Rapid Synthesis

Identifying Approaches for Optimal Management of Ambulance-to-hospital Offload Processes

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Rapid Synthesis:
Identifying Approaches for Optimal Management of Ambulance-to-hospital Offload Processes
30-day response

19 August 2022

McMaster Health Forum

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Timeline

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. This synthesis was prepared over a 30-business-day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

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Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis. The funder played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the rapid synthesis.

Merit review

The rapid synthesis was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its scientific rigour and system relevance.

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KEY MESSAGES

Question

- What are the features and impacts of approaches for optimally managing ambulance-to-hospital offload processes?
- What is known from the best available evidence and experiences from Canadian provinces and territories about:
  a) how ambulance-to-hospital offload is defined, including what constitutes delay; b) what data are collected and reported about ambulance-to-hospital offloading; c) what the ambulance-to-hospital offload times are across provinces; d) how financial burden is offset or shared when ambulance-to-hospital times exceed limits set; and e) what strategies are being used to reduce ambulance-to-hospital offload delay?

Why the issue is important

- The availability of ambulance or emergency medical services (EMS) is critically important to meet call demands of a community, and any significant delays in ambulance offload of patients to hospital can create resource inefficiencies and have an impact on ambulance response times and community safety.
- Ambulance offload delay (i.e., the delay between the arrival of the ambulance at the emergency department (ED) and the transfer of the patient from EMS to the ED), is a well-recognized issue that can be caused by ED crowding, high call demand for ambulances, or a combination of both.
- The constant pressure for ambulance services to respond rapidly to dynamic call demand patterns and minimize offload delays has challenged EMS and ED administrators to refine offload management systems through process-improvement strategies.
- This rapid synthesis explores the features and impacts of approaches that can be used to optimally manage ambulance-to-hospital offload processes and help minimize ambulance offload delay.

What we found

- We identified two systematic reviews, five other types of reviews (e.g., scoping, narrative, or integrated reviews), and 20 primary studies relevant to the research question.
- The approaches we identified from the evidence that may improve ambulance-to-hospital offload processes included education and training for ambulance offload staff, development of ambulance offload standards, feedback mechanisms for ambulance offload personnel, improved communication tools for all ambulance offload personnel, and enhancements to the settings and equipment used during the ambulance offload process.
- The evidence we found used various terms when defining the ambulance-to-hospital offload process, including 'handover', 'turnaround interval', and 'patient transfer'.
- Generally, ambulance-to-hospital offload was defined in the evidence we identified as the transfer or handing over of patients from emergency medical services (EMS) or ambulance personnel to in-hospital personnel typically in the emergency department (ED).
- In terms of ambulance-to-hospital offload times, the evidence suggests that offload times and the potential for offload delay are influenced by the size and capacity of the hospital's emergency department and the availability of offload staff to assist in patient transfer, although other influences may exist.
- Strategies to reduce ambulance-to-hospital offload delay that were identified from the evidence include increasing inter- and multi-professional education and training, reducing interruptions, developing structured tools and national guidelines for handover processes, providing feedback on handover performance to ambulance and ED staff, changing the workplace culture to encourage collaboration, improving ED design, providing adequate equipment, and addressing ambulance offload delay in a system-wide manner.
- Our jurisdictional scan of select Canadian provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, New Brunswick, Nova Scotia) yielded limited insights about the management of ambulance-to-hospital offload processes.
- Ambulance-to-hospital offload was defined similarly in findings from Saskatchewan, Manitoba and Ontario as the time when ambulance or paramedic personnel turn over or transfer patients to emergency department staff at the hospital.

- While our scan did not identify specific data measures or data systems that collect and report on ambulance-to-hospital offloading across most provinces, we found some reported outcomes of ambulance-to-hospital offload evaluations within British Columbia, Saskatchewan and Nova Scotia, including: increased offload delays in B.C. due to insufficient ED beds and in Saskatchewan due to critical care pressures from the COVID-19 pandemic; and significant ambulance costs in Nova Scotia due to non-productive activities of paramedics waiting to offload patients.
- We found that ambulance-to-hospital offload times ranged between 20 to 60 minutes in Saskatchewan, Manitoba and Ontario, and to offset the financial burden when ambulance-to-hospital times exceed limits, the city of Winnipeg charges the Winnipeg Regional Health Authority when offload is more than 60 minutes, and the Government of Saskatchewan has increased funding to help cover patient wait-time fees and implement a new computer dispatch system.
- Provincial commitments that aimed to modernize emergency health services and reduce ambulance response times were also identified, including the commitments of BC Emergency Health Service's 2020 Action Plan to increase capacity of primary-care providers and standardize handovers, the Ontario government's commitment to modernize emergency health services in the province, and Alberta's development of a provincial emergency medical services advisory committee to inform a new provincial EMS service plan.
- Finally, we identified the implementation of two programs to offset ambulance-to-hospital delays, namely the QEII Health Sciences Centre Halifax Infirmary Site at Dartmouth General Hospital in Nova Scotia, where an ED transition team helps to reduce the amount of time ambulances are waiting at the ED, and Calgary's Integrated Operations Centre (IOC), which will coordinate with the EMS to maximize existing system capacity and relieve hospital offload pressures.

QUESTION

1) What are the features and impacts of approaches for optimally managing ambulance-to-hospital offload processes?
2) What is known from the best-available evidence and experiences from Canadian provinces and territories about:
   a) how ambulance-to-hospital offload is defined, including what constitutes delay;
   b) what data are collected and reported about ambulance-to-hospital offloading;
   c) what the ambulance-to-hospital offload times are across provinces;
   d) how financial burden is offset or shared when ambulance-to-hospital times exceed limits set; and
   e) what strategies are being used to reduce ambulance-to-hospital offload?

Box 1: Background to the rapid synthesis

This rapid synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, the rapid synthesis summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. The rapid synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. An overview of what can be provided and what cannot be provided in each of these timelines is provided on the McMaster Health Forum's Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

This rapid synthesis was prepared over a 30-business-day timeframe and involved four steps:
1) submission of a question from a policymaker or stakeholder (in this case, the British Columbia Ministry of Health);
2) identifying, selecting, appraising and synthesizing relevant research evidence about the question;
3) drafting the rapid synthesis in such a way as to present concisely and in accessible language the research evidence; and
4) finalizing the rapid synthesis based on the input of at least two merit reviewers.

WHY THE ISSUE IS IMPORTANT

The availability of ambulance services is critically important to meet call demands of a community for emergency medical services (EMS) and to ensure that patients can access care at the emergency department (ED) as quickly as possible. An ambulance can be occupied by patients during transfer to hospital, during offload to the ED, and during recovery preparation for the next EMS call. The availability of the ambulance to a community is affected by the length of time it takes to complete these three processes, and any significant delays can create resource inefficiencies and have an impact on ambulance response times and community safety.(1)

Ambulance offload delay (i.e., the delay between the arrival of the ambulance at the ED and the transfer of the patient from EMS to the ED) is a well-recognized issue that can be caused by ED crowding, high call demand for ambulances, or a combination of both.(2) In recent months, the issue of ambulance offload delay has been compounded by unprecedented staffing strains in Canadian hospitals that have forced urgent-care department closures and limited the availability of emergency-care services. The constant pressure for EMS to respond rapidly to dynamic call demand patterns and minimize offload delays has challenged EMS and ED administrators to refine offload management systems through process-improvement strategies.(3) This rapid synthesis explores the features and impacts of approaches that can be used to optimally manage ambulance-to-hospital offload processes and help minimize ambulance offload delay.

WHAT WE FOUND

We identified three systematic reviews, five other types of reviews (e.g., scoping, narrative, or integrated reviews), and 20 primary studies relevant to the question that were identified from a targeted search for relevant literature (see Box 2 for our search strategy). In addition, we conducted a jurisdictional scan to identify experiences from select Canadian provinces, namely British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, New Brunswick, and Nova Scotia.

We outline in narrative form below our key findings from the identified evidence and jurisdictional scan. We provided an overview of the approaches identified to optimally manage ambulance-to-hospital offload processes in Table 1, and additional details from the research evidence are provided in Table 2, and in Appendix 1 (systematic reviews) and Appendix 2 (primary studies). Details from the jurisdictional scan are provided in Table 3.

We organized our findings using the framework below:

a) how ambulance-to-hospital offload is defined, including what constitutes delay;
b) what data are collected and reported about ambulance-to-hospital offloading;
c) what the ambulance-to-hospital offload times are across provinces;
d) how financial burden is offset or shared when ambulance-to-hospital times exceed limits set; and
e) what strategies are being used to reduce ambulance-to-hospital offload delay (e.g., diverting to another care setting such as urgent-care settings and/or processes within hospital to make hand-off more efficient)?

Box 2: Identification, selection and synthesis of research evidence

We identified research evidence (systematic reviews and primary studies) by searching (on 22 April 2022) Health Systems Evidence (www.healthsystemsevidence.org) and PubMed. In Health Systems Evidence, we searched for overviews of systematic reviews, systematic reviews and primary studies using (ambulance OR paramedic) AND hospital. In PubMed, we searched for (Hospital OR emergency OR urgent) AND (ambulance OR paramedic) AND (offload OR handoff OR handover).

The results from the searches were assessed by one reviewer for inclusion. A document was included if it fit within the scope of the questions posed for the rapid synthesis.

For each systematic review we included in the synthesis, we documented the focus of the review, key findings, last year the literature was searched (as an indicator of how recently it was conducted), methodological quality using the AMSTAR quality appraisal tool (see the Appendix for more detail), and the proportion of the included studies that were conducted in Canada. For primary research (if included), we documented the focus of the study, methods used, a description of the sample, the jurisdiction(s) studied, key features of the intervention, and key findings. We then used this extracted information to develop a synthesis of the key findings from the included reviews and primary studies.

Key findings from the research evidence

Features and impacts of approaches for optimally managing ambulance-to-hospital offload processes

We identified several approaches to optimally manage ambulance-to-hospital offload processes from evidence documents. These included increasing education and training of ambulance offload staff, developing standards for ambulance offload processes, incorporating feedback mechanisms for ambulance offload personnel from ED staff, improving communication tools for all personnel involved in the ambulance offload process, and enhancing the design of EDs and equipment used during the ambulance offload process.

Enhanced inter- and multi-professional education and training was suggested as a strategy for improving diagnosis, clinical decision-making, and treatment administration skills during ambulance offload in three of the identified studies.(4-6) A 2013 rapid review and a 2021 primary study recommended the implementation of a structured offload process and improved collection and transmission of important information on vital signs by paramedics to ensure safe and effective offload.(4; 7) The primary study as well as a 2019 systematic review also suggested the use of standardized transition guidelines to provide clarity about the transfer of responsibility.(8)

Feedback from ED staff to ambulance personnel on their offload processes was recommended as an improvement strategy by a medium-quality systematic review that described the development of an ambulance-based paramedic role during and after handover.(5) Electronic information tools (e.g., mobile web-based technology), mnemonics, and triage tools were suggested in one systematic review and two literature reviews as communication tools for offload process staff, and a recent primary study from Scotland identified an effective technology supporting clinical-information recording and delivery during pre-alert and handover.(8-11) Another literature review from 2010 recommended reducing interruptions and changing the workplace culture from individual health professionals to collaborative teams so that misunderstandings can be avoided and cultural differences can be better addressed among offload staff.(6) Finally, a 2017 primary study that explored the perspectives of paramedics and ED staff in Iran suggested that the external environmental and internal structural factors that have an impact on patient handover experiences can be improved by enhancing ED design, providing adequate equipment, and training personnel involved in handovers.(12)

The evidence sources we identified also provided insights about how ambulance-to-hospital offload is defined, including what constitutes delay, ambulance-to-hospital offload times, and strategies to reduce ambulance-to-hospital delay. We did not find evidence that addressed data collected and reported about ambulance-to-hospital offloading and financial offset or burden of exceeding offload times.

