

# ESCN Systematic and Scoping Review Grant Competition 2016-2021



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This report has been prepared by the Emergency Strategic Clinical Network, Alberta Health Services.

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## Background

The Emergency Strategic Clinical Network (ESCN) was created to lead Alberta Health Services (AHS) in the promotion, adoption and diffusion of innovation as well as the creation and use of evidence to drive decision-making in emergency medicine.

## Mission

The mission of the Emergency Strategic Clinical Network (ESCN) is to support quality patient and family-centred emergency care driven by education, innovation, and practice-changing research through collaboration.

## Vision

Build an inclusive network that supports the advancement of evidence-informed emergency care for all Albertans.

The SCN Scientific Offices pursue six pillars of activity

1. Advancing Research Knowledge
2. Knowledge Translation
3. Research Facilitation
4. Engaging and Building Partnerships for Research and Innovation
5. Research Capacity Building and Training
6. Research Prioritization

## Systematic and Scoping Review Grant Competition

In 2016 the Scientific Office established an annual Systematic and Scoping Review competition to produce high-quality research summaries for emergency medicine.

This document summarizes competition results from 2016 to 2021 and the projects that were published with ESCN support. During this period nineteen systematic and scoping reviews were funded and fifteen have led to publications to date (18 publications total, including protocols). Additional publications are expected from these competition years. \$270,000 dollars were assigned for the competition in this period.

2021

**Impact of COVID-19 on emergency care for children: a living scoping review**

*Dr. Samina Ali*

“Background: Over the past year, the world has been grappling with an unprecedented pandemic caused by a novel coronavirus, SARSCoV-2. The global research community has discovered a great deal about the virus and the illness it causes, COVID-19, which has led to a massive proliferation of research publications. As a result, there are numerous agencies and organizations across the globe that have created specific data and citation repositories to enhance access to information that can increase our understanding of the virus, the disease, and the impact it has had on society and our health care systems. However, these repositories are either too general in their collection approach or they predominantly focus on the management and implications of the virus in adults. Research Questions: We will describe and map COVID-19 related literature reporting outcomes that could impact the care of children and adolescents in the ED. Broadly, this ScR aims to: 1) provide an overview of the published literature related to COVID-19 and children in emergency care settings; and 2) identify gaps to guide future research and funding.

**Association between Social Determinants of Health and Emergency Department Utilization: A Systematic Review**

*Dr. Maria Ospina*

“Background: Emergency departments (ED) play a pivotal role in the health care system in Canada. ED overcrowding is recognized as a major healthcare problem, a barrier to timely patient care and one of the main causes of ED physician burnout. The cause of ED overcrowding is widely debated in clinical and scientific community; traditionally an input, throughput, output model has served as a reference for many studies. Research Questions: What is the evidence on the association between social determinants of health (SDOH) and emergency department (ED) utilization? The specific questions to be addressed are: 1. Are there differences in the frequency and characteristics of ED visits by SDOH groups? 2. What is the association between SDOH and ED outcomes?”

## **Quantifying Unused Opioids Following Emergency and Ambulatory Care: A Systematic Review**

*Dr. Michele Dyson*

“Background: The opioid crisis has highlighted the intertwined complexities of pain management, prescribing practices, and misuse liability, while continuing to exact a severe toll, currently exacerbated by the COVID-19 pandemic. Between January and October 2020, 904 Albertans died from opioid overdose, an average of 90 per month. Opioid and other drug related visits to the emergency department (ED) increased by 22% from the first to the second quarter of the year. Within this context, efforts to prevent opioid-related harms must be a priority. Research Questions: Research Questions: Three key questions will guide our review, the findings of which will inform recommendations for discharge prescribing of opioids. Among patients discharged from the ED or ambulatory care settings, and prescribed opioids for acute pain for at-home use: 1) What is the proportion of unused opioids available following a prescription for acute pain?; 2) What is the quantity of opioids that were used as directed by the patient for acute pain?; and 3) What clinical and/or demographic factors are associated with the proportion of leftover opioids following a discharge prescription for acute pain?”

