the potential for the same intervention to lead to improved outcomes in another context or setting if implemented as intended.
- Beyond the evidence reviewed by CADTH, other evidence types and sources may be relevant to inform decisions around ED overcrowding, including philosophical ethics and other social scientific literature, engineering and operations research, media and case studies, case law, and theories of resource allocation, justice, and game theory.

HTERP's Guidance to Inform Decision- and Policy-Making to Alleviate ED Overcrowding

Ensure Alignment Between Factors Contributing to, and Interventions to Alleviate, ED Overcrowding

- HTERP advises that:
  - Interventions intended to alleviate overcrowding need to be aligned with the main contributing factors to ED overcrowding in the particular context in which they will be implemented. The specific contributors to overcrowding are relatively unique to each setting, considering the ED, hospital, and corresponding health region, given the complex nature of the problem and health and social systems, and the effect of local contexts on the interrelationships between the many interacting and contributing underlying factors.
  - Solutions to alleviate overcrowding may require implementation and coordination of multiple interventions with a view to the whole health system and external and closely related systems (e.g., housing, transportation, access to mental health resources). HTERP suggests a learning health systems approach[14] that acknowledges dynamic health systems with multiple influences and ongoing learning to provide value to patients, providers, and the broader health system.
  - The implementation of any intervention(s) intended to alleviate overcrowding occurs in the context of an accountability framework that identifies and ensures clear roles, responsibilities, and reporting relationships for the outcomes and experiences within the ED across health system partners, including ED and hospital staff and administration, health authorities, and health ministries.
- The Evidence Navigation Guide (Appendix 2) provides a 4-step process to help decision-makers assess ED overcrowding and consider interventions to implement. As the first step, HTERP recommends an assessment of the context in which ED overcrowding is occurring to identify evidence-informed solutions, with attention to potential bottlenecks to patient flow. Prompting questions to support this step are included Guide and include consideration of the following:
  - **Local and health system data, metrics, and indicators of ED overcrowding,** such as number of ED visits, ED length of stay, wait times to physician initial assessment, wait times for inpatient beds, proportion of alternate level of care patients, and proportion of patients who "left without being seen." These metrics should be analyzed to identify patterns or trends, such as by time of day, day of week, or time of year.
  - **Input factors**, such as access to diagnostic services in the community outside the ED, access to ambulatory care and specialist care services in the community, availability of primary care, patient arrival patterns, and the characteristics of the population the ED is intended to serve.
  - **Throughput factors**, such as specialist consultations; diagnostic and imaging utilization and processes; staffing capacity, skill mix and processes; patient processing, triage, and intake processes; and ED infrastructure.

- ◦ **Output factors**, such as proportion of patients requiring alternate levels of care, availability of alternate level of care resources in the community, admission planning and management processes, proportion of admitted and discharged patients, and wait times for inpatient beds.
- ◦ **Contextual and systems factors**, such as staff well-being and burnout, accountability policies and frameworks, communication and coordination strategies between different parts of the health system, and population growth and demographic shifts.

Identify Potential Solutions Aligned With the Context in Which ED Overcrowding Is Occurring

- With an understanding of the context in which ED overcrowding is occurring, including the main contributing factors, HTERP recommends identifying potential interventions to alleviate overcrowding with the support of the following:
  - ◦ a report on *Emergency Department Overcrowding: An Environmental Scan of Contributing Factors and a Summary of Systematic Review Evidence on Interventions*[10]
  - ◦ a Horizon Scan on *New and Emerging Interventions to Alleviate Emergency Department Overcrowding*[12]
  - ◦ the Evidence Navigation Guide (Appendix 2) that includes a web-based interface detailing all interventions identified through expert input and CADTH's reviews.
- In consideration of the available evidence and expert input, HTERP asserts that some interventions and strategies show promise to alleviate ED overcrowding in Canadian jurisdictions if aligned with the main contributing factors to ED overcrowding in a specific context and if successful implementation is possible. These interventions are presented as input, throughput, output, and systemic categories in Appendix 3.

Ensure Implementation Feasibility and Evaluate

- When an intervention(s) is considered for implementation, HTERP recommends an assessment to ensure the intervention(s) can be successfully implemented and is able to have the intended effect on ED overcrowding. An assessment would involve consideration of available financial and human resources and infrastructure, support and leadership from all relevant health system partners, and perspectives of those who work in, use, and support the ED, hospital, and health ministry. Several published frameworks can support successful implementation, including the Implementation in Context (ICON) Framework and the Consolidated Framework for Implementation Research (CFIR). The third step in the Evidence Navigation Guide in Appendix 2 provides prompting questions to assist in designing an implementation strategy.
- Implementing interventions should be done in consideration of the differential impacts ED overcrowding has on different people and with an aim to reduce and not exacerbate existing inequities. HTERP recommends identifying and attending to who might benefit from, be harmed by, excluded by, or experience discrimination or bias from the implementation of an intervention. Targeted approaches may be needed for specific equity-deserving groups.