Definition of ambulance-to-hospital offload, including what constitutes delay

A literature review from 2013 defined ambulance and emergency department (ED) handover as ambulance members handing over patients to in-hospital nurses or physicians, while a rapid review published in the same year defined handovers as the "transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis."(7; 9) A recent study conducted in Southeast Queensland, Australia identified two types of clinical handover processes that were distinguished by their location and the ED and patients' level of acuity: 1) handover at the ambulance ramp entrance of non-critical patients; and 2) handover directly outside and repeated within a specially designated resuscitation room for critically ill patients requiring immediate treatment for their medical condition or traumatic injuries.(4) A 2012 primary study that assessed and quantified ED handover delays experienced by the Ambulance Services of New South Wales (ASNSW) in Australia defined the turn-around interval as the interval between the arrival of the ambulance to the ED and the return of that ambulance to availability, and defined handover delay or 'offload delay' as the delay in the transfer of patient care from emergency medical services (EMS) to ED personnel.(13) Additionally, a 2022 primary study evaluating the impact of a Hospital Liaison Program (HLP) in Maryland, United States had an ambulance offload process that involved assigning a member of the fire department's EMS personnel to expedite patient transfer and provide real-time feedback on ED bed capacity to EMS crews in the field. Duties of the EMS clinician included initiating the transfer process when EMS arrived at the hospital ED, monitoring dispatch systems and PPE supplies, assisting with unloading the patient, and assisting EMS staff with PPE disposal and disinfection.(14) Finally, an observational cohort study published in 2019 that evaluated whether EMS offload delays in Calgary EDs were associated with adverse system and patient outcomes considered EMS offloads as delayed if patients had to wait more than 60 minutes to get into a definitive ED care space. The study indicated that offload delays between 15 and 60 minutes were considered acceptable in many Canadian urban EDs.(15)

Ambulance-to-hospital offload times

We identified three primary studies that explored ambulance-to-hospital offload times. A 2013 primary study from New York, United States measured EMS patient arrival, time of EMS report, and time of movement of the patient off of the EMS stretcher against the National Emergency Department Overcrowding Scale (NEDOCS) scores for emergency-department crowding. The study found that the ambulance offload delay ranged from 0 minutes to 157 minutes with a median of 11 minutes. Moreover, when the NEDOCS scores were grouped into four groups according to the standard NEDOCS groupings (e.g., 0 to 100, 101 to 140, 141

to 180, anything greater than 180), there was a statistically significant difference in median ambulance offload delay (AOD) between the groups. This indicated a relationship between emergency-department crowding and AOD.(16) The primary study identified in the section above that assessed handover delays experienced by Ambulance Services of New South Wales (ASNSW) in Australia found that the median handover interval was 15 to 16 minutes, and overall, 12.5% of patients experienced a handover delay of 30 to 60 minutes, and 5% experienced a delay of over 60 minutes, with larger hospitals having the highest median handover interval.(13) A 2022 primary study that evaluated the impact of the Maryland hospital's Hospital Liaison Program (HLP) on ambulance offload times found that when the liaison from the HLP was on duty, there was a 16.31% reduction in the mean offload times compared to the offload times six months prior to the HLP.(14) Lastly, of the 162,002 patients in Calgary emergency departments that were assessed in the 2019 observational cohort study mentioned previously, 56%, 40%, and 25% experienced offload delays greater than 15, 30, and 60 minutes, respectively. The study's researchers did not find that offload delays were associated with increased patient mortality or prolonged hospital length of stay, and hypothesized that this result was possible due to the proficiency of triage nurses in selecting lower-risk patients for hallway placement when ED stretchers were blocked, and the ongoing hallway observations of at-risk patients by EMS crews and ED staff during delay intervals.(15)

Strategies to reduce ambulance-to-hospital offload delay

Most of the evidence documents we identified provided insights and recommendations for reducing ambulance-to-hospital offload delay. A 2016 medium-quality systematic review described the development of an ambulance-based paramedic role during and after handover for time-critical conditions, and highlighted that enhanced paramedic skills, such as diagnosis, clinical decision-making, and administration of treatment, may improve handover information, and structured handover tools and feedback on handover performance can have an impact on paramedic behaviour during clinical communication.(5) In a high-quality systematic review from 2019, transition guidelines, mobile web-based technology, and the introduction of a dedicated ED ambulance offload nurse were identified as potential interventions for improving transitions in care between EMS providers and ED nurses. While mobile technology and the use of a dedicated ambulance offload nurse were recognized as effective interventions, there were mixed findings overall for transition guideline use, adherence and effectiveness.(8) Another more recent systematic review of low quality aimed to identify factors that contribute to the ambulance offload delay. It concluded that ED crowding and ambulance diversion is a well-researched area, however, literature on ambulance offload delay is still limited. Recommendations for future research that were highlighted in the study included addressing system-wide mitigation interventions, root causes of ED crowding and access block, and providing more operations research models to evaluate AOD mitigation interventions prior implementation.(1)

One 2013 rapid review that aimed to identify the role of hospital clinical handovers between paramedics and ED staff in the identification and management of deteriorating patients found that safe and effective handovers were affected by levels of stress, staff competency, noisy or interruptive environments, and availability of space, as well as barriers to staff communication due to lack of active listening, disinterest, distractions, amount of eye contact, and disbelief by the ED staff as perceived by paramedic staff. The review suggested a need for a more structured handover process and better collection and transmission of important information on vital signs by paramedics to ED staff or documented at the handover.(7) These suggestions were echoed in a 2014 literature review of the handover process in pre-hospital settings that found that poor communication between paramedics and hospital personnel rooted in non-active listening, mistrust and misunderstanding is a key problem in handovers.(10)

One literature review we identified suggested improvement strategies to address barriers to effective ambulance and ED staff handover. The strategies included identifying structured handover information, 'electronic information boards', and triage tools that could support standardization for verbal and written communication, developing national guidelines for handover processes, and increasing inter- and multi-professional education and training to enhance mutual understanding and a change in culture in a team.(9) Another literature review from 2010 that explored the perceptions and experiences of staff during handover

recommended that improvements to handover should include reducing interruptions, utilizing an electronic tool such as a whiteboard to decrease missed information, changing the workplace culture from individual health professionals to collaborative teams, and engaging healthcare professionals in multidisciplinary training using simulations.(6)

Three of the primary studies we identified also offered similar improvement strategies to those mentioned above. An Australian primary study from 2012 examined processes used during handover from ambulance to ED personnel and the factors that potentially have an impact on the quality of the handover. Findings suggested the use of guidelines and interdisciplinary education and training on communication and information transfers between paramedics and emergency room staff to minimize potential errors that can occur during handover.(4) In addition, a 2017 primary study from Iran explored the external environmental and internal structural factors that have an impact on patient handover experiences within the ED. The study found that poor emergency-room environments, non-standardized equipment, and differences in workforce capacity and expectations about responsibilities during handover resulted in poor patient handoffs and slower turnover times. To address this, the study suggested improving ED design, providing adequate equipment, and training personnel involved in handovers.(12) Finally, a recent primary study from Scotland examined the feasibility, acceptability, and preliminary testing of a technology supporting clinical information recording and delivery during pre-alert and handover within the pre-hospital setting. It was found that among ambulance clinicians, most felt that the pre-alert and handover components of the intervention were either 'very useful' or 'useful', and reported using the technology 'often' or 'always' to support handover.(11)

Key findings from the jurisdictional scan

Features of approaches to optimally managing ambulance-to-hospital offload process

Our jurisdictional scans of select Canadian provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, New Brunswick, Nova Scotia) provided a few examples of approaches that some of these provinces are taking to improve their ambulance offload processes. The governments of British Columbia and Nova Scotia are implementing plans to replace Emergency Medical Dispatchers (EMD) with highly trained Primary Care Paramedics (PCPs), and to establish emergency transition teams, respectively. In B.C. and in Winnipeg, Manitoba, emergency response services have triaged patients based on acuity to manage ambulance arrivals across facilities when demand surges.

We also found that an emergency medical advisory committee has been established in Alberta in response to growing demand for emergency services, and emergency health officials in B.C. are collaborating with regional health authorities to create offload-process standards. Funding has also been provided in B.C. to upgrade the skills of paramedics working in rural areas, in Saskatchewan to increase paramedic staff capacity, and in Ontario to incentivize nursing programs to increase education of ambulance offload nurses and to build a new ED ambulance offload and medicine transition unit facility.

Our jurisdictional scans yielded limited insights about the management of ambulance-to-hospital offload processes.

Definition of ambulance-to-hospital offload, including what constitutes delay

We identified some definitions of 'ambulance-to-hospital offload' used by Canadian provinces and cities. Some of the reported definitions include:

- "the time that paramedics wait with patients in emergency departments, for hospital staff and vacant beds" (Saskatchewan);
- "the time from when the paramedic arrives with the patient in the emergency room to the time that patients are ready to receive care in the emergency room, whereby a total wait for care of more than 60 minutes is considered a delay" (City of Winnipeg);

- "the time spent from when an ambulance first arrives with a patient at a hospital to when the ambulance and its crew are available to respond to another call" (Health Quality Council of Alberta); and
- "date and time when the ambulance personnel turn over care of the patient to ED/hospital staff" (Government of Ontario, 2012 Auditor General report).

Data collected and reported about ambulance-to-hospital offloading

While we did not identify specific data measures or data systems that collect and report on ambulance-to-hospital offloading across most provinces, we found some reported outcomes within British Columbia, Saskatchewan, Ontario, and Nova Scotia. For example, the BC Emergency Health Services (BCEHS) commissioned the Operational Research in Health (ORH) to conduct a review of the emergency response services. The ORH determined that if BCEHS did not expand its ambulance and workforce numbers in response to growing demands, the average response times to critical calls would increase from the 2014 average of 10:24 minutes in Metro Vancouver to 15:07 minutes in 2020, with only 25.6% of patients seen within nine minutes. Additionally, a 2018 report by the BC Patient Transport Network (PTN) reported that many offload delays were due to waiting for a bed. The same report identified priorities for improving processes, such as reducing the time spent on the phone with dispatch, improving communication about transport arrival times and delays, reviewing referral patterns to improve services, and receiving detailed feedback on critical incidents. In Saskatchewan, a 2021 report by the Saskatchewan Health Authority found that the maximum offload delays at various hospitals ranged between two to eight hours due to critical-care pressures from the COVID-19 pandemic. In Ontario, there was a brief mention in the 2012 Auditor General report that the province uses the Computer Aided Dispatch system (CAD) to record the 'paramedic transfer of care time' in support of offload delay management across the province, which reports the length of time paramedics have spent with a patient at a hospital. Finally, a 2019 comprehensive review of Nova Scotia's emergency medical services (EMS) system design issued by the Nova Scotia Department of Health and Wellness and Emergency Health Services reported that the current EMS system arrangements have resulted in significant ambulance costs due to non-productive activities, specifically when paramedics are waiting in hospitals to offload patients in emergency departments.

Ambulance-to-hospital offload times across provinces

Ambulance-to-hospital offload times and benchmarks were reported in Saskatchewan, Manitoba and Ontario, which ranged from 20 to 60 minutes. A news report from 2018 indicated that the offload benchmark in Saskatchewan is 20 minutes, but reported that 50% of monthly transports experienced delays. Additionally, a 2016 report indicated that paramedics in Saskatoon spent 800 hours waiting to offload patients. Based on an expert panel report in Ontario, the benchmark for ambulance offload time is 30 minutes for 90% of the time, and in Alberta, Alberta Health Services has an EMS hospital time target that nine out of every 10 ambulances spend less than 90 minutes at the hospital. Finally, the Winnipeg Regional Health Authority indicated that the average time for ambulance-to-hospital offload was 78 minutes in 2014, which is above its threshold of 60 minutes.

Financial offset or burden related to exceeded ambulance-to-hospital offload times

We found limited information on the financial offset or burden related to exceeded ambulance-to-hospital offload times. For example, the City of Winnipeg charges the Winnipeg Regional Health Authority when paramedics sit with patients in emergency rooms for more than 60 minutes, and in the Government of Saskatchewan's 2021-2022 budget announcement, it was announced that Emergency Medical Services would receive an increase of $6.6 million for additional ambulances to help address offload delays, cover patient wait-time fees, and fund a new computer dispatch system.