**Systematic Review Citation:** Dyson MP, Dong K, Sevcik W, Graham SZ, Saba S, Hartling L, Ali S. Quantifying unused opioids following emergency and ambulatory care: A systematic review and meta-analysis. *J Am Coll Emerg Physicians Open.* 2022 Sep 30;3(5):e12822. doi: 10.1002/emp2.12822. PMID: 36203538; PMCID: PMC9523453.

2020

**A Systematic Review Protocol to Determine the Most Effective Strategies to Reduce Computed Tomography Usage in the Emergency Department\***

*Dr. Shawn Dowling*

“This study describes the protocol for a systematic review and meta-analysis. The primary objective of the review is to identify experimental studies assessing the effectiveness of interventions that aim to reduce the proportion of computed tomography (CT) in emergency departments (EDs). Data permitting, our secondary objectives will be to assess the impact of reduction in CT utilization on the length of stay, admission to hospital, and uptake/satisfaction with the intervention. When available, balancing measures such as readmission to hospital or ED revisit rates will be included. Pre-defined subgroup analyses include patient populations (adult or pediatric), type of ED, and the nature of the intervention.”

**Systematic Review Proposal Citation:** Elzinga, J. L., Dunne, C. L., Vorobeichik, A., Keto-Lambert, D., Grigat, D., Lang, E., & Dowling, S. (2020). A Systematic Review Protocol to Determine the Most Effective Strategies to Reduce Computed Tomography Usage in the Emergency Department. *Cureus*. <https://doi.org/10.7759/cureus.9509>

**Systematic Review Citation:** Dunne C.L., Elzinga J.L., Vorobeichik A., Sudershan S., Keto-Lambert D., Lang E., Dowling S. (2022). A Systematic Review of Interventions to Reduce Computed Tomography Usage in the Emergency Department. *Ann Emerg Med*. 80(6):548-560. doi: 10.1016/j.annemergmed.2022.06.001.

**METASTART: A Systematic Review and Meta-Analysis of the Diagnostic Accuracy of the Simple Triage and Rapid Treatment (START) Algorithm for Disaster Triage.**

*Dr. Jeffery Franc*

“The goal of disaster triage at both the prehospital and in-hospital level is to maximize resources and optimize patient outcomes. Of the disaster-specific triage methods developed to guide health care providers, the Simple Triage and Rapid Treatment (START) algorithm has become the most popular system world-wide. Despite its appeal and global application, the accuracy and effectiveness of the START protocol is not well-known.

The purpose of this meta-analysis was two-fold: (1) to estimate overall accuracy, under-triage, and over-triage of the START method when used by providers across a variety of backgrounds; and (2) to obtain specific accuracy for each of the four START categories: red, yellow, green, and black.”

**Systematic Review Citation:** Franc, J. M., Kirkland, S. W., Wisnesky, U. D., Campbell, S., & Rowe, B. H. (2021). METASTART: A Systematic Review and Meta-Analysis of the Diagnostic Accuracy of the Simple Triage and Rapid Treatment (START) Algorithm for Disaster Triage. *Prehospital and Disaster Medicine*, 37(1), 106–116.  
<https://doi.org/10.1017/s1049023x2100131x>

**Pet therapy in the emergency department and ambulatory care: A systematic review and meta-analysis.**

*Dr. Lisa Hartling*

“Pet therapy, or animal-assisted interventions (AAs), has demonstrated positive effects for patients, families, and health care providers (HCPs) in inpatient settings. However, the evidence supporting AAs in emergency or ambulatory care settings is unclear. We conducted a systematic review to evaluate the effectiveness of AAs on patient, family, and HCP experience in these settings.”