- Evaluation of the process and outcomes of implementing interventions to alleviate overcrowding is essential to ensure interventions are being adopted and having their intended effect, to assess potential need for any adjustments in the approach, and to gather information that can be shared with others for learning. HTERP recommends evaluation plans that reflect the dynamic nature of ED overcrowding as a complex health systems issue and that are dynamic to ensure adoption of different strategies as the context changes. HTERP recommends planning for evaluation before interventions are implemented and disseminating the results of evaluations through presentations and publications to build the Canadian-specific evidence base. The fourth step of the Evidence Navigation Guide in Appendix 2 includes a recommended approach to evaluation and reassessment using the RE-AIM framework.[15]

Uphold Transparency and Accountability Through Data Collection, Analysis, Use, and Reporting

- HTERP strongly advises transparency and accountability as key principles in ED, hospital, and health system operations, which includes collecting, analyzing, using, and reporting a consistent and comprehensive set of data elements within hospitals and health regions. HTERP recommends identifying and ensuring clear roles, responsibilities, and reporting relationships embedded within an accountability framework for ED overcrowding across health system partners and a commitment to act on data within a learning health system approach.[14]

- HTERP advises that each province and territory mandate consistent and comprehensive reporting by all hospitals to CIHI's NACRS database to support assessment of health system capacity relative to demand for, and equity in, access to health services.

- HTERP also advises consistent, comprehensive, and timely data collection, analysis, use, and reporting:

  - **Within each health region** to support needs-based planning by understanding population health needs and availability of resources that affect ED input and output factors, such as access to diagnostic services, postoperative follow-up, urgent care, primary care, and long-term care.

  - **Within each hospital** including real-time and patient-centred utilization and experience data to help characterize the population and population needs and service requirements. Data collection at the hospital level will additionally support an evaluation of interventions on ED overcrowding outcomes and the experiences of patients, visitors, and staff.

- HTERP acknowledges that collecting, analyzing, and reporting data requires time and other resources, the burden of which may be reduced through automation and integrated and centralized information technology systems. Ongoing efforts to enhance interconnectivity and communication within regions may also be leveraged. HTERP noted that the reporting of the majority of NACRS data elements can be automated with minimal technology and could be included in the implementation of ED information systems.

- Engagement with representatives inclusive of Canada's diverse cultures and peoples is required to ensure data collection, analysis, and reporting strategies do not perpetuate harm or inequities and

respect appropriate disclosure practices. At present, under-representation of marginalized and equity-deserving groups is noted as a major limitation in the administration of data collection systems and should be addressed moving forward.

Summary of the Evidence That Informed HTERP's Guidance

This section summarizes the evidence and information reviews produced by CADTH on ED overcrowding in Canada. These were used by HTERP as inputs into their deliberations and to develop their guidance for addressing the decision problem. CADTH produced 5 reports:

- *An Analysis of Demographic and Utilization Patterns of Patients Accessing Emergency Departments in Canada*[3]
- *Multistakeholder Dialogue: Emergency Department Overcrowding in Canada*[13]
- *Qualitative Review: Perspectives and Experiences Regarding the Impacts of Emergency Department Overcrowding*[11]
- *Emergency Department Overcrowding: An Environmental Scan of Contributing Factors and a Summary of Systematic Review Evidence on Interventions*[10]
- *Horizon Scan: New and Emerging Interventions to Alleviate Emergency Department Overcrowding*[12]

Demographic and Utilization Patterns of EDs in Canada

This utilization analysis summarized ED use and overcrowding in Canada and was primarily based on data from NACRS. NACRS collects data on hospital- and community-based ambulatory care, including day surgery, outpatient and community-based clinics, and EDs. Other data sources used in the utilization analysis include the Commonwealth Fund's International Health Policy Survey (IHPS), CIHI's Your Health System database, and the OECD database. Most of the analysis was based on findings from Alberta, Ontario, and Yukon because these were the only jurisdictions where data collection to NACRS is mandated and therefore available (data collection is also mandated in Quebec, but the data were not made available). According to these data sources:

- From fiscal year 2010–2011 to 2019–2020, the number of ED visits per 1,000 population remained relatively stable across the jurisdictions that reported to NACRS, with all jurisdictions observing a decrease in 2020–2021 and returning to near prepandemic levels in 2022–2023.
- From 2010–2011 to 2019–2020, the acuity of patients presenting to the ED, as measured by CTAS level, increased. The overall proportion of patients assigned CTAS Level 1 (i.e., resuscitation required) was low (i.e., less than 1.3% of all ED visits in 2022–2023), but it has increased steadily since 2010–2011 in all jurisdictions that mandate reporting to NACRS. Reporting jurisdictions have also experienced higher proportions of patients assigned CTAS Levels 2 and 3 and lower proportions of patients assigned CTAS Level 4 over the same time period. Proportions of patients assigned CTAS Level 5 varied over time and across jurisdictions.