Strategies to reduce ambulance-to-hospital offload delay

We identified some examples of strategies to reduce ambulance-to-hospital offload delay across Canada. For example, we identified provincial commitments to modernizing the emergency health services such as:

- BCEHS 2020 Action Plan, which aims to add capacity to reduce ambulance response times with highly trained primary-care providers, improve the timeliness and quality of patient handovers by engaging regional health authorities, select sites in standardizing handovers, increase supervisory capacity for delay management, and implement secondary triage for 911 calls so that ambulances can respond quickly to the most acute patient events;
- the Province of Ontario's commitment to modernizing emergency health services, which includes reducing ambulance offload times and delays; and
- development of a provincial emergency medical services advisory committee in Alberta, which will focus on developing a report of long-term recommendations with contracted ambulance operators, unions representing paramedics, municipal representatives, and Indigenous community representatives to inform a new provincial EMS service plan.

We also identified key financial investments from some provinces such as:

- the Government of Saskatchewan's investment of $780,000 to help improve offload delays and transitions between The Royal University Hospital staff and EMS; and
- the Ontario Ministry of Health's $16.1 million investment of the Dedicated Offload Nurse Program and $16 million to the Ottawa Hospital Civic Campus to develop a new emergency department ambulance offload and medicine transition unit facility.

Finally, we identified the implementation of two programs to offset ambulance-to-hospital delays, including:

- QEII Health Sciences Centre Halifax Infirmary Site, where an emergency department transition team will support the improvement of patient flow and reduce the amount of time ambulances are waiting at the hospital's emergency department, after implementation success at the Dartmouth General Hospital; and
- Calgary's Integrated Operations Centre (IOC), which will coordinate with the EMS to maximize existing system capacity and relieve pressures such as hospital offload delays.

Table 1: Overview of approaches to optimally managing ambulance-to-hospital offload processes

Approach	Features and impacts of the approach
Evidence sources	
Education and training of ambulance offload staff	• Enhanced inter- and multi-professional education and training was suggested as an approach to improving diagnosis, clinical decision-making, and treatment administration skills during offload processes by three studies we identified: o A 2021 primary study from Southeast Queensland, Australia that evaluated responses from ambulance and ED personnel about handover processes (4) o A medium-quality systematic review from 2016 that described the development of an ambulance-based paramedic role during and after handover for time-critical conditions (5) o A literature review from 2010 that explored the perceptions and experiences of staff during handover (6)
Feedback mechanisms	• A medium-quality systematic review from 2016 that described the development of an ambulance-based paramedic role during and after handover recommended that ED staff should provide feedback to ambulance personnel on their offloading procedures o The review suggested that providing this feedback could help to improve handover consistency and reduce questioning by ED staff (5)
Communication tools	• One 2013 literature review focused on identifying barriers to effective ambulance and ED staff handover suggested structured handover information, 'electronic information boards', and triage tools as improvement strategies for standardizing verbal and written communication (9) • A literature review from 2014 suggested that mnemonics to standardize handover and feedback from receiving personnel may improve handover consistency and reduce questioning by ED staff o The review also pointed out the importance of clearly stated handovers where paramedic staff speak confidently and loudly, and hospital personnel are actively listening in addressing the communication issues identified (10) • Another literature review from 2010 that explored the perceptions and experiences of staff during handover recommended reducing interruptions, utilizing an electronic tool (e.g., a whiteboard) to decrease missed information, and changing the workplace culture from individual health professionals to collaborative teams to avoid misunderstandings and help address cultural differences among handover staff (6) • A recent primary study from Scotland examined the preliminary testing of a technology supporting clinical information recording and delivery during pre-alert and handover, and found the technology intervention effective in improving data recording and information exchange processes (11) • Mobile web-based technology (e.g., EMS smartphone for sending files and location date) was suggested as an intervention for improving ambulance offload transitions between EMS providers and ED staff in a systematic review from 2019

	○ Mobile technology was seen positively by both ED nurses and EMS providers in some included studies as it helped to better describe the pre-hospital context and to plan flow in the ED (8)
Standardization of offload processes	• A structured offload process and improved collection and transmission of important information on vital signs by paramedics were suggested as strategies to ensure safe and effective offload in a rapid review from 2013 (7) • In addition to training to improve communication, a 2021 primary study from Southeast Queensland, Australia suggested the use of standardized guidelines to provide clarity about the transfer of responsibility, and other structured forms of communication to enhance handover processes (4) • A 2019 systematic review identified the use of ambulance offload transition guidelines to improve the efficiency of offload processes, but there were mixed findings overall for guideline use and adherence, communication between EMS and ED staff, and the effectiveness of the transition (8)
Offload setting enhancements	• A 2017 primary study from Iran that explored the perspectives of paramedics and ED staff suggested that the external environmental and internal structural factors that have an impact on patient handover experiences can be improved by enhancing ED design, providing adequate equipment, and training personnel involved in handovers (12)
Jurisdictional scan sources	
Offload process outsourcing	• The governments of British Columbia and Nova Scotia are implementing plans to replace Emergency Medical Dispatchers (EMDs) with highly trained Primary Care Paramedics (PCPs) and establish emergency transition teams, respectively. ○ These strategies are intended to add offload staff capacity and improve transition of patients from ambulance to hospital
Standardization of offload processes	• To improve timeliness and quality of patient handovers, emergency health officials in B.C. are collaborating with regional health authorities to create offload process standards
Governmental and organizational leadership	• The Government of Alberta plans to launch a provincial emergency medical services advisory committee in response to growing demand for emergency medical services • In addition to the above, the Integrated Operations Centre (IOC) will be supporting Alberta Health Services' (EMS) 10-point plan to work with EMS staff and community and service delivery partners to maximize existing EMS system capacity
EMS adaptation changes	• In B.C. and in Winnipeg, Manitoba, emergency response services have triaged patients based on acuity in order to level ambulance transport arrivals across facilities when demand surges
Funding	• Funding to increase ambulance offload quality and staff capacity has been provided in several provinces: ○ A bursary fund for paramedics working in rural areas of B.C. to upgrade their skills ○ Funding for additional paramedic staff at hospitals in Saskatchewan ○ Funding for nursing programs in Ontario to increase nurses dedicated to ambulance offload and patient transfer ○ Funding for a new emergency department ambulance offload and medicine transition unit facility in Ontario

Table 2: Overview of evidence on the features and impacts of approaches for optimally managing ambulance-to-hospital offload processes

Organizing framework	Key findings from evidence on approaches for optimally managing ambulance-to-hospital offload processes
Definition of ambulance-to-hospital offload, including what constitutes delay	• A rapid review from 2013 that aimed to identify the role of hospital clinical handovers between paramedics and emergency-department (ED) staff in the identification and management of deteriorating patients defined handovers as the 'transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis'(7) • Another literature review from 2013 defined ambulance and ED handover as ambulance members handing over patients to in-hospital nurses or physicians(9) • A 2021 study conducted in Southeast Queensland, Australia identified two types of clinical handover processes that were distinguished by their location and the ED and patients' level of acuity: 1) handover at the ambulance ramp entrance for non-critical patients; and 2) handover directly outside and repeated within a specially designated resuscitation room for critically ill patients requiring immediate treatment for their medical condition or traumatic injuries(4) • Another 2012 primary study that assessed and quantified handover delays experienced by the Ambulance Services of New South Wales (ASNSW) in Australia defined the turnaround interval as the interval between the arrival of the ambulance to the ED and the return of that ambulance to availability, and defined handover delay or 'offload delay' as the delay in the transfer of patient care from emergency medical services (EMS) to ED personnel(13) • A Hospital Liaison Program (HLP) implemented at a general hospital in Maryland, United States that was evaluated in a 2022 primary study had an ambulance offload process that involved assigning a member of the fire department's EMS personnel to expedite patient transfer and provide real-time feedback on ED bed capacity to EMS crews in the field o Duties of the EMS clinician included initiating the transfer process when EMS arrived at the hospital ED, monitoring dispatch systems and PPE supplies, assisting with unloading the patient, and assisting EMS staff with PPE disposal and disinfection(14) • One observational cohort study published in 2019 that assessed whether ambulance offload delay in Calgary emergency departments was associated with adverse health-system and patient outcomes considered EMS offloads as delayed if patients had to wait more than 60 minutes to get into a definitive ED care space o The study indicated offload delays between 15 and 60 minutes were considered acceptable in many Canadian EDs(15)
Data collected and reported about ambulance-to-hospital offloading	• None identified

Ambulance-to-hospital offload times	• A 2013 primary study from New York, United States observed emergency medical services (EMS) patient arrival, time of EMS report, and time of movement of the patient off of the EMS stretcher, and measured this information against the National Emergency Department Overcrowding Scale (NEDOCS) scores o NEDOCS scores were grouped according to the standard NEDOCS groupings for the scores over 100, which is indicative of emergency-department crowding o The study found that the ambulance offload delay ranged from 0 minutes to 157 minutes with a median of 11 minutes, and when the NEDOCS scores were grouped into four groups according to the standard NEDOCS groupings (e.g., 0 to 100, 101 to 140, 141 to 180, anything greater than 180), there was a statistically significant difference in median ambulance offload delay (AOD) between the groups(16) • A 2012 primary study quantified and assessed handover delays experienced by Ambulance Services of New South Wales (ASNSW) in Australia and found that the median handover interval was 15 to 16 minutes o Overall, 12.5% of patients experienced a handover delay of 30 to 60 minutes and 5% experienced a delay of over 60 minutes, with larger hospitals having the highest median handover interval(13) • The recent primary study that evaluated the impact of a novel EMS Hospital Liaison Program at a general hospital in Maryland, United States on ambulance offload times found that when the liaison from the HLP was on duty, there was a 16.31% reduction in the mean offload times compared to the offload times six months prior to the HLP(14) • Of the 162,002 patients that were assessed in the observational cohort study mentioned previously, 56%, 40%, and 25% experienced offload delays greater than 15, 30, and 60 minutes, respectively o The researchers did not find that offload delays were associated with increased patient mortality or prolonged hospital length of stay and hypothesized that this result was possibly due to: 1) the proficiency of triage nurses in selecting lower-risk patients for hallway placement when ED stretchers were blocked; and 2) the ongoing observation by hallway EMS crews and close communication with ED staff during delay intervals which allowed for secondary observations of at-risk patients o Researchers highlighted that the study's results demonstrated the magnitude of the offload delay issue in Calgary EDs(15)
Offsetting financial burden when ambulance-to-hospital times exceed limits	• None identified
Strategies to reduce ambulance-to-hospital offload delay	• A 2018 systematic review of low quality aimed to identify the various factors that contribute to the ambulance offload delay and found that a common theme of the literature on ambulance offload delay included clinical, operational, and administrative perspectives o The review's authors concluded that offload delay must be addressed in a system-wide manner and suggested that future research is needed in conducting system-wide mitigation interventions, addressing root causes of ED crowding and access block, and providing more operations research models to evaluate ambulance offloading delays mitigation interventions prior to implementation (1)

	• A medium-quality systematic review from 2016 described the development of an ambulance-based paramedic role during and after handover for time-critical conditions, such as trauma, stroke and myocardial infarction, and highlighted that enhanced paramedic skills, such as diagnosis, clinical decision-making, and administration of treatment, may improve handover information o The review also emphasized that structured handover tools and feedback on handover performance can have an impact on paramedic behaviour during clinical communication. o However, the review could not propose strong recommendations due to limited literature and suggested that research should be furthered in the scope of designing cost-effective handover and feedback processes (5) • Another systematic review from 2019 that assessed the effectiveness of interventions to improve transitions in care between EMS providers and ED nurses identified transition guidelines, mobile web-based technology (e.g., EMS smartphone for sending files and location date), and a new clinical role for a dedicated ED ambulance offload nurse as potential interventions o There were mixed findings overall for transition guideline use, adherence, and effectiveness, but mobile technology was seen positively by both ED nurses and EMS providers as it helped to better describe the pre-hospital context and to plan flow in the ED o The use of a dedicated nurse for ambulance offload proved to be effective in reducing the number of patients who left the ED without being seen (8) • A rapid review from 2013 that aimed to identify the role of hospital clinical handovers between paramedics and emergency department (ED) staff in the identification and management of deteriorating patients found that in terms of professional relationships, respect, and barriers to communication, the most common factors identified in the literature are lack of active listening, disinterest, distractions, amount of eye contact, and disbelief by the ED staff as perceived by paramedic staff o Safe and effective handovers were found to be affected by levels of stress, staff competency, noisy or interruptive environments, and availability of space o Some of the included studies suggested a need for a more structured handover process and better collection and transmission of important information on vital signs by paramedics to ED staff or documented at the handover (7) • One 2013 literature review identified several barriers to effective ambulance and emergency-department (ED) staff handover, including information loss or gaps during handover (e.g., due to lack of 'active listening' by ambulance personnel while receiving, misinterpretations or wrong statements, recall bias), data and IT-related challenges (e.g., data transmission from ambulance to ED rooms), and cultural differences between professions and organizational aspects (e.g., scope of responsibilities, lack of well-functioning teamwork, lack of shared understanding) o Improvement strategies that were suggested in the review were to identify structured handover information, 'electronic information boards', and triage tools that could support standardization for verbal and written communication, develop national guidelines for handover processes, and increase inter- and multi-professional education and training to enhance mutual understanding and a change in culture in a team (9)