**Systematic Review Citation:** Gaudet, L. A., Elliott, S. A., Ali, S., Kammerer, E., Stauffer, B., Felkar, B., Scott, S. D., Dennett, L., & Hartling, L. (2021). Pet therapy in the emergency department and ambulatory care: A systematic review and meta-analysis. *Academic Emergency Medicine*. <https://doi.org/10.1111/acem.14421>



2019

**Non-Medical Opioid Use Following Short-Term Therapeutic Exposure in Children:  
A Systematic Review**

*Dr. Samina Ali*

Understanding, reducing and preventing opioid-related harm is a priority in Alberta, and beyond. There have been urgent calls from prominent child health leaders to identify and synthesize the available evidence with respect to appropriate uses and safety concerns around the use of opioids for children and youth. Two key questions guide this review: 1) Is short-term therapeutic use of opioids in children associated with future development of an opioid use disorder over their lifespan?; and 2) Are there high-risk predictive variables associated with the development of an opioid use disorder following short-term therapeutic opioid use in children? Importantly, this study will support a much-needed shift in emphasis from addictions management to prevention.

**Systematic Review Citation:** Ahrari, M., Ali, S., Hartling, L., Dong, K., Drendel, A. L., Klassen, T. P., Schreiner, K., & Dyson, M. P. (2021). Nonmedical Opioid Use After Short-term Therapeutic Exposure in Children: A Systematic Review. *Pediatrics*, 148(6). <https://doi.org/10.1542/peds.2021-051927>

**Clinical risk prediction scores and high-sensitivity cardiac troponin assays for the prediction of major adverse cardiac events in emergency department patients with chest pain: A systematic review and meta-analysis**

*Dr. Andrew McRae*

Many clinical risk scores can accurately identify patients at low risk of short-term major adverse cardiac events (MACE). However, existing scores were derived prior to the availability of high sensitivity cardiac troponin (hs-cTn) assays, and as such they incorporate less sensitive contemporary cTn results. The goal of the proposed review will be to summarize the evidence on the performance of existing risk prediction scores for MACE and coronary artery disease when combined with hs-cTn assay results. Appropriate use of risk prediction scores can guide clinicians to better match follow up strategy to a patient's risk for MACE.

## **Detection of *Clostridium difficile* in Asymptomatic Children: A systematic review**

*Dr. Otto Vanderkooi*

“Question: What is the prevalence of *Clostridioides difficile* detection among asymptomatic children across the age spectrum? Findings: In this systemic review and meta-analysis of 95 studies with 19 186 participants, the prevalence of detection of toxigenic and nontoxigenic *C difficile* was greatest (41%) among infants aged 6 to 12 months and was lowest (12%) among children aged 5 to 18 years. The prevalence of toxigenic *C difficile* detection was greatest (14%) among infants aged 6 to 12 months. Meaning: These findings suggest that test result interpretation should include consideration of the high likelihood of *C difficile* colonization in young children.”

**Systematic Review Citation:** Tougas, S. R., Lodha, N., Vandermeer, B., Lorenzetti, D. L., Tarr, P. I., Tarr, G. A. M., Chui, L., Vanderkooi, O. G., & Freedman, S. B. (2021). Prevalence of Detection of *Clostridioides difficile* Among Asymptomatic Children. *JAMA Pediatrics*, 175(10), e212328. <https://doi.org/10.1001/jamapediatrics.2021.2328>

2018

**The characteristics and effectiveness of interventions targeting chronic pain patients in the emergency department: A systematic review**

*Dr. Charles Wong*

Pain is the most common presenting complaint in the emergency department (ED), with chronic pain accounting for an estimated 12 to 16% of all emergency department visits. The goal of the proposed review will be to summarize the available evidence on interventions for chronic pain patients in the ED, and to evaluate the effectiveness of these interventions.