- Canada ranked 35th among 47 OECD countries in terms of the total number of hospital beds per 1,000 population and 13th among 34 OECD countries in the number of long-term care beds per 1,000 population aged 65 years and older. In Canada, both the number of total hospital beds per 1,000 population and number of long-term care beds per 1,000 population have decreased from 2010 through 2021.

- Canada had the second-highest curative and acute bed occupancy rate compared with 31 other OECD countries, and the fourth-longest average acute care length of stay compared with 38 other OECD countries. This indicates that Canada has relatively fewer acute care beds available and a population in need of longer hospital admissions.

- Median and 90th percentile length of stay and wait time to physician initial assessment in EDs increased over time and varied by patient acuity. Patients assigned CTAS Levels 1 and 2 experienced longer lengths of stay.

- Patients in need of admission to a hospital bed after an ED visit experienced extended wait times for an inpatient bed, a key indicator of ED overcrowding, year over year from 2010−2011 through 2022−2023. Urban EDs experienced longer wait times year over year than rural EDs. Wait times for an inpatient bed appear to be increasing at a higher rate since 2020−2021.

- The proportions of patients who visited the ED who were not seen or left (with or without being seen) has been increasing since 2010−2011. After a decrease in 2020−2021 in each reporting jurisdiction, Alberta and Ontario experienced a more than 100% increase between 2020−2021 and 2022−2023. Yukon experienced a 45% increase during the same time period.

- The proportions of patients who needed to be admitted, transferred to another facility, or transferred within the same facility after their ED visit increased from 2010−2011 through 2020−2021, with decreases in subsequent years. This might suggest that a greater proportion of people are visiting the ED with more complex and/or severe health care needs and that there is a corresponding increased need for additional care after the ED.

- Because not all jurisdictions are required to submit data to the NACRS, considerable knowledge gaps remain.

- Although inequity in access to, or care within, EDs is an important issue, it is not accounted for in the data presented in this report.

Multistakeholder Dialogue: ED Overcrowding in Canada

Three multistakeholder dialogue sessions were held with patients, families, community members, and ED staff and trainees. Their perspectives and feedback were as follows:

- ED overcrowding is a symptom of wider health care system dysfunction, namely the following:
  - A limited number of long-term care beds in the community means that large proportions of patients who need an alternate level of care cannot be discharged from the ED in a timely manner.
  - The limited amount of health care resources in the community results in EDs becoming overburdened by patients who have legitimate, but not emergency, health care needs — such as

for urgent care, diagnostic testing or specialists, primary care, and postoperative follow-up — and who present to the ED because they do not have another option.

- Solutions to ED overcrowding should:
  - address accountability and promote integration across health care systems
  - be driven by the specific needs of the population
  - leverage technologies and data.

Qualitative Review: Perspectives and Experiences Regarding the Impacts of ED Overcrowding

A review was undertaken of qualitative studies on how people who engage with ED services experience and understand the impacts of ED overcrowding on quality of care, patient safety, and the well-being of health care professional learners and staff working in the ED. The review included the following observations:

- ED overcrowding creates an unsafe environment where patients experience delayed, missed, and inappropriate care, leading to potential or actual physical harm, threats to human rights and dignity, exposures to others' suffering, reduced satisfaction, and worsening emotional and psychological states.

- ED overcrowding has negative impacts on health care professional learners and staff working in the ED, including violence and physical harm, emotional and moral distress, dimensions of burnout, and missed learning opportunities.

- To address the adverse impacts of ED overcrowding, decision-makers could consider integrating routine preventive care into ED processes, enhancing communication within the ED, optimizing available equipment and space, giving patients information to manage their expectations, and enhancing staff access to education and resources that address the needs of patients who frequently experience extended stays in the ED.

- To improve the working conditions within an overcrowded ED, decision-makers could consider promoting the well-being and retention of ED staff by incentivizing senior staff to remain in their positions, enhancing learning opportunities for health care professional learners, and promoting interprofessional collaboration.

- To address the causes of ED overcrowding, decision-makers could consider investigating and addressing systemic factors contributing to overcrowding and access block as well as the recruiting and retaining of health care providers in their jurisdictions.

- When choosing interventions to address ED overcrowding, decision-makers should explore how the interventions might address or exacerbate ethical and equity issues.

- The reviewed studies provided limited or no insight into the perspectives of people belonging to equity-deserving groups with a history of harm and lack of agency in the ED. None of the studies were conducted in Canada.