	• A literature review from 2014 described the handover process in pre-hospital settings, including ambulance crews, healthcare professionals outside secondary care, and hospital staff involved in transfer from emergency to hospital facilities o The review found that poor communication between paramedics and hospital personnel rooted in non-active listening, mistrust, and misunderstanding was a key problem in handovers o It was suggested in the review that mnemonics to standardize handover and feedback from receiving personnel may improve handover consistency and reduce questioning by ED staff o The authors of the review noted the importance of clearly stated handovers where paramedic staff speak confidently and loudly and hospital personnel are actively listening in addressing the communication issues identified (10) • Another literature review from 2010 explored the perceptions and experiences of staff during handover and found that in one included study, only 19.4% of ambulance officers had received formal training on giving a handover, resulting in inconsistent and missed information during handover o A lack of active listening by ED nursing staff was also expressed as an issue during handover of patients o Recommendations for improving handover included reducing interruptions, utilizing an electronic tool such as a whiteboard to decrease missed information, changing the workplace culture from individual health professionals to collaborative teams, and engaging healthcare professionals in multidisciplinary training using simulations(6) • A recent primary study from Scotland examined the feasibility, acceptability, and preliminary testing of a technology supporting clinical information recording and delivery during pre-alert and handover at a large city ambulance station that required ambulance clinicians to record all clinical information provided via the radio call into the respective boxes of a double-sided card with pre-alert and handover clinical information requirements o Among ambulance clinicians, most felt that the pre-alert and handover components of the intervention were either 'very useful' or 'useful', and reported using the card 'often' or 'always' to support handover o Overall, the review authors found the intervention effective in improving data recording and information exchange processes (11) • A 2017 primary study from Iran explored the external environmental and internal structural factors that have an impact on patient handover experiences from the perspectives of paramedics and ED members, and suggested improving ED design, providing adequate equipment, and training personnel involved in handovers after finding that: o Poor emergency room environments, described as busy and crowded, contributed to poor patient handoff and communication between paramedics and emergency-department staff o Non-standardized equipment, such as stretchers, used by ambulances and in emergency rooms, resulted in slower ambulance turnover times due to the need to source hospital equipment to transfer patients, and re-stock ambulance equipment

	○ Internal factors such as differences in workforce capacity and expectations about responsibilities when transferring patients to the emergency-department staff resulted in communication errors between nurses and paramedics(12) • A 2018 primary observational study conducted in the Netherlands explored the satisfaction regarding handovers between ambulance and emergency-department nurses and found that reasons for dissatisfaction expressed by ED nurses included the lack of a structured handover instrument, incomplete information or disagreement between pre-hospital announcement and patient condition at ED entry (17) • A 2021 primary study from Southeast Queensland, Australia evaluated ambulance and ED personnel responses about the processes undertaken during handover and the factors that potentially have an impact on the quality of the handover, and found that clinical handover was varied and unstructured due to constant interruptions, workload, working relationships, and transfer of responsibility, which often lead to missing information ○ It was suggested that interdisciplinary education and training to improve communication and information transfers between paramedics and emergency-room staff could minimize potential errors, and that the use of guidelines to provide clarity about the transfer of responsibility, and other structured forms of communication, such as whiteboards, could enhance handover (4)

Table 3: Experiences from select Canadian provinces with approaches for optimally managing ambulance-to-hospital offload processes

Province/ territory	Definition of ambulance-to-hospital offload, including what constitutes delay	Data collected and reported about ambulance-to-hospital offloading	Ambulance-to-hospital offload times	Offsetting financial burden when ambulance-to-hospital times exceed limits	Strategies to reduce ambulance-to-hospital offload delay
British Columbia	• None identified	• BC Emergency Health Services (BCEHS) commissioned Operational Research in Health (ORH) to conduct a review of the emergency response services they provided • The ORH determined that if BCEHS did not expand its ambulance and workforce numbers in response to growing demands, the average response times to critical calls would increase from the 2014 average of 10:24 minutes in Metro Vancouver to 15:07 minutes in 2020, with only 25.6% of patients seen within nine minutes • BCEHS has a handbook with specific guidelines for reporting offload delays with or without transfer to another crew • According to a report on a discussion with the BC Patient Transport Network (PTN) in 2018, many offload delays were due to waiting for a bed	• None identified	• None identified	• BCEHS 2020 Action Plan included priority actions for mitigating demand for emergency services: o Add capacity to reduce ambulance response times by replacing EMRs with highly trained PCPs o Improve the timeliness and quality of patient handovers by engaging regional health authorities and select sites in standardizing handovers and increasing supervisory capacity for delay management o Implement secondary triage for 911 calls so that ambulances can respond quickly to the most acute patient events • During the spread of the omicron variant of COVID-19, BCEHS experienced delays in repatriating patients by air transport, and responded by triaging all cases according to acuity, with patients needing the most urgent care being prioritized first

		○ The PTN has no control over receiving beds and the PTN cannot move a bed without the Provincial Health Authority confirming an accepting hospital ○ Another concern was identifying where patients near the B.C./Alberta border should go • The top priorities identified for the BCEHS from the discussion were to reduce time spent on the phone with PTN, improve communication about transport arrival times and delays, review referral patterns to improve services, and receive detailed feedback on critical incidents • The report mentioned that a dashboard would be available in early 2019 to enable hospital staff to see ingoing and outgoing patients as well as ambulance times			• A specialized bursary fund was established by BCEHS to encourage paramedics working in rural areas to upgrade their skills and add capacity of ambulance personnel in communities across the province ○ It was proposed that a criterion of the fund would be that recipients must practise in the province for a specific period of time after receiving their training
Alberta	• The Health Quality Council of Alberta (HQCA) defines ambulance-to-hospital offload as the time spent from when an ambulance first	• None identified	• Alberta Health Services has an EMS hospital time target that nine out of every 10 ambulances spend less than 90 minutes at the hospital	• None identified	• Announced on 24 January 2022, the Government of Alberta is launching a provincial emergency medical services advisory committee in response to growing demand for emergency medical services (EMS) across Alberta and focused on issues faced by

	arrives with a patient at a hospital to when the ambulance and its crew are available to respond to another call				EMS, such as system pressures that may cause service gaps, staffing issues, and hours of work o The advisory committee will include contracted ambulance operators, unions representing paramedics, municipal representatives, and Indigenous community representatives to collaborate, identify concerns, and provide immediate and long-term recommendations that will inform a new provincial EMS service plan o The committee will be submitting its initial report to Alberta's Minister of Health in May 2022, followed by a final and more detail report with long-term recommendations in July 2022 • Announced on 28 April 2022, the new Calgary Integrated Operations Centre (IOC) team will work with emergency medical services (EMS), as part of Alberta Health Services to help address EMS pressures by better managing patient flow and reducing delays • The IOC will be supporting Alberta Health Services emergency medical services'

					(EMS) 10-point plan, an initiative in place to work with EMS staff and community and service=delivery partners to maximize existing EMS system capacity, as well as relieving EMS pressures such as hospital offload delays
Saskatchewan	• A Saskatoon news report defined offload delays as the time that paramedics wait with patients in emergency departments for hospital staff and vacant beds	• A Physician Town Hall report from the Saskatchewan Health Authority on 7 October 2021 reported maximum offload delays at various hospitals throughout the province, due to the pressures COVID-19 had placed on hospital capacity ○ Royal University Hospital (RUH) reported a maximum delay of eight hours; Regina General Hospital reported a maximum delay of six hours; Regina Pasqua reported a maximum delay of four and a half hours; and Moose Jaw reported a maximum delay of two hours, noting that delays were considered rare prior to the pandemic	• A 29 September 2018 news report stated that while the offload benchmark should be 20 minutes, ambulance services reportedly experienced an estimated 1,200 to 1,300 delays per month, which was equivalent to approximately 50% of its monthly transports ○ In 2016, paramedics in Saskatoon were reported to have spent 800 hours waiting to offload	• The 2021-22 Budget from the Government of Saskatchewan announced that Emergency Medical Services would receive an increase of $6.6 million for additional ambulances to help address offload delays, cover patient wait-time fees, and implement a new computer dispatch system	• On 11 September 2020, the Government of Saskatchewan provided an investment of $2.9 million to improve Emergency Medical Services (EMS) paramedic staffing and staffing at the Royal University Hospital (RUH) Emergency Department in Saskatoon ○ $780,000 will be directed to RUH Emergency Department to help improve offload delays and transitions between EMS and RUH staff ○ This is expected to improve turnaround times for EMS providers in rural and remote areas

			patients, with delays experienced in more than 50% of the 2,300 trips in March 2016		
Manitoba	• The City of Winnipeg describes ambulance-to-hospital offload as the time from when the paramedic arrives with the patient in the emergency room to the time that patients are ready to receive care in the emergency room, thus relieving the paramedic from responsibility for the patient o A total wait for care of more than 60 minutes is considered a delay and is subject to a fine	• None identified	• In 2014, the average time paramedics wait with patients at hospitals was 78 minutes, and the Winnipeg Regional Health Authority paid the city $1.6 million for 13,900 hours of this offload time which occurred above the threshold of 60 minutes	• The City of Winnipeg charges the Winnipeg Regional Health Authority when paramedics sit with patients in emergency rooms for more than 60 minutes	• The City of Winnipeg levels ambulance transport arrivals across facilities, primarily by shifting lower acuity patient arrivals to other levels of care besides acute emergency departments, and conducting in-depth telephone assessments to determine the urgency of need for an ambulance
Ontario	• The 2012 Auditor General report indicated that the	• The Computer Aided Dispatch system (CAD) records the 'paramedic	• According to the 2012 Auditor General report,	• None identified	• The Ontario Ministry of Health provided $16.1 million for the Dedicated Offload Nurses

	government is using the National Ambulatory Care Reporting system definition for 'ambulance transfer of care'	transfer of care time' in support of offload delay management across the province, which reports the length of time paramedics have spent with a patient at a hospital	the benchmark for ambulance offload time is 30 minutes, 90% of the time (based on an expert panel report from 2005)		Program in 2020-21, which provided municipalities funding for dedicated nurses to receive ambulance patients ○ The program allows for paramedics to transfer patients to hospital staff, which provides them the opportunity to respond to the next 911 call more quickly ○ The government indicated that dedicated offload nurses help reduce ambulance offload delays, improve patient flow, and ensures timely access to care for patients ○ The Ontario Ministry's Dedicated Offload Nurses Program reported that in 2020-21, about 800,000 patients were cared for by offload nurses and improved ambulance availability by 500,000 hours • The Ontario Ministry of Health invested $16 million at the Ottawa Hospital Civic Campus to develop a new emergency department ambulance offload and medicine transition unit facility, which will allow for 20 beds dedicated for ambulance offload to allow paramedics to transfer patients safely, in

					addition to 20 medicine transition beds • In response to challenges identified by the Auditor General, The Dispatch Working Group, the Association of Municipalities of Ontario, and the Ontario Association of Paramedic Chiefs, the government will be modernizing emergency health services and has started consultations, including discussions on lengthy ambulance offload times and delays • In response to the consultation, the Association of Municipalities (Ontario) suggested strategies for the government to consider, such as increasing hospital capacity, having alternate health facilities, and expanding the use of community paramedicine
Québec	• None identified	• None identified	• None identified	• None identified	• None identified
New Brunswick	• None identified	• None identified	• None identified	• None identified	• None identified
Nova Scotia	• None identified	• A comprehensive review of Nova Scotia's emergency medical services (EMS) system design was issued by the Nova Scotia Department of Health and Wellness and Emergency Health Services in October 2019, and conducted by third	• None identified	• None identified	• As of 1 October 2021, a new pilot program launched at the QEII Health Sciences Centre Halifax Infirmary Site to improve patient flow and reduce the amount of time ambulances are waiting at the

		party contractors of Fitch & Associates • Some of the key findings reported that current system operations result in significant ambulance time (dollars) spent in non- productive activities, specifically waiting in hospitals to offload patients in emergency departments, and that on average EMS ambulances spend one to one and a half hours offloading patients for Category 1 calls, or three hours 15 minutes measured at the 90th percent			hospital's emergency department ○ An emergency-department transition team will help get patients into the care of hospital staff quicker and assist with the flow of patients who no longer require emergency care out of the department and into hospital ○ Full implementation of the program was expected in December 2021 ○ In 2017, a similar transition team was at the Dartmouth General Hospital and evaluations by the Nova Scotia Health Authority showed the team was effective in reducing offload delays

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APPENDICES

The following tables provide detailed information about the systematic reviews and primary studies identified in the rapid synthesis. The ensuing information was extracted from the following sources:

- systematic reviews - the focus of the review, key findings, last year the literature was searched, and the proportion of studies conducted in Canada; and
- primary studies - the focus of the study, methods used, study sample, jurisdiction studied, key features of the intervention and the study findings (based on the outcomes reported in the study).