**Systematic Review Citation:** Wong, C. K., O’Rielly, C. M., Teitge, B. D., Sutherland, R. L., Farquharson, S., Ghosh, M., Robertson, H. L., & Lang, E. (2020). The Characteristics and Effectiveness of Interventions for Frequent Emergency Department Utilizing Patients With Chronic Noncancer Pain: A Systematic Review. *Academic Emergency Medicine*, 27(8), 742–752. <https://doi.org/10.1111/acem.13934>

**Choosing Wisely in Emergency Medicine: A systematic review exploring the effectiveness of interventions targeting physician behavior change in diagnostic imaging use in pediatric emergency medicine**

*Dr. William Sevcik*

Although several systematic reviews demonstrate the effectiveness of clinical guidelines at reducing imaging for a variety of conditions (e.g., appendicitis, minor head injury), the most current evidence demonstrates that their implementation and regular use in the ED is uncertain. The proposed review addresses this gap and intends to provide much needed insight into the intervention development and implementation within this field.

## **Performance of Commercial Molecular Tests for Rapid Detection of Shiga Toxin-producing *Escherichia coli* (STEC): A Systematic Review and Meta-analysis**

*Dr. Stephen Freedman*

Shiga toxin-producing *Escherichia coli* (STEC) cause significant disease. It is important that ED providers have a means of detecting STEC that is both rapid and applicable to any serotype. Thus, we propose to conduct a meta-analysis evaluation of commercial enzyme immunoassay and nucleic acid amplification tests for STEC detection and to determine if and how their performance differs.

**Systematic Review Citation:** Tarr, G. A. M., Lin, C. Y., Vandermeer, B., Lorenzetti, D. L., Tarr, P. I., Chui, L., Hartling, L., & Freedman, S. B. (2020). Diagnostic Test Accuracy of Commercial Tests for Detection of Shiga Toxin–Producing *Escherichia coli*: A Systematic Review and Meta-Analysis. *Clinical Chemistry*, 66(2), 302–315.

<https://doi.org/10.1093/clinchem/hvz006>

**Systematic Review Protocol Citation:** Tarr, G. A. M., Lin, C. Y., Lorenzetti, D., Chui, L., Tarr, P. I., Hartling, L., Vandermeer, B., & Freedman, S. B. (2019). Performance of commercial tests for molecular detection of Shiga toxin-producing *Escherichia coli*(STEC): a systematic review and meta-analysis protocol. *BMJ Open*, 9(3), e025950.

<https://doi.org/10.1136/bmjopen-2018-025950>

2017

**Transition in care from paramedics to emergency department nurses: A systematic review**

*Dr. Gudrun Reay*

"Transitions in care between emergency medical services (EMS) providers and emergency department (ED) nurses are critical to patient care and safety. However, interactions between EMS providers and ED nurses can be problematic with communication gaps and have not been extensively studied. The aim of this review was to examine (1) factors that influence transitions in care from EMS providers to ED nurses and (2) the effectiveness of interventional strategies to improve these transitions. In total, 8,348 studies were screened and 130 selected for full text review. The final synthesis included 20 studies. While multimedia applications may potentially improve the handoff process, future intervention studies need to be rigorously designed. We recommend interdisciplinary training of EMS and ED staff in the use of flexible structured protocols, especially given review findings that interdisciplinary communication and relationships can be challenging."

**Systematic Review Citation:** Reay, G., Norris, J. M., Nowell, L., Hayden, K. A., Yokom, K., Lang, E. S., Lazarenko, G. C., & Abraham, J. (2019). Transition in Care from EMS Providers to Emergency Department Nurses: A Systematic Review. *Prehospital Emergency Care*, 24(3), 421–433. <https://doi.org/10.1080/10903127.2019.1632999>

**Systematic Review Protocol Citation:** Reay, G., Norris, J. M., Alix Hayden, K., Abraham, J., Yokom, K., Nowell, L., Lazarenko, G. C., & Lang, E. S. (2017). Transition in care from paramedics to emergency department nurses: a systematic review protocol. *Systematic Reviews*, 6(1). <https://doi.org/10.1186/s13643-017-0651-z>