ED Overcrowding: An Environmental Scan of Contributing Factors and a Summary of Systematic Review Evidence on Interventions

An Environmental Scan was conducted to identify literature on factors that contribute to ED overcrowding. An assessment of the systematic review evidence on the effectiveness of different interventions to alleviate ED overcrowding was also conducted. CADTH produced a report on both of these components, which decision-makers can use to help identify interventions to implement within their local contexts.

The Environmental Scan found the following:

- Few of the factors that contribute to ED overcrowding exist within the ED. Therefore, most solutions are to be found either outside of the ED or at the interface of the ED and other health care services.
- Examples of the factors identified in the published literature include increased complexity of patients' needs, limited access to diagnostic testing and procedures outside of regular business hours, access block, and limited resources for mental health and substance use in the community.

The summary of systematic reviews found several interventions that might help alleviate ED overcrowding. Most studies assessed outcomes on ED visits or revisits, total ED length of stay, ED-related wait times, and the number of patients who left the ED prematurely without being seen. Examples of effective interventions, most of which would be implemented outside the ED, include:

- prehospital decision-making by first responders, which reduced ED visits
- short-stay crisis units for people experiencing mental health challenges, which improved ED length of stay, wait times, access block, and patient safety
- ED-based discharge planning, which reduced ED return visits
- time-based policy reforms, which reduced ED length of stay.

Horizon Scan: New and Emerging Interventions to Alleviate ED Overcrowding

A Horizon Scan was conducted to identify new and emerging interventions that could reduce ED overcrowding. The interventions identified in the Horizon Scan are not captured in the CADTH summary of systematic review evidence described previously because they are either new or are not yet in wide use in EDs and health systems across Canada. Decision-makers can refer to the Horizon Scan report when looking for interventions to implement within their local contexts.

- A total of 87 interventions were identified. Of these, 32% addressed input factors contributing to ED overcrowding, 29% addressed contextual factors that exist outside of the input-throughput-output categories, 18% addressed throughput factors, 13% addressed output factors, and 8% addressed more than 1 factor.
- Interventions that address input and output factors are intended to improve access to primary and community care, bolster preventive care, increase access to diagnostic testing, and improve access to health care supports in the community.
- Many of the interventions are being implemented in EDs across Canada.

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Appendix 1: The CADTH Health Technology Expert Review Panel

Note that this appendix has not been copy-edited.

The mandate of the CADTH Health Technology Expert Review Panel (HTERP) is advisory in nature and is to participate in the development of guidance or recommendations for CADTH projects on medical devices, diagnostic tests, and clinical interventions (inclusive of models and programs of care).

HTERP comprises 7 core (plus specialist) members to serve for all topics under consideration during their term of office: chair, ethicist, health economist, patient member, 2 health care practitioners, and a health technology assessment specialist. In addition to the core (plus specialist) members, HTERP comprises up to 5 expert members appointed to provide their expertise on a specific topic. For this project, 3 members with expertise and experience with ED care and administration, 1 member with lived experience of ED overcrowding, and 1 member with expertise in implementation science were appointed.

HTERP Core Members

Leslie Anne Campbell – Chair, Nova Scotia

Louise Bird – Patient member, Saskatchewan

Brian Clarke – Health care practitioner, British Columbia

Sandor Demeter – Health care practitioner, Manitoba

Lawrence Mbuagbaw – Health technology assessment specialist, Ontario

HTERP Specialist Members

Lisa Schwartz – Ethicist, Ontario

Jean-Éric Tarride – Health economist, Ontario

Expert Members

Marc Afilalo, Jewish General Hospital, Quebec

Marilyn Barrett, lived experience, Prince Edward Island

Janet Curran, Dalhousie University, Nova Scotia

Howard Ovens, Mount Sinai Hospital, Ontario

Adam Topp, (Former) CEO, Shared Services, Manitoba

Conflicts of Interest

None identified or reported.

Appendix 2: Evidence Navigation Guide — 4-Step Support for the Identification of Evidence-Informed Solutions to Alleviate ED Overcrowding

Note that this appendix has not been copy-edited.

Step 1: Assess the Context in Which ED Overcrowding Is Occurring

HTERP advises interventions intended to alleviate overcrowding need to be aligned with the main contributing factors to ED overcrowding in the particular context in which they will be implemented, and thus recommends an assessment of the context in which ED overcrowding is occurring as the first step to identify evidence-informed solutions, with attention to potential bottlenecks to patient flow.

HTERP acknowledges that contributors to overcrowding are relatively unique to each setting, considering the ED, hospital, and corresponding health region, given the complex nature of the problem and health and social systems. Solutions to alleviate overcrowding may require implementation and coordination of multiple interventions with a view to the whole health system and external and closely related systems (e.g., housing, transportation, access to mental health resources). Prompting questions to assess the context are in Table 1.