For the appendix table providing details about the systematic reviews, the fourth column presents a rating of the overall quality of each review. The quality of each review has been assessed using AMSTAR (A Measurement Tool to Assess Reviews), which rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered "high scores." A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8).

All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid synthesis.

Appendix 1: Summary of findings from systematic reviews and other types of reviews about approaches for optimally managing ambulance-to-hospital offload processes

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Systematic reviews	A review on ambulance offload delay literature (1)	This review aimed to address the ambulance offload delay problem by searching the literature and exploring the various factors that contribute to the problem. The findings are organized by the following topics: improved understanding and assessment of the problem; analysis of the root causes and impacts of the problem; and development and evaluation of interventions. Emergency-department (ED) crowding and ambulance diversion is a well-researched area, however, research focused on the ambulance offloading delay is still limited. A common theme found throughout the literature was that this problem includes clinical, operational, and administrative perspectives, and therefore must be addressed in a system-wide manner. The most common intervention type was ambulance diversion. The authors made the following recommendations with respect to future research: conducting system-wide mitigation interventions, addressing root causes of ED crowding and access block, and providing more operations research models to evaluate ambulance offloading delays mitigation interventions prior to implementations.	Published 28 January 2018	3/9 (AMSTAR rating from McMaster Health Forum)	Not indicated
	A review of enhanced paramedic roles during and after hospital handover of stroke, myocardial infarction and trauma patients (5)	The systematic review aimed to describe the development of an ambulance-based paramedic role during and after handover for time-critical conditions (e.g., trauma, stroke, and myocardial infarction). The review did not identify any studies that evaluated the health impact of an emergency ambulance paramedic intervention following arrival at a hospital. However, the authors provided a narrative review of 36 studies related to structured handover tools/protocols, and protocols to enhance paramedic skills during handover. The narrative review found positive findings, including: 1) enhanced paramedic skills (e.g., diagnosis, clinical decision-making, and administration of treatment) may improve handover information; and 2) structured handover tools and feedback on handover performance can have an impact on paramedic behaviour during clinical communication. Some studies reported that paramedic roles were limited to 'direct transportation' without involvement in assessment or treatment. The authors concluded that they could not make strong recommendations due to the limited literature on the topic. They recommended that paramedic research is needed to design cost-effective handover and feedback processes.	Published 2016	7/10 (AMSTAR rating from McMaster Health Forum)	Not reported
	Transition in Care from EMS Providers to Emergency Department Nurses: A Systematic Review (8)	The aim of this systematic review was to assess the factors that influence transitions in care between EMS providers and ED nurses, and the effectiveness of interventions to improve these transitions. A total of 20 studies were included and six factors that influenced transitions were identified from 15 of these studies: operational constraints, professional relationships, different professional lenses, information shared between the professions, patient presentation and involvement, and components of the transition.	Published July 2019	9/10 (AMSTAR rating from McMaster Health Forum)	Not reported

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		Some of the challenges identified from the studies for EMS and ED staff included differences in professional language used, poor communication during transitions, tension between completing a full report for patient transfer and the need for EMS staff to quickly return to the community, the limited capacity of EDs to receive patients from EMS, and burnout of EMS providers and ED staff. In terms of interventions, three were identified from six methodologically weak studies, namely transition guidelines, mobile web-based technology (e.g., EMS smartphone for sending files and location date), and a new clinical role for a dedicated ED ambulance offload nurse. There were mixed findings overall for transition guideline use, adherence and effectiveness, but mobile technology was seen positively by both ED nurses and EMS providers as it helped to better describe the pre-hospital context and to plan flow in the ED. The use of a dedicated nurse for ambulance offload proved to be effective in reducing the number of patients who left the ED without being seen. The authors recommended interdisciplinary training in the use of flexible structured protocols for EMS and ED staff in order to ensure safe and effective transitions.			
Rapid reviews	Review article: Improving the hospital clinical handover between paramedics and emergency-department staff in the deteriorating patient (7)	This study aimed to identify the role of hospital clinical handovers between paramedics and emergency-department (ED) staff in the identification and management of the deteriorating patient, and offer recommendations for how handovers can be improved. In this study, handover is defined as the 'transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis.' A deteriorating patient is defined as 'someone who is experiencing physiological deterioration that might lead to serious adverse events, including death.' Following the literature search conducted during 2011 and in July 2012, 17 peer-reviewed quantitative and qualitative studies from 2001 to 2012 were included in this study. The study settings included general EDs, trauma centres or resuscitation rooms, and a high-fidelity simulation setting. Six themes were identified by the reviewers: 1) professional relationships, respect and barriers to communication; 2) need for structure or a handover tool; 3) multiple handovers and identification of staff in ED; 4) education and training; 5) vital signs; and 6) documentation and other data display formats. The most common communication and behavioural themes identified in the literature were lack of active listening, disinterest, distractions, amount of eye contact, and disbelief by ED staff (as perceived by paramedics). Safe and effective handovers were found to be affected by levels of stress, staff competency, a noisy environment, interruptions, and availability of space. Studies indicated that these barriers can be addressed through sharing a common language, familiarity, and easy flowing communication between staff. A few studies provided evidence that there was a need for a more structured handover process, and seven studies found that multiple handovers contributed to information	Published October 2013	Not applicable	1/17

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		being lost or changed. The number of times handover was repeated correlated with the acuity of the patient and the availability of an ED team of a doctor and a nurse to receive the patient. Some paramedics wanted 'appropriate staff' to receive the handover in the trauma setting if the patient was deteriorating. In terms of education and training, in most of the included studies, ambulance staff either had formal training in giving a handover or expressed a need for it. However, research highlighted that ED and paramedic professionals found experiential 'on the job' peer observation more beneficial for learning the handover process. The literature identified that important information on vital signs often was not being collected or transmitted by paramedics to ED staff or documented at the handover. Research also found that vital signs were one of the most predictable, routine, and valued pieces of information handed over that when measured and managed appropriately can help to prevent adverse events. Lastly, paramedics acknowledged in a study that the reliance on memory and writing patient information on different mediums can be a significant impediment to data transmission and can lead to loss of important information. Recording and displaying patient information electronically could improve data tracking and reduce data loss. The main limitation of this study was that the evidence of the included studies was weak. However, based on the study's findings, recommendations for further research were identified including testing of the efficacy of handover tools, exploration of the handover process specifically for deteriorating patients, and understanding of the criteria for escalation of a deteriorating patient by paramedics and ED staff.			
Literature reviews	Clinical handovers between pre-hospital and hospital staff: Literature review (10)	This review aimed to describe handover in pre-hospital settings, including ambulance crews, healthcare professionals outside secondary care, and hospital staff involved in transfer from emergency to hospital facilities. Twenty-one studies were included in the review. Interviews with clinicians noted the importance of clearly stated handovers, and that paramedics were confident and succinct, and able to speak loudly. Effective handover was achieved when personnel actively listened. When handovers were unstructured, staff felt that there was room for miscommunication. A lack of feedback from receiving personnel was also a communication problem. In addition, mnemonics to standardize handover improved handover consistency and reduced questioning by ED personnel; however, one study found that mnemonics did not improve information retention by ED staff. One study in Norway preferred verbal handover to be combined with supporting written paperwork; however, doctors found documentations from other doctors to be more useful than that of ambulance crews. Receiving personnel often threw out patient report	1 September 2014	Not applicable	3 from U.S./Canada

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		forms without reading them. The use of scraps of paper, gloves, and bed linen were impractical to record information, while electronic systems were also difficult due to the time taken to enter data. The authors concluded that the poor communication between personnel rooted in not actively listening, mistrust, and misunderstanding is a key problem in handovers. A positive relationship between clinicians facilitated by a shared understanding and working atmosphere would allow for more successful handovers.			
	Handover of patients: a topical review of ambulance crew to emergency department handover (9)	Ambulance and ED staff handover involves ambulance members handing over patients to in-hospital nurses or physicians. The literature review included 18 studies, which included eight studies that focused on ambulance handover barriers, models, and gaps in the literature. The authors identified some barriers, including: 1) information loss or gaps during handover (e.g., due to lack of 'active listening' by ambulance personnel while receiving, misinterpretations or wrong statements, recall bias); 2) data and IT-related challenges (e.g., data transmission from ambulance to ED rooms); and 3) cultural differences between professions and organizational aspects (e.g., scope of responsibilities, lack of well-functioning teamwork, lack of shared understanding). The authors identified suggested improvement strategies to patient handover between EMS and hospitals. First, the authors identified structured handover information, 'electronic information boards', and triage tools (such as BAUM, MIST, IMIST-AMBO) that could support standardization for verbal and written communication. Second, they reported that some studies recommended the development of national guidelines for handover processes. Third, the authors suggested that inter- and multi-professional education and training could enhance mutual understanding and a change in culture in a team. Finally, the authors concluded that any strategy needs to address context-specific differences.	2013	Not applicable	Not reported
	Clinical handover of patients arriving by ambulance to the emergency department (6)	This paper reviewed research on clinical handover between the ambulance service and ED in hospitals, exploring the perceptions and experiences of staff during handover. Eight studies fit the inclusion criteria. Three themes were identified: 1) important information that may be missed during clinical handover; 2) handovers that include written and verbal components improving information exchange; and 3) multidisciplinary education about the handover process may encourage teamwork. One study reported that only 19.4% of ambulance officers had received formal training on giving a handover, resulting in inconsistent and missed information during handover. Lack of active listening by ED nursing staff was also an issue, especially during handover of patients with ambiguous symptoms and complex social problems.	6 February 2010	Not applicable	0

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		In response to a concern about clarity of information during handover, one study recommended that handovers for critically ill patients should be delivered in two phases: one for immediate and essential information and another after initial treatment. In addition, to counteract information retention issues, a study recommended having written ambulance reports accessible by ED staff. Recommendations for improving handover included reducing interruptions and utilizing an electronic tool such as a whiteboard to decrease missed information. In addition, it was recommended that the standardized handover model be flexible to fit within the context of the patient and local environment. Changing workplace culture from individual health professionals to collaborative teams would also promote teamwork during handover and prevent poor patient outcomes. Another recommended strategy was for healthcare professionals to engage in multidisciplinary training utilizing simulations. The authors concluded that knowledge gaps exist concerning ambulance to ED handover, the consequences of poor handover, transfer of responsibility, staff perception of handovers and staff training and evaluation to improve handovers.			
Scoping reviews	Concepts, antecedents and consequences of ambulance ramping in the emergency department: A scoping review (18)	The aim of the review was to synthesize the literature on the conceptualization, meaning, antecedents and consequences of ambulance ramping. Ambulance ramping was most often found to be a term used to describe a set of practices within the emergency healthcare system at the interface between ambulance services and Eds, and occurred when patients experienced a delay of more than 30 minutes from offload from ambulance to an ED treatment area. In total, five different types of time measures were identified describing ambulance patient delays in triage and handover in the ED: 1) total time in the ED (total time in ED from ambulance arrival to patient departure from ED); 2) offload time (from ambulance arrival to ED treatment area); 3) pre-triage (from ambulance arrival to ED triage; 4) post-triage (from ED triage to patient departure from ED); and 5) from ED triage to ED treatment area (Queensland Health recorded Ramping). This review included peer-reviewed and grey literature documents that reported ambulance ramping (or similar) and that documented a delay in ambulance patient handover to ED staff, detailed antecedents, or consequences of delay in ambulance patient handover, or documented delays of ambulance crews within the ED. After screening and inclusion criteria were applied, 13 articles were included, with most being multi-site studies from developed countries, and included a geographical area serviced by a network of hospitals with at least one trauma centre or tertiary hospital.	Published 20 November 2017	4/9 (AMSTAR rating from McMaster Health Forum)	1/13

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		Antecedents identified for ambulance ramping include: 1) limited availability for ambulance diversion; 2) patient acuity; 3) time of day; 4) day of the week; 5) insufficient staffing at the ED; 6) insufficient beds at the ED; and 7) high levels of workload at the ED. The consequences of ambulance ramping identified across studies were longer time to triage, longer patient's length of stay, higher levels of access block (i.e., patients spending longer times in the ED due to a lack of inpatient bed capacity), and higher admission rates. An additional consequence that was identified was a delay in the ability to triage new ambulance-arriving patients. The authors highlight the need to use consistent definitions and outcome measures to report ambulance ramping, and research is required to better understand patients' perspectives of ambulance ramping. Literature on patient crowding in ED suggests that patients may withhold information, refuse thorough examination because of compromised privacy, and be reluctant to return to the ED in the future as a result of communication breakdown and unmet expectations. Research is needed to understand if these findings hold true for patients experiencing ambulance ramping.			