**Effectiveness of hospital avoidance interventions among elderly patients: A systematic review**

*Dr. Paul Ronksley*

Improving transitions in care for frail elderly patients at greatest risk of ED presentation and subsequent admission to inpatients services is a priority area for the Emergency Strategic Clinical Network. Given the aging Canadian population and the expected increasing strain placed on ED services provincially, up-to-date information on the most effective strategies to avert ED presentation and hospital admission is required. Results from this systematic review, in conjunction with an evaluation of the level of evidence, could inform how interventional strategies could be implemented or adapted to the local context in an effort to improve the appropriateness, efficiency, effectiveness and safety of care provided to our aging population.

**Systematic Review Citation:** Pritchard, C., Ness, A., Symonds, N., Siarkowski, M., Broadfoot, M., McBrien, K. A., Lang, E., Holroyd-Leduc, J., & Ronksley, P. E. (2020). Effectiveness of hospital avoidance interventions among elderly patients: A systematic review. *CJEM*, 22(4), 504–513. <https://doi.org/10.1017/cem.2020.4>

**Interventions aiming at an improvement in emergency department (ED)-related transitions in care for patients with Atrial Fibrillation/Flutter: A systematic review.**  
*Dr. Cristina Villa-Roel*

Decisions to ensure the coordination and continuity of health care of patients with Atrial Fibrillation/Flutter should be based on the highest quality of evidence. This project will synthesize information regarding the transitions in care for these patients in the ED setting which should inform a variety of stakeholders in Alberta and elsewhere (e.g., ED staff and administrators). Our summary of the evidence should allow researchers to identify those areas in which further research needs to be completed. The description of the challenges involved in summarizing the evidence should also help identifying strategies to enhance the quality of future research work in this area.

**Systematic Review Citation:** Gilbertson, J., Moghrabi, R., Kirkland, S., Tate, K., Sevcik, W., Lam, N., Rowe, B., & Villa-Roel, C. (2018). P054: Interventions aimed at improvement in emergency department related transitions in care for adult patients with atrial fibrillation and flutter: a systematic review. *CJEM*, 20(S1), S76. <https://doi.org/10.1017/cem.2018.252>

**The Safety and Efficacy of Tranexamic Acid in Bleeding Paediatric Trauma Patients: A Systematic Review of the Literature.**  
*Dr. Mary Brindle*

“Trauma is the leading cause of death among children aged 1–18. Studies indicate that better control of bleeding could potentially prevent 10–20% of trauma-related deaths. The antifibrinolytic agent tranexamic acid (TxA) has shown promise in haemorrhage control in adult trauma patients. However, information on the potential benefits of TxA in children remains sparse. This review proposes to evaluate the current uses, benefits and adverse effects of TxA in the bleeding paediatric trauma population”

**Systematic Review Citation:** Urban, D., Dehaeck, R., Lorenzetti, D., Guilfoyle, J., Poon, M. C., Steele, M., Lardner, D., Ma, I. W. Y., & Brindle, M. E. (2016). Safety and efficacy of tranexamic acid in bleeding paediatric trauma patients: a systematic review protocol. *BMJ Open*, 6(9), e012947. <https://doi.org/10.1136/bmjopen-2016-012947>

## **Prediction of Early Adverse Events in Emergency Department Patients With Acute Heart Failure: A Systematic Review.**

*Dr. Andrew McRae*

“Acute heart failure (AHF) accounts for a substantial proportion of Emergency Department (ED) visits and hospitalizations. Previous studies have shown that emergency physicians' clinical gestalt is not sufficient to stratify patients with AHF into severe and requiring hospitalization vs nonsevere and safe to be discharged. Various prognostic algorithms have been developed to risk-stratify patients with AHF, however there is no consensus as to the best-performing risk assessment tool in the ED.