Table 1: Prompting Questions to Assess ED Overcrowding Context

Prompting questions	Evidence and information sources
Gathering data and information • What are you seeing and hearing from ED and hospital staff and leadership, and visitors? • What do you know from local ED and hospital data sources to help characterize ED overcrowding and patient flow? (e.g., supply and demand of acute care beds, wait times for inpatient beds, length of acute care stays, wait times to physician assessment, ED and hospital staff satisfaction and morale, patient satisfaction, patients leaving without being seen/completing treatment) • What do you know from health system data sources to help characterize ED overcrowding and patient flow? (e.g., supply and demand for long-term care beds, supply and demand for care in the community including urgent care, diagnostic testing, postoperative follow-up, and primary care)? • What patterns and trends are you seeing in terms of patient arrival, patient flow, and patient discharge? (e.g., by day of week, time of day, or time of year)	• CADTH's Emergency Department Overcrowding: Utilization Analysis • Local Emergency Department Information Systems • OECD Healthcare Utilization database • National Ambulatory Care Reporting System, from the Canadian Institute of Health Information • Discharge Abstract Database from CIHI • National Rehabilitation Reporting System from CIHI • Continuing Care Reporting System from CIHI

Prompting questions	Evidence and information sources
Identifying bottlenecks and what might be contributing • Thinking of the flow of patients through their pathway of care, from arrival at the ED to discharge from the ED or hospital, where are there bottlenecks that may be contributing to overcrowding? Consideration of ED metrics alongside benchmarks may help indicate bottlenecks or inefficiencies in flow. • What populations are experiencing flow problems, and what are their needs? Differentiate among the major subgroups with different clusters of need. • What adjustments would need to be made if the bottleneck(s) moves? • Which factors may be contributing to the bottlenecks and ED overcrowding? • Can the factors be characterized as input, throughput, output, contextual (micro, meso, macro) or a combination of these? • Which health system partner has primary accountability for the factors identified? (e.g., ED or hospital staff, ED or hospital leadership and administrators, health authorities and health ministries)? • Considering there are likely multiple factors that could be contributing to ED overcrowding, which might be the most impactful?	• Emergency Department Overcrowding: An Environmental Scan of Contributing Factors and a Summary of Systematic Review Evidence on Interventions • Considering population, capacity, and process[16]
Considering perspectives • What are the perspectives of those who work in, use, and support the ED and hospital? • What are patients, front-line staff, hospital leadership, health administrators, policy-makers, and other experts saying about the issue?	• Local data sources, including staff and patient satisfaction surveys, formal complaints systems • Community outreach activities, including engagement with patient groups • CADTH's Qualitative Review: Perspectives and Experiences Regarding the Impacts of Emergency Department Overcrowding • Summary – CADTH's Multi-Stakeholder Dialogue: Emergency Department Overcrowding in Canada

Step 2: Identify Potential Interventions to Alleviate Overcrowding

With an understanding of the context in which overcrowding is occurring, and the main contributing factors, HTERP recommends identifying potential interventions to alleviate overcrowding with the support of this Evidence Navigation Guide, and CADTH's reports on:

- Emergency Department Overcrowding: An Environmental Scan of Contributing Factors and a Summary of Systematic Review Evidence on Interventions[10]
- Horizon Scan: New and Emerging Interventions to Alleviate Emergency Department Overcrowding[12]

Prompting questions to help identify interventions to alleviate ED overcrowding:

- Considering the factors that seem to be bottlenecks for patient flow and contributing to ED overcrowding, do you want to consider input, throughput, output, multicomponent, or interventions outside the ED (broader systems)?
- Do you want to consider all evidence, or only evidence from Canada?
- Do you want to consider all evidence, or only evidence from rural/remote or urban settings?
- Is there a specific population type you would like to focus on? (e.g., pediatrics/adults/older adults, people with specific medical conditions, newcomers)
- Do you want to consider only evidence from the published literature or also emerging interventions for which evidence may not yet have been published or appraised?

CADTH has developed a web-based interface to help users of this Evidence Navigation Guide identify potential interventions to alleviate overcrowding, based on responses to prompting questions. The interface includes all interventions found through expert input and CADTH's reviews including:

- Interventions with promise
- Moderate- and high-quality conclusive evidence
- New and emerging interventions
- Inconclusive, unfavourable, or low-quality evidence

Step 3: Designing an Implementation Strategy

Once intervention(s) are being considered for implementation, HTERP recommends an assessment to ensure the intervention(s) can be successfully implemented and are able to have the intended effect on ED overcrowding. An assessment would involve consideration of available financial and human resources and infrastructure, support and leadership from all relevant health system partners, an analysis of local and health system data and metrics from Step 1, and perspectives of those who work in, use, and support the ED, hospital, and health ministry to reflect whether and how the intervention may work in the local context.

Several published frameworks and tools can support successful implementation, including The ICON Framework,[17] the CFIR,[18] Implementation Science Methodologies and Frameworks Toolkit,[19] equity considerations in health technology assessment,[20] and ethical analysis in HTA.[21] Prompting questions from these frameworks and tools to support an assessment of implementation feasibility are included in Table 2.