Appendix 2: Summary of findings from primary studies about approaches for optimally managing ambulance-to-hospital offload processes

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
Impacts of an EMS Hospital Liaison Program on Ambulance Offload Times: A Preliminary Analysis (14)	*Publication date:* February 2022 *Jurisdiction studied:* Maryland, United States *Methods used:* Retrospective study	The included transport data was based on a sample of 11,210 transfer incidents from September 2019 to September 2020.	To evaluate the outcomes of the Hospital Liaison Program (HLP), operational transport data for all Emergency Medical Service (EMS) incidents to the Howard County General Hospital (HCGH) was analysed both six months before the HLP implementation and six months after. The HLP, initiated in March 2020, involved assigning a member of the fire department's EMS personnel to expedite patient transfer and provide real-time feedback on ED bed capacity to EMS crews in the field. As the EMS arrived at the ED, the EMS clinician initiated the transfer process. Other duties of the liaison included monitoring dispatch systems and PPE supplies, assisting with unloading the patient, and assisting EMS staff with PPE disposal and disinfection. Secondary outcome measures included the ambulance response level designation and the priority level of incident calls, ranging from Priority 1 (critically ill patients needing immediate attention) to Priority 4 (calls that do not require medical attention).	This study aimed to evaluate the impact of a novel Emergency Medical Service (EMS)-based Hospital Liaison Program (HLP) at Howard County General Hospital (HCGH) on ambulance offload times (AOTs). Of the 11,210 incidents included in the study's sample, 4,898 were before program implementation and 6,312 were after implementation. The mean offload time at HCGH was 20.89 minutes, with the majority of calls being Priority 2 calls that had patients with less urgent but potentially life-threatening conditions (41.76%), and Priority 3 calls that had patients with non-urgent conditions (50.82%). The study found a statistically significant increase in the proportion of incidents after the program's implementation. When the liaison from the HLP was on duty, there was a 16.31% reduction in the mean offload times compared to the offload times six months prior to the HLP. In addition to this, higher severity calls had reduced AOTs when compared with lower acuity patients, which indicated the effectiveness of the EMS liaison in facilitating rapid triage and transfer to the ED. It was also highlighted that previous research found that patients with offload times less than 30 minutes have significantly better outcomes and shorter ED stays than those with longer offload times. The hospital liaison program also provided an avenue to regularly reinforce departmental policy changes, improve proficiency among department members with doffing procedures, and ensure that hospital protocols were adhered to during transfers of COVID-19 patients. Limitations of the study methodology included only using transfer data from one hospital setting during a 12-month period, and carrying out the study during the COVID-19 pandemic, which is a unique contextual factor. The authors recommended that further research should be undertaken to explore the casual link between the primary and secondary outcomes in this study as well as the differences in offload times in hospitals without a liaison program using a longer timeframe.
Assessing the quality of patient handovers between ambulance services and emergency department -	*Publication date:* 2022 *Jurisdiction studied:* Germany	The Emergency Department Human Factors in Handover tool (ED-HFH) was completed by 90 of 120 eligible staff members participating in	This study reports the development and validation of a new standardized tool to assess human factors, such as psychological, cognitive and social characteristics of people influencing their interactions with their	The ED-HFH promises to be a feasible tool for measuring and improving the quality of patient handover processes in the ED. This study has shown its feasibility, reliability, as well as content and construct validity. The ED-HFH also promises to be a short and useful tool for ongoing quality assurance of the handover in the ED. It can also be part of a set of outcome measures to evaluate

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
development and validation of the emergency department human factors in handover tool (19)	*Methods used:* Descriptive Analysis	handovers in the emergency department of a German university hospital. In total, 50 interviews were conducted with 19 paramedics, 15 nurses and 16 doctors. The paramedics interviewed included ambulance officers, paramedics and intensive-care paramedics with experience ranging from two to 15 years.	environment, during handovers between the ambulance service and the emergency department (ED). This tool was intended for use as a self-assessment questionnaire by participants of handovers as well as a tool for usage by an external observer. This validation study primarily focused on its usage as a questionnaire. Staff was asked for informed written consent for participation in observation and surveying in the context of handovers. Participation was voluntary.	interventions to improve interprofessional cooperation. Finally, it could be used as a tool for feedback and self-reflection in teaching interprofessional communication during handovers to students or medical staff.
Paramedic streaming upon arrival in emergency department: A prospective study (20)	*Publication date:* 2020 *Jurisdiction studied:* Victoria, Australia *Methods used:* Prospective cohort design	Data from 500 patients representing 1.6% of cases were collected during the study period. The patient population was 55.4% male with a median age of 57 years. 57.8% presented with medical complaints, 30.2% presented with trauma, and 9.6% with psychiatric presenting complaints.	The purpose of the study was to assess the concordance between a streaming decision by paramedics with the decision by nurses after arrival to the ED. Paramedics were met at the entrance to the hospital and asked which destination they thought was appropriate for the patient. The ED nurse streaming decision was then compared to their response, and cases of discordance were reviewed and assessed for clinical risk by a blinded independent expert panel.	The overall concordance between paramedics' judgment and nurses' streaming decision was 86.4%. In most cases of discordance, patients were streamed into a more acute destination than what was suggested by paramedics. Of 68 discordant cases, 56 were deemed not to be of any clinical risk. The authors conclude that although paramedics have limited knowledge of patient load within the ED, they can allocate a streaming destination with high accuracy and with low clinical risks. Pre-hospital notification of streaming destination with proactive allocation of ED destination could help reduce off-load times and improve patient flow.
Statewide Method of Measuring Ambulance Patient Offload Times (21)	*Publication date:* 2019 *Jurisdiction studied:* California, United States *Methods used:* Descriptive	California EMS is a two-tiered system with the state agency responsible for coordination, regulation, and oversight of the EMS system. Thirty-three local EMS agencies are responsible for local needs such as specialty care hospital designation, medical and destination protocols. This includes 830,679 ambulance	A task force including stakeholders from the California Hospital Association, the California EMSA, and the Emergency Medical Services Administrators Association of California was convened to develop standard definitions and methodology to measure. ambulance offload delays	The ambulance patient offload time (APOT) was defined as "the time between the arrival of an ambulance at an emergency department and the time that the patient is transferred to an ED gurney, bed, chair or other acceptable location and the ED assumes responsibility for care of the patient." Additionally, the EMS agency indicated that 20 minutes would be the target benchmark, but most varied from 15 to 45 minutes (with 30 minutes being most selected). The standardized data collection provided the authors an understanding of significant ambulance patient offload time delays, which prompts the need for a statewide assessment to determine effective strategies to reducing such delays.

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
		transports to 126 hospitals. Nine of the 33 local EMS agencies in California comprise 37% of the state population.		
Are emergency medical services offload delay patients at risk of adverse outcomes? (15)	*Publication date:* July 2019 *Jurisdiction studied:* Calgary, Alberta, Canada *Methods used:* Observational cohort study	Study setting was in four adult EDs of the Calgary Health Zone from July 2013 to June 2016. The Calgary Health Zone is an integrated care delivery system in Calgary that shares regional leadership, operational processes, program structure, quality management, and information systems. EMS offload of 162,002 patients were considered in this study.	This study assessed whether ambulance offload delay is associated with adverse health-system and patient outcomes. The administrative data of all high-acuity Canadian Triage Acuity Scale (CTAS) 2 and 3 (emergent and urgent) patients who were brought by ambulance to one of the four Calgary EDs were assessed. Those patients assigned a care space within 15 minutes of triage were *controls* and those who were delayed for 60 minutes or more were considered *delayed*. More than 60 minutes was chosen to define the *delayed* cohort because the researchers felt that 30-minute delays were too brief to cause outcome differences. "Grey zone" patients that were delayed between 15 and 60 minutes were excluded because many Canadian EDs in urban areas would consider these delays acceptable, and because they would blur the distinction between the *cohort* and *delayed* study groups.	Of all the patients that were assessed, 56%, 40%, and 25% experienced offload delays greater than 15, 30, and 60 minutes, respectively. These results highlighted the magnitude of the issue of offload delays. Patients who were considered *delayed* were more likely to be older, female, to live in dependent living situations, to have lower acuity (CTAS 3) complaints, and to arrive on weekdays during day or evening hours. They were also less likely to require admission and, when admitted, more likely to go to the hospitalist service. After comparing 35,000 high-acuity EMS arrivals who received timely emergency access and 35,000 well-matched patients who suffered substantial offload delays, the researchers did not find that offload delays were associated with increased patient mortality or prolonged hospital length of stay. The study provided possible reasons for this counterintuitive result: 1) triage nurses are good at selecting a lower-risk patient population for hallway placement when ED stretchers are blocked; and 2) ongoing observation by hallway EMS crews and close communication with ED staff during the delay interval allows for secondary observations of at-risk patients who may have seemed stable during the initial triage interaction. The researchers recommended that future studies should address the effect of offload delays on patient experience and syndrome-specific quality measures as well as on EMS cost and operational performance (e.g., response times to high-acuity calls).
The Satisfaction Regarding Handovers Between Ambulance and Emergency Department Nurses: An Observational Study (17)	*Publication date:* 10 September 2018 *Jurisdiction studied:* Groningen, Netherlands *Methods used:* Prospective observational study, questionnaire for level of satisfaction	The University Medical Center Groningen is a tertiary care teaching hospital with over 34,000 visits to the emergency department (ED) annually. A total of 97 handovers were observed.	Not applicable. An intervention was not introduced.	Reasons for ambulance nurses being less satisfied included the absence of an ED physician and waiting times. Ambulance nurses were unsatisfied in one of 20 cases if the physician was present, and they were unsatisfied in fuve of 77 handovers if they were absent. There was no correlation between the severity of the emergency and nurse satisfaction. Reasons for ED nurses being unsatisfied included the lack of a structured handover instrument, incomplete information or disagreement between pre-hospital announcement and patient condition at ED entry. When more letters from the ABCDE (Airway, Breathing, Circulation, Disability, Exposure) or AMPLE (Allergies,