Methods :A systematic review of Medline, PubMed, and Embase up to May 2016 was conducted using established methods. ”

**Systematic Review Citation:** Michaud, A. M., Parker, S. I., Ganshorn, H., Ezekowitz, J. A., & McRae, A. D. (2018). Prediction of Early Adverse Events in Emergency Department Patients With Acute Heart Failure: A Systematic Review. *Canadian Journal of Cardiology*, 34(2), 168–179. <https://doi.org/10.1016/j.cjca.2017.09.004>

## **Improving Door-to-Needle Times for Acute Ischemic Stroke Effect of Rapid Patient Registration, Moving Directly to Computed Tomography, and Giving Alteplase at the Computed Tomography Scanner**

*Dr. Eddy Lang*

“The effectiveness of specific systems changes to reduce DTN (door-to-needle) time has not been fully evaluated. We analyzed the impact of 4 specific DTN time reduction strategies implemented prospectively in a staggered fashion. The HASTE (Hurry Acute Stroke Treatment and Evaluation) project was implemented in 3 phases at a single academic medical center. In HASTE I (June 6, 2012 to June 5, 2013), baseline performance was analyzed. In HASTE II (June 6, 2013 to January 24, 2015), 3 changes were implemented: (1) a STAT stroke protocol to prenotify the stroke team about incoming stroke patients; (2) administering alteplase at the computed tomography (CT) scanner; and (3) registering the patient as unknown to allow immediate order entry. In HASTE III (January 25, 2015 to June 29, 2015), we implemented a process to bring the patient directly to CT on the emergency medical services stretcher. Log-transformed DTN time was modeled. Data from 350 consecutive alteplase-treated patients were analyzed. Taking the patient to CT on the emergency medical services stretcher, registering the patient as unknown, STAT stroke protocol, and administering alteplase in CT are associated with lower DTN time.”

**Systematic Review Citation:** Kamal, N., Holodinsky, J. K., Stephenson, C., Kashayp, D., Demchuk, A. M., Hill, M. D., Vilneff, R. L., Bugbee, E., Zerna, C., Newcommon, N., Lang, E., Knox, D., & Smith, E. E. (2017). Improving Door-to-Needle Times for Acute Ischemic Stroke. *Circulation: Cardiovascular Quality and Outcomes*, 10(1).

<https://doi.org/10.1161/circoutcomes.116.003242>

## **Associations Between Hydration Status, Intravenous Fluid Administration, and Outcomes of Patients Infected With Shiga Toxin-Producing *Escherichia coli*: A Systematic Review and Meta-analysis.**

*Dr. Stephen Freedman*

"Importance: The associations between hydration status, intravenous fluid administration, and outcomes of patients infected with Shiga toxin-producing *Escherichia coli* (STEC) remain unclear. Objective: To determine the relationship between hydration status, the development and severity of hemolytic uremic syndrome (HUS), and adverse outcomes in STEC-infected individuals. Data sources: MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials via the OvidSP platform, PubMed via the National Library of Medicine, CINAHL Plus with full text, Scopus, Web of Science, ClinicalTrials.gov, reference lists, and gray literature were systematically searched. Two predictors of poor outcomes for STEC-infected children were identified: (1) the lack of intravenous fluid administration prior to establishment of HUS and (2) a higher hematocrit value at presentation. These findings point to an association between dehydration and adverse outcomes for children with HUS."

**Systematic Review Citation:** Grisar, S., Xie, J., Samuel, S., Hartling, L., Tarr, P. I., Schnadower, D., & Freedman, S. B. (2017). Associations Between Hydration Status, Intravenous Fluid Administration, and Outcomes of Patients Infected With Shiga Toxin-Producing *Escherichia coli*. *JAMA Pediatrics*, 171(1), 68.  
<https://doi.org/10.1001/jamapediatrics.2016.2952>



2016

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