Table 2: Prompting Questions to Support Implementation

Considerations	Prompting questions	Tool/framework
Implementation in context	• What are the characteristics of the patients and health professionals in the ED, hospital, and health region that may influence whether, how and with what supports you would be able to implement? • What are the characteristics of the ED, hospital, health region, and broader political system, including their	The Implementation in Context (ICON) Framework[17] ICON Qualitative Screening Tool[17] Consolidated Framework for Implementation Research (CFIR)[22] Implementation Science

Considerations	Prompting questions	Tool/framework
	complexity, that might influence whether, how and with what supports you could implement? • Thinking about how you might approach implementing the intervention, what would be the characteristics of what you would do, and when, and how you would do it that may influence whether, how and with what supports you could implement? • How might the availability of human and financial resources influence whether, how and with what supports you could implement? • Are there any other contextual factors that might influence whether, how, or with what supports you could implement? • What feedback do patients, ED and hospital staff, hospital leadership, and other stakeholders and experts in your local have on the implementation of certain interventions? • Are there special considerations due to seasonality or time of the year?	Methodologies and Frameworks Toolkit[19]
Equity and ethical considerations	• Are there existing disparities (e.g., based on race, sex, geography) in populations who may access (or be excluded from access to) emergency departments that will impact who can benefit or not from interventions? • Are there populations who are disproportionately impacted by overcrowding and any interventions that may be implemented? • Does the prioritization of interventions to be implemented, and approaches identified to implement them, favour certain population groups above others? • Are there considerations for intersectionality of ED visitors and potential diversity in how the intervention can work for different people? • Do certain population groups within each stakeholder/ collaborator category require targeted engagement approaches? • Are there any institutional biases that might contribute to inequities in access to, or experiences of, ED care or interventions? • What kind of occupational harms emerge in different interventions? What duties are owed to health care providers working in the ED and hospital, including during overcrowding? • How does implementation of interventions, or absence of intervention, affect the distribution of health care resources within institutions and the health system more broadly? The ability to exercise meaningful choice, of patients or providers (e.g., patient transfers, provider duty to care, or moral distress)?	Equity considerations in health technology assessment[20] Ethical analysis in HTA[21]

Considerations	Prompting questions	Tool/framework
	• How might overcrowding affect confidentiality in patient-provider encounters in the ED and any interventions that are implemented? • What resource allocation considerations do interventions imply? • What are the implications for considering opportunity costs of implementing interventions?	
Quality improvement	• What are you trying to accomplish? • What change can be made that will result in improvement? • How will you know a change is an improvement?	Interventions would ideally be implemented within existing quality improvement structures. Some frameworks that could support development include: • Model for improvement (MFI)[23] • Plan-do-study-act • Lean

Step 4: Evaluate and Reassess ED Overcrowding to Feed Back Into Step 1

Evaluation of the process and outcomes of implementing interventions to alleviate overcrowding is essential to ensure interventions are being adopted and having their intended effect, to assess potential need for any adjustments in the approach, and to gather information that can be shared with others for learning. HTERP recommends evaluation plans that reflect the dynamic nature of ED overcrowding as a complex health systems issue, and that are themselves dynamic to ensure adoption of different strategies as the local context changes.

HTERP recommends planning for evaluation before interventions are implemented and disseminating the results of evaluations through presentations and publications to build the Canadian-specific evidence base. Table 3 provides considerations, questions, and tools to from the RE-AIM and other frameworks to support evaluation planning and reassessment to then feed into Step 1 of the cycle.

Table 3: Prompting Questions to Support Evaluation and Reassessment

Considerations	Prompting questions	Tool/framework
Evaluation	• What is the reach (proportion of the target population that the intervention will impact)? • What is the intended effectiveness of the intervention, as measured by ED overcrowding outcomes, including but not limited to: ED length of stay; ED-related wait times; boarding or access block outcomes; ED occupancy; ALC levels; number/proportion of patients left without being seen, or without completing treatment; patient safety; patient satisfaction; patient mortality in ED; staff satisfaction and experiences (e.g., burnout, workload, shortages) • What are the wider changes that may occur as a result of the intervention?	RE-AIM Framework[15] RE-Aim Planning Tool[24] RE-AIM Scoring Instrument[25] Consolidated Framework for Implementation Research (CFIR)[18] Medical Research Council Guidance for Developing and Evaluating Complex Interventions[26]

Considerations	Prompting questions	Tool/framework
	• What is the adoption (proportion of settings, practices, and plans that will adopt this intervention)? • What is the implementation (extent to which the intervention is implemented as intended in the real world)? • What is the maintenance (extent to which a program is sustained over time)? • What information is needed to determine whether the intervention should be continued as is, modified, or terminated, before going back to Step 1?	
Equity and ethical considerations	• What are the known and estimated benefits and harms for patients when implementing or not implementing select interventions? • What are the benefits and harms of interventions for relatives, other patients, health care providers, health care organizations, commercial entities, society, and so on? • Are outcome measures chosen relevant to patients' and providers' perspectives? • Are the methods used to collect and/or identify data conducive to finding data on disadvantaged population groups? • Are there historical or current disadvantages (or disparities/inequities) to consider that might impact the choice of variables to assess, the choice of methods, and so on? • Does the methodological approach chosen allow for the analysis of disaggregated data by relevant population groups, if appropriate?	Equity considerations in health technology assessment[20]

ALC = alternative level of care ; ED = emergency department.