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
				Medicine, Past, Last meal, Event) instruments were used, satisfaction increased.
The feasibility, acceptability and preliminary testing of a novel, low-tech intervention to improve pre-hospital data recording for pre-alert and handover to the emergency department (11)	*Publication date:* 2018 *Jurisdiction studied:* Glasgow, Scotland *Methods used:* Pre- and post-test (historical control)	Eligible participants for the surveys included all ambulance clinicians (n=69) based at one large city ambulance station, and all nursing and physician staff (n=99) based in a city emergency department (ED).	The aim of this study was to measure the feasibility and acceptability of a low-tech intervention supporting clinical information recording and delivery during pre-alert and handover within the pre-hospital and ED setting. The intervention consisted of a double-sided A6 card in high contrast colour with pre-alert and handover clinical information requirements on opposing sides, with writing boxes for clinical variables available for use with a marker pen. Ambulance clinicians were each issued a personal pre-alert and handover card with pens. Instruction notices were placed at various strategic locations. Those receiving the ambulance pre-alert within the ED were instructed to record all clinical information provided via the radio call in the respective boxes on the form.	Twenty-five ambulance clinicians and 37 ED staff responded to the follow-up survey. Among ambulance clinicians, most felt the pre-alert and handover components of the card were either 'very useful' or 'useful' and reported using the card 'often' or 'always' to support handover. The provision of clinical variables in pre-alert information improved. ED staff showed small, statistically significant improvements in handover across three of five domains measured. Overall, the authors found that the intervention was highly acceptable and improved data recording and information exchange processes.
The impact of an emergency department ambulance offload nurse role: A retrospective comparative study (22)	*Publication date:* 2017 *Jurisdiction studied:* Queensland, Australia *Methods used:* Retrospective comparative	All patients presenting to an emergency department of a 570-bed, regional teaching hospital in Queensland, Australia over the course of 2012	The aim of this study was to compare demographic and emergency department (ED) patient outcomes before, during and after the implementation of the Emergency Department Ambulance Offload Nurse (EDAOLN) role. The EDAOLN role was introduced in one Australian ED in 2012 and performed by senior nurses trained in the assignment of Australian Triage Scale (ATS) categories of the ED, and dedicated to ambulance-arriving patients. For usual care, there was one main triage nurse who	The study evaluated time to be seen as the primary outcome. Secondary outcomes included ED length of stay; discharge destination from the ED, left ED after treatment commenced but not completed, transferred to other hospital, and died in ED. The study found that during the study period, small but statistically significant differences were seen in time to be seen, admission rate, and the proportion of those who left after treatment commenced. The outcomes that did not improve with the EDAOLN role implementation included ED length of stay that is less than four hours, overall ED length of stay, and access block, which is ED length of stay that is equal to or greater than eight hours for admitted patient presentations. The authors suggested that the EDAOLN role was potentially useful to support the input stage of the patient's journey in the ED;

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
			was responsible for all arriving patients, those that walked into the ED and those who arrived by ambulance or police vehicle. The main triage nurse was assisted, on an ad hoc basis, by other nurses.	however, this was an uncontrolled before and after study and the interpretation of results should be considered accordingly.
Perspectives of Patient Handover among Paramedics and Emergency Department Members; a Qualitative Study (12)	*Publication date:* August 2017 *Jurisdiction studied:* Fasa, Iran *Methods used:* Qualitative descriptive study using inductive content analysis	Emergency department members with two years or more of clinical experience, working in the Valiasr Hospital in the urban city of Fasa, Iran in 2015. This study recruited 14 paramedics and 11 nurses.	This aim of this study was to understand patient handover and transfer of care, from the perspectives of paramedics and emergency-room members.	This study described the external environmental and internal structural factors that affected patient handoff experiences within the emergency department. This study reported that the poor emergency-room environments, described as busy and crowded, contributed to poor patient handoff and communication between paramedics and emergency-department staff. A second external factor was non-standardized equipment, such as stretchers, used by ambulances and in emergency rooms, which resulted in slower ambulance turnover times due to the need to source hospital equipment to transfer patients, and re-stock ambulance equipment. Internal factors were described as differences in workforce capacity and expectations about responsibilities when transferring patients to the emergency department staff. Participants described a lack of qualified and experienced personnel that resulted in communication errors between nurses and paramedics, and described nurses as having an expectation of paramedics to help stabilize and transfer patients in the emergency department, while paramedics did not view this as part of their role. This study suggests considerations of emergency-room design, providing adequate equipment, and training personnel could improve patient safety and communication between paramedics and emergency-room staff. The authors recommend that organizations should develop and prioritize in-service education.
Quantitative Analysis of the Content of EMS Handoff of Critically Ill and Injured Patients to the Emergency Department (23)	*Publication date:* 2016 *Jurisdiction studied:* *N/A* *Methods used:* Quantitative Analysis	This study was conducted at an urban academic medical centre with an emergency-department census of greater than 100,000 visits annually. All patients arriving to the institution by EMS and meeting predefined triage criteria are brought	From April to July 2013, handoffs from EMS to ED providers occurring in the resuscitation area were observed and audio recorded by four trained research assistants (RAs). RAs received training on the handoff process and the data collection tool. RAs were further trained on the use of a handheld audio recording device, after which	This study demonstrates that presenting problem and initial patient condition are the most common pieces of information transferred. Likewise, patient vital signs, past medical history and medications were also frequently transferred, although the study demonstrates information transfer at lower rates than expected based on previous analyses. The patients' pre-hospital vital signs, arguably the greatest predictor of hospital course and need for immediate intervention, were transferred just over half of the time. Only the patient's chief concern was transmitted more than 60% of the time.

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
		immediately to the ED resuscitation area upon EMS arrival. Ninety patient handoffs were evaluated.	RAs responded to all patients brought to the ED resuscitation area by EMS providers during weekday daytime hours. RAs were instructed to remain as inconspicuous as possible, wearing similar attire to that of the resuscitation team and wearing a concealed microphone. RAs began audio recording immediately following the overhead announcement of patient arrival.	The study demonstrates the need for further training in the provision of patient handoff. EMS handoff should be clear, concise, confident, and respectful. Furthermore, standardization of the patient handoff has been used for some time in the hospital setting and is increasingly used by EMS.
Offload zones to mitigate emergency medical services (EMS) offload delay in the emergency department: a process map and hazard analysis (24)	*Publication date:* November 2015 *Jurisdiction studied:* Halifax, Nova Scotia, Canada *Methods used:* Process and hazard analysis	The offload zone (OZ) processes of two emergency-department (ED) hospitals in Nova Scotia were assessed for hazard risks.	This study involved developing a process map to quantify and understand the process of offload zones and conducting a hazard analysis, and to identify any issues that could have adversely affected patient safety and process efficiency. In this study, offload delay (OD) is defined as a delay between ambulance arrival at the ED and transfer of patient care where the patient is transferred off the EMS stretcher and a verbal report is be given to ED staff. 'Offload zones' describes a concept for reducing OD that involves placing patients with a dedicated nurse and paramedic in the OZ when there are no ED beds available. A process map was initially developed by direct observation and from the written OZ protocol, and then OZ staff members and paramedics in the ground ambulance system were invited to map any step that could occur as patients go through the OZ process. OZ staff members and EMS crews were also asked to participate in focus groups. Note that the process map data was not cross referenced with any EMS or hospital data.	This study aimed to use a process map to quantify and understand the process of offload zones at two ED hospitals in Halifax, Nova Scotia, and to identify any issues that could have adversely affected patient safety and process efficiency by conducting a hazard analysis. The OZ process map developed during the study consisted of 110 steps in total, and 78 FM were identified, 28 of which were deemed high risk. The high-risk cause with the highest hazard score relevant to patient safety was patient not properly assessed/cared for because of lack of proper equipment, while the high-risk cause with the highest score relevant to the OZ process was patient not placed in ED from OZ because patient already receiving care in OZ. Overall, the hazard analysis revealed a number of failures in steps that involved mostly tasks. One mitigation suggestion mentioned was to add a patient attendant or healthcare assistant to free up OZ staff. A suggestion was also proposed to add a device with multi-function cardiac monitoring and defibrillation to the OZ to address the issue of a lack of patient monitoring equipment. The unexpected finding of the study was that real-life implementation of the OZ deviated significantly from the original protocol, in that extensive patient care was being provided in the OZ, which was not included in the OZ protocol. The authors highlighted that this could create an even bigger challenge than what the OZ process was meant to address, in that it has the potential to create a backlog of arriving ambulance patients being cared for in OZ rather than the ED, and subsequently lead to an increase in OD. The authors concluded that the process map developed in the study can be replicated by other institutions and can be used to guide ongoing work to quantify OD times when the OZ concept is implemented.

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
			The hazard analysis involved having focus groups identify failure modes (FM) (i.e., ways in which each step may fail to provide its anticipated result), and the probability and severity of FM occurring in order to calculate a hazard mode score.	
Can emergency medical services use turnaround time as a proxy for measuring ambulance offload time?(25)	*Publication date:* July 2014 *Jurisdiction studied:* Richmond, Virginia, United States *Methods used:* Observational study	A total of 1,732 ambulance runs from the Richmond Ambulance Authority were observed from 1 April to 31 December 2008	This study aimed to determine if the total turnaround interval was an appropriate surrogate for the delivery interval in terms of measuring ambulance offload times. In the study, the "turnaround interval" is defined as the time spent by the ambulance paramedics at the hospital, which includes the "delivery interval" (transfer of patient to ED) and the "recovery interval" (cleaning, restocking, reporting on patient, etc.) Data sources included Richmond Ambulance Authority (RAA) data on the ambulance arrival and departure times, and "care transferred" data reported by paramedics in Richmond that marked the end of the actual patient delivery time. The delivery interval was calculated "care transferred" time minus "hospital arrival" time.	Of the 1,732 ambulance runs included in this study, the mean and median turnaround interval were 30:22 and 28:00 minutes, respectively, and the mean and median delivery interval were 19:43 and 17:00 minutes, respectively. Based on these results, the median delivery interval represented 70% of the total turnaround time, meaning that the recovery time represented the remaining 30%. The analysis conducted for this study did not account for variability in crowding, facility, or patient acuity conditions. The authors reported that while the results of the study indicated that, on average, if the turnover interval was long the delivery interval was also long, they did not provide sufficient information to make policy decisions about how to address long offload delay. A post-hoc analysis of the study results revealed that the relationship between delivery and turnaround intervals is not simple, and that there may be systematic ways in which correlation varies based on times of shift change, fluctuation in ED, and ambulance call volume. For example, the delivery interval was found to be the longest on average in the early mornings and late afternoons, but recovery intervals did not always shorten in alignment with the study correlation during these same times. The study highlights that due to the significant proportion of the turnaround interval that the delivery represents, policies and actions of the ED is a significant determining factor in the availability of ambulance services to populations.
Ambulance handovers: can a dedicated ED nurse solve the delay in ambulance turnaround times?(26)	*Publication date:* 2013 *Jurisdiction studied:* N/A *Methods used:* Simulation Study	N/A	A Simuli 2009 (Simul8 Corporation) discrete event simulation model was generated to assess the impact that dedicated handover nurses would make on handover duration. The timings used within the model were three to five minutes for handover from paramedic to nurse, and assessment and completion of notes	The study found a correlation between increase of staffing levels dedicated to handover and reduced ambulance waiting times; however, this does not come without cost or challenges. No doubt it reduces ambulance handover delays, but adds delays to other aspects of the department's work. A more detailed inspection of causation of handover delays may be required to develop other improvement strategies.

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			taking five to 10 minutes. Timings are based on expert opinion of those involved in the process. Two versions were run, the first with a constant average arrival time (random times averaged rate across 24 hours) and the second with daily fluctuation of arrival rates using data from one NHS Trust. The model was run in two modes. In the first, average ambulance arrival rate was kept constant (inter-arrival time was sampled from an exponential distribution which is the random arrival pattern expected when arrivals are independent of each other). In this mode, the expected waiting times could be assessed at any given arrival rate. The second mode replicated the variation in ambulance arrivals rate throughout the day, using data from one NHS Trust.	
Evaluation of ambulance offload delay at a university hospital emergency department (16)	*Publication date:* 2013 *Jurisdiction studied:* New York, United States *Methods used:* Observational study	The sample consisted of 483 patients arriving via emergency medical services (EMS) to a level 1 academic trauma center during a period of 12 months	The study employed research assistants (RAs) to directly observe emergency medical services (EMS) patient arrival, time of EMS report, and time of movement of the patient off of the EMS stretcher. The RAs recorded the current National Emergency Department Overcrowding Scale (NEDOCS) score, demographic information and location of offload for each patient at the time of EMS patient arrival to the emergency department. The NEDOCS score was recorded from the last score calculated by the charge nurse, which is typically every one to two hours throughout the	NEDOCS scores were grouped according to the standard NEDOCS groupings for the scores over 100, which is indicative of emergency-department crowding. The four groups of NEDOCS scores were group 1 of scores 0 to 100, group 2 of scores 101 to 140, group 3 of scores 141 to 180, and group 4 of scores equal to or greater than 181. The authors found that the ambulance offload delay (AOD) ranged from 0 minutes to 157 minutes with a median of 11 minutes. When data were grouped by NEDOCS score, there was a statistically significant difference in median AOD between the groups, indicating a relationship between emergency-department crowding and AOD.

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			day. The ambulance offload delay (AOD) was determined as the time that elapsed from ambulance arrival until both EMS report was given and movement of the patient off of the EMS stretcher completed.	
Analysis and impact of delays in ambulance to emergency department handovers (13)	*Publication date*: October 2012 *Jurisdiction studied:* New South Wales, Australia *Methods used:* Retrospective observational study	A total of 141,381 EMS transports of the Ambulance Services of New South Wales (ASNSW) in Australia were assessed.	Emergency medical services (EMS) dispatch and ambulance patient records from January/April/July/October 2009 were reviewed and analyzed to determine turnaround intervals and handover delays. In this study, the turnaround interval was defined as the interval between the arrival of the ambulance to the ED and the return of that ambulance to availability. It defined handover delay or 'offload delay' as the delay in the transfer of patient care from EMS to ED personnel. The handover interval was organized into three categories: less than 30 minutes, 30 to 60 minutes, and more than 60 minutes. All emergency calls were prioritized by a Medical Dispatch Priority System that categorizes ambulance calls as either priority 1 or priority 2, with only priority 1 calls receiving an urgent response.	The aim of this study was to quantify and assess handover delays experienced by the Ambulance Services of New South Wales (ASNSW). After analyzing dispatch and ambulance records, the researchers found that the median turnaround interval of the total EMS transports assessed was 29:47 minutes, with large hospitals having the highest median turnaround time. The median handover interval was 15:46 minutes, and overall, 12.5% of patients experienced a handover delay of 30 to 60 minutes and 5% experienced a delay of over 60 minutes. July (winter in Australia) had the highest median handover delay, and patients aged 16 years and over were more likely to be delayed for more than 30 minutes than patients aged less than 16 years old. Additionally, of the total hours spent by the ambulance crews waiting to offload patients during the study, just over seven two-person ambulance shifts per day were lost to offload delays of more than 30 minutes. The study's researchers pointed out that the exact reasons for associations found between handover delays and the different factors identified could not be determined from the methodology used. They recommend that further research is needed to examine the effects of ED crowding on EMS and on patient clinical outcomes.
Patient handover between ambulance crew and healthcare professionals in Icelandic emergency departments: a qualitative study (4)	*Publication date:* 2012 *Jurisdiction studied:* Reykjavík, Iceland and Northern Iceland *Methods used:* Ethnographic study using participant observation, conversational interviews	Thirty-eight handovers were observed and 20 conversational interviews were conducted among paramedics and ED staff	The study aimed to explore the processes undertaken during handover from ambulance to ED personnel as well as the factors that have an impact on the quality of handover. The study identified two types of clinical handover processes that were distinguished by their location and the ED and patients' level of acuity:	Participants from all professional groups reported that clinical handover was varied and unstructured, often leading to missed information. However, participant observations revealed that the information transferred used a structure, and a handover tool was used in the resuscitation room where the medical team could ask further questions or seek clarification from the paramedics. Information routinely given by paramedics to ED personnel included place of retrieval, condition of patient on arrival of ambulance, age, signs and symptoms, observations performed and treatment given by paramedics, past medical history if available, medications prescribed

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	and examinations of handover tools		1) handover at the ambulance ramp entrance for non-critical patients; and 2) handover directly outside and repeated within a specially designated resuscitation room for critically ill patients requiring immediate treatment for their medical condition or traumatic injuries. The second type of handover often occurred several times, including a brief initial handover between an advanced care or intensive care paramedic and a senior ED doctor, followed by a transfer to the resuscitation room where a more detailed handover was given to the team once the patient was transferred onto the bed.	for previous medical conditions, and social history if judged to be relevant. Constant interruptions, workload, working relationships and transfer of responsibility were all identified as factors compromising handover. The authors note that interdisciplinary education may be important for each health discipline to understand each other's culture, language, work values and priorities. Additionally, training courses facilitating knowledge sharing between healthcare disciplines may help improve the relevance and effectiveness of handover practices.
Clinical handover of patients arriving by ambulance to a hospital emergency department: a qualitative study (27)	*Publication date:* 2012 July *Jurisdiction studied:* Southeast Queensland, Australia *Methods used:* Focused ethnography	Emergency room and ambulance service staff were recruited from a 472-bed public hospital in Queensland, Australia in 2008. Sixty-five emergency department nurses, 19 doctors, and 79 paramedics from within the hospital's catchment area were included in the study.	The aim of this study was to describe the handover process between paramedics and emergency-department staff, and identify factors and strategies to improve information-sharing between them.	The study described the complexity of the patient handover process, and organization and individual factors that had an impact on the handover. This study reported that handover delays were also attributed to busy emergency-room environments where staff attention was divided by multiple cases. Long wait times were attributed to a lack of space and overcrowding in emergency rooms, and uncertainty about the transfer of responsibility. For example, participants reported that paramedics maintained responsibility while patients remained on ambulance stretchers. Handovers for non-critical and critical patients were described as a multi-step verbal and physical process, that involved the repetitive sharing of patient information to different members of the emergency-department staff. Participants often described this as unstructured, and sometimes dependent on strong working relationships, experience, and trust between paramedics and emergency-department staff. The study reported clinical tools used during handovers (i.e., telephones, radio and telephone alerts, electronic report forms, and whiteboards recording mechanisms, injury/illness, symptoms, and treatments given), and comments about their perceived effectiveness at communicating information between paramedics and emergency-department staff. These communication strategies were generally described as unreliable forms of communication as emergency

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				department staff accessed reports after paramedics had left, and tools were dependent on the level of detail given to emergency department staff, therefore considered inconsistent. This study suggested that interdisciplinary education and training to improve communication and information transfers between paramedics and emergency-room staff could minimize potential errors. The authors suggest that the use of guidelines to provide clarity about the transfer of responsibility, and other structured forms of communication, such as whiteboards, could enhance handover.
Lost in translation: maximizing handover effectiveness between paramedics and receiving staff in the emergency department (28)	*Publication date:* 2009 *Jurisdiction studied:* Australia *Methods used:* Qualitative study	The participants were recruited from two hospitals and two ambulance services across Victoria and Tasmania. The EDs selected were an urban/district and a major referral department. The departments saw between 40,000 and 45,000 presentations each year. Both ambulance services were within the catchment area of the two selected hospitals.	A semi-structured interview script was developed based on issues around handover identified in the literature. Three experienced qualitative researchers conducted the interviews, using open-ended probing questions to elicit participants' perceptions of handover. Interviews were transcribed verbatim immediately following each interview with identifying data removed. Two of the three researchers independently assessed the transcripts before reaching a shared agreement about themes. Early themes were revised and refined through a process of constant comparison of instances from the data and confirmed the direction of future interviews. The data analysis was inductive and guided by a grounded theory approach, which results in an organizing system of data that are further refined to concepts or themes. In total, 50 interviews were conducted with 19 paramedics, 15 nurses and 16 doctors. The paramedics interviewed included ambulance officers, paramedics and intensive care paramedics with	Three main themes emerged that were evident at both sites and in the three professional groups. These were: difficulties in creating a shared cognitive picture, tensions between 'doing' and 'listening' and fragmenting communication. Findings of the study indicate that although paramedics and receiving staff in the ED recognize the importance of effective handover, there are a number of factors that result in variable quality of handover. The authors recommended that paramedics and emergency receiving staff should consider the adoption of a standardized approach to handover. There is also a need for a common language between paramedics and staff in the ED, for shared experiences and understanding between the members of the team and for the development of a standardized approach to handover from paramedics to ED receiving staff.

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			experience ranging from two to 15 years.	
Handover from paramedics: observations and emergency-department clinician perceptions (29)	*Publication date:* 2008 April *Jurisdiction studied:* New South Wales, Australia *Methods used:* Exploratory survey questionnaire	Participants were sampled from emergency-room clinicians and nurses at the St. Vincent Hospital in Melbourne, Australia. St. Vincent is a 320-bed hospital that receives 12,000 ambulances and 37,000 emergency-room visits annually.	The aim of this study was to examine the information provided during patient handovers, and the attitudes of emergency-room clinicians towards patient handovers from paramedics. Two survey questionnaires asked for emergency-room staff to respond to: usefulness of information received before and during handover, potential improvements for handover, and communication with paramedics.	This study reported that the majority of emergency-room staff found the verbal and written reports provided by paramedics related to patient presentation (e.g., consciousness, trauma, presentation problems), were relevant and useful for handovers. This study observed 621 handovers and reported that the majority (81%) did not involve pre-hospital communication between emergency-room staff and paramedics. The study found that triage nurses attended the majority of handovers (91%), and that paramedics completed at least two handovers (i.e., relayed information about patients to triage nurses, and attending clinicians and nurses) in the majority of observations (91%). Paramedics relayed information about presenting problem, vital signs, medical history, and pre-hospital treatment. The study reported that emergency-department staff found this information useful and accurate. The study reported that emergency-department staff would find a universal patient unit record number most useful to improve patient handover, and pre-hospital triage the least useful.
Retention of information by emergency-department staff at ambulance handover: do standardized approaches work?(30)	*Publication date:* 2007 *Jurisdiction studied:* United Kingdom *Methods used:* Prospective Observational Study	Ten unmodified ambulance handovers were observed in two EDs (Birmingham Heartlands Hospital and The Royal London Hospital). At the Heartlands site, 10 consecutive ambulance crews were asked to structure their verbal handover into the DeMIST format prior to their delivery to hospital staff.	Current handover practice was evaluated in two large EDs. A structured DeMIST format for verbal handover of pre-hospital information from the ambulance crew to receiving ED staff was then introduced into one of the departments. The number of packets of information in each verbal handover and the accuracy of ED staff's recall was assessed.	The average accuracy of packets of data retained by the ED staff in the structured DeMIST handovers was 49.2%, which was worse than the accuracy from the unstructured handovers (56.6%). Due to the small study numbers, it is not possible to determine the statistical significance of this data, however trends can be identified. The ED staff may have faired worse in the structured handovers due to the distraction of the ambulance staff who were trying to handover their patient using an unfamiliar system. It seems that there was no advantage for ED staff retention of information in using a structured handover, such as DeMIST, alone. A structured model may offer other advantages, but it doesn't seem to improve ED staff information recall. The authors stated that further time for the ambulance crews to become familiar with the DeMIST handover structure may have led to a different outcome.
The handover process and triage of ambulance-borne patients: the	*Publication date:* 2005 August *Jurisdiction studied:* Sweden	Six emergency nurses were purposively sampled, based on three years experience, and current	The aim of this study was to describe the experiences of emergency-department nurses who receive patients from ambulance nurses during ambulance to hospital triage,	This study described the reflections of emergency nurses related to pre-hospital communication and planning, and symbolic, ideal, and non-ideal handovers of patients who arrived to the emergency room by ambulance.

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experiences of emergency nurses (31)	*Methods used:* Qualitative descriptive study	work in the emergency department.	described as assessment and prioritization, and handover process. Sweden began staffing all emergency ambulances with registered nurses in 2005. Ambulance nurses are responsible for patient handover to emergency-room nurses, who are responsible for triage within emergency departments.	This study reported that during ambulatory transport, brief and structured communication between the ambulatory nurse and emergency nurse helped to facilitate appropriate preparations for treatment. Information included context about the incident, patient condition, treatment and care measures, and potential emergency personnel needed. The study reported a symbolic handover as a brief verbal account of patient care decisions, assessment of the patient by the emergency nurse, and verbal and/or physical transfer from the ambulatory nurse to the emergency nurse. An ideal handover was described as a high-quality verbal report and clear presentation of the patient's condition/needs for further care planning, which was described as time-saving. Non-ideal handover was described as unclear communication about patient conditions, patients with complex needs, or diagnostic errors from ambulatory nurses. This study suggested that experienced-based knowledge in emergency nurses, and clear structured communication from ambulance to emergency nurses helped to improve efficient patient handover and subsequent triage. The authors suggest that guidelines that help to focus on medical care needs, and further study into documentation, such as patient records, could improve ambulance handover and appropriate levels of care.

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