Appendix 3: Interventions With Promise

Note that this appendix has not been copy-edited.

In consideration of the available evidence, information, and expert input, HTERP asserts the following nonexhaustive list of interventions and strategies show promise to alleviate ED overcrowding in Canadian jurisdictions, if aligned with the main contributing factors to ED overcrowding in a specific context and with consideration of whether implementation fidelity is possible.

Due to the complex nature of overcrowding, implementing interventions is context dependent and typically requires coordination and cooperation across various levels of the health system (e.g., ED, hospital, region, ministry) and potentially external and closely related systems (e.g., housing, transportation). It is possible that some interventions will lead to improved outcomes in some contexts, and not others.

The list of interventions and strategies includes those that have been:

- assessed through CADTH's evidence reviews[10] as favourable (i.e., high or moderate certainty of better effectiveness with the intervention versus the comparator) and,
- assessed through CADTH's evidence reviews[10] as neutral (i.e., certain evidence or evidence with some uncertainty that neither the intervention nor comparator was favoured) and,
- otherwise identified by HTERP as showing promise, based on expert opinion and experience.

Input

Input interventions relate to the need for ED services, and how and whether patients access the ED. Accountability for the identification, implementation, and evaluation of input interventions typically lies with the **health authority or health region** where they exist, or the **ministry or department of health**.

HTERP has identified misalignment of care available in the community and population needs, including care outside of regular business hours and that addresses population needs as 1 of the top 3 contributors to ED overcrowding in Canada. Promising interventions to address this misalignment, and other input factors contributing to ED overcrowding are in Table 4

Table 4: Input Interventions With Promise

Intervention or strategy	Description
Enhanced access to nonemergent care outside of the ED[27-31]	Enhanced access to external specialists, imaging and other diagnostic interventions, home care, primary care, postoperative follow-up, and long-term care, including access outside of regular business hours.
Surge management and prediction[32-40]	Planning and tools to apply real-time protocols to address uncertainty in demand for ED services and help ensure appropriate resource levels and manage surges before they occur.
Matching staffing to patient arrival[41-43]	Analyzing patient arrival patterns (e.g., by day/week/seasonal), and matching staffing capacity and skill mix to these patterns.

Intervention or strategy	Description
Remote triage[44,45]	Triage from a distance, including telephone, video, web, or SMS.
Paramedic practitioner service[46-49]	Paramedic practitioners receive additional training (e.g., palliative care, gerontology) to 'assess and treat' or to refer older adults with a range of conditions, as part of prehospital care.
EMS prehospital decision-making[49]	Prehospital decision-making by first responders with training in and access to prehospital decision systems and associated decision support tools.
Ambulance offload strategies[50]	Dedicated staff and space for ambulance offload, including offload to chairs.
Ambulance diversion strategies[6,7,9,51]	ED diversion protocols for ambulances transporting patients with nonemergent conditions who may be suitable for care at facilities offering subacute care (i.e., facilities providing primary care or multidisciplinary care for patients without immediate or acute care needs) rather than EDs.
Home-based care strategies[52]	Health and supportive care provided by a professional in the home, which may include support for a range of activities, such as bathing, toileting, feeding, and supporting activities of daily living. Home care providers may also monitor vital signs, carry out physician orders, and facilitate testing and monitoring of patients' conditions.

Throughput

Throughput interventions are implemented within the ED. Accountability for the identification, implementation, and evaluation of throughput interventions typically lies within individual **ED and hospital administration**, and with support of the health authority or health region where they exist.

HTERP asserts that attention to ED throughput factors is critical for managing ED overcrowding; however, that health systems will observe a greater impact on alleviating ED overcrowding by implementing interventions and strategies that focus on output and input factors, relative to throughput factors.

Table 5: Throughput Interventions With Promise

Intervention or strategy	Description
Rapid assessment zones, or fast-track zones, in moderate and large sized EDs[53,54]	Rapid assessment and fast track zones complement or replace typical triage processes to identify patients who will likely remain ambulatory vs. requiring further ED, hospital, or other health care services. These typically include dedicated spaces in the ED that can support patients in a chair vs. ED bed and require relatively limited observation.
Virtual ED care[55-59]	ED care delivered using secure video conferencing software or video-based telemedicine, ideally embedded into the hospital's electronic medical record.
Consistent accountability for patient flow[60]	Identifying and implementing dedicated human resources accountable for patient flow during all operational hours. This may occur via CEO led direction, by employing a Director of Patient Flow, or other interventions.
Rapid viral testing[61]	Provision of same day identification of influenza, parainfluenza virus, COVID-19, RSV, and adenovirus to inform patient management and triage decisions

Intervention or strategy	Description
Nurse-initiated X-rays in the ED[62]	X-rays initiated by nurses, as compared to physicians, within the ED and using standard of care X-ray ordering decision-making protocols, such as the Ottawa Ankle Rules, when available
Short-stay crisis units for mental health[38]	Therapeutic spaces for stabilization, assessment, and appropriate referral, with the aim of reducing ED mental health presentations and wait times, and/or psychiatric admissions
Advanced triage protocols[63]	Standardized approaches, applicable to specific groups of patients, where a triage professional initiates diagnostic or therapeutic actions before the patients are seen by a physician

Output

Output interventions are related to supporting patients in leaving the ED, for example to inpatient care, outpatient care, long-term care, or home. Accountability for the identification, implementation, and evaluation of output interventions typically requires coordination and cooperation between **ED and hospital administration, health authorities or health regions, and health ministries or departments**.

HTERP has identified misalignment between the availability of resources (such as the number of long-term care beds within the community) and types of services (including care outside of regular business hours) and population needs, as top contributors to ED overcrowding in Canada. Promising interventions to address these misalignments, and other output factors contributing to ED overcrowding are in Table 6.

Table 6: Output Interventions With Promise

Intervention or strategy	Description
Align acute care bed capacity within hospitals[64]	To account for over occupancy and bottlenecks on wards, particularly the surgical ward, simulation scenario testing was undertaken to support bed capacity management. The optimal solution was deemed to be inpatient bed occupancy of 70% to 85%.
Active bed management[60]	Dedication of staffed positions to ensure timely identification and allocation of inpatient beds, including communication around discharge and bed availability.
Hospital-led transitional care[65]	Time-limited health services that may include patient or caregiver education on self-management, discharge planning, structured follow-up, and coordination among health care professionals involved in transition planning between EDs, hospitals, and primary and community care.
Care coordination and transition strategies[66,67]	Deliberate coordination of care between 2 or more health system partners, and may include case management, changing of roles, and support for self-management and decision-making.
Rapid transfer of patients admitted in the ED to inpatient wards[68,69]	Strategies to enhance capacity and efficiency to rapidly transfer patients admitted in the ED to inpatient wards, for example multidisciplinary rounding, or boarding patients within wards as opposed to the ED.

Intervention or strategy	Description
Discharge planning and coordination of services[70]	Dedicating a health professional responsible for improving transitional care to home or other health care facilities (e.g., discharge to home or nursing home, hospital admission, rehabilitation centre) by developing individualized discharge plans that include treatment summaries, medication and referral plans, transportation plans, community services, and primary care referrals.

Systemic Interventions

Systemic interventions are implemented outside the ED. Accountability for the identification, implementation, and evaluation of systemic interventions lies within **health ministries**, and in some cases external and closely related systems (e.g., housing, transportation), with coordination and cooperation of the health authority or health region where they exist, and ED and hospital administration.

Table 7: Systemic Interventions With Promise

Intervention or strategy	Description
7-day per week, or 16 hour per day, hospital operational models[69]	Access to hospital services outside the ED (e.g., diagnostic testing, medical imaging) beyond regular business hours including 7 days a week or for extended hours.
Accountability frameworks[71]	Accountability frameworks ensure accountability for ED overcrowding outcomes do not lie solely within the ED. Accountability frameworks make roles, responsibilities, and expectations clear within different zones or boundaries (e.g., surgery, diagnostic testing) and share and distribute accountability across health system partners including the ED and hospital, and importantly the health regions or authorities in which they are situated. An example of an accountability framework is a performance incentive such as paying for results, accompanied by appropriate resourcing and shared accountability for results across health system partners.
Time-based targets[72]	Implementation of time-based targets for example on ED length of stay, patient disposition, or wait time for an inpatient bed.
Coordination of electronic health records and health information among health system partners[73]	Electronic clinician-to-clinician communication and documentation may help alleviate the need for face-to-face visits to specialists and improve access to care for patients with a variety needs.
Hospital capacity command centres[74]	Physical and multifunctional units with interdisciplinary teams that influence patient flow, use real-time data integrated from electronic health records, and manage multiple patient flow processes (e.g., admission, bed management, interhospital transfer management, patient transport, environmental services).
Hospital-at-home care models[75]	Patients receive care in their own homes to target multiple factors such as preventing admissions and providing early discharge care.