

Scoping Review

A Scoping Review of the Impact of Emergency Department Nurse Practitioners on Healthcare Outcomes in Canada

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ABSTRACT

Background: Nurse Practitioners (NPs) are a valuable yet untapped resource in Canadian healthcare – especially in the emergency department (ED). Multiple international studies showed positive outcomes associated with NPs working in EDs, but limited Canadian studies are available.

Aim: The objective of this study was to review the literature available in Canada on the outcomes associated with having NPs in the ED. These outcomes include wait times, length of stay (LOS), rates of patients who left without being seen (LWBS), willingness to be treated by an NP, and patient satisfaction with their treatment by an NP.

Methods: This scoping review was informed by the procedures outlined by the Joanna Briggs Institute. Reporting was guided by the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). Two independent reviewers systematically searched CINAHL, EMBASE, SCOPUS, Cochrane Library, and MEDLINE in January 2022. All peer-reviewed articles that met the eligibility criteria were included. A pair of independent reviewers completed the selection process, screening, and data extraction. The reviewers discussed disagreements until they reached a consensus.

Results: A total of five studies met the inclusion criteria. Decrease in wait times, LOS, rates of patients who LWBS, and increase in patient throughput were noted. One study did not find significant improvement in wait times, LOS, and rates of patients who LWBS. There was also a high rate of patient satisfaction and willingness to see an NP.

Conclusion: This review shows evidence of positive change on the outcomes of decreased wait times, LOS, rates of patients who LWBS, and patient satisfaction associated with having NPs in EDs. However, there is limited up-to-date evidence in the Canadian literature leaving room for future research. Future research needs to address outcomes associated with NPs working in the ED in Canadian provinces other than British Columbia, Alberta, and Ontario, research that is more in line with the current political climate of the pandemic and lack of resources, and how NPs can be best integrated into EDs.

Keywords: emergency department, nurse practitioner, scoping review, outcomes

BACKGROUND

There is an increasing demand for high-efficiency emergency departments (EDs). According to the data gathered by the

Canadian Institute for Health Information (CIHI) (2021), there was an increase of ED visits by 83.9% from 2010 to 2020. As demand for quality care continues to rise, EDs leadership will find themselves in compromised positions regarding available space and staff. The shortage of advanced practice nurses is one factor that may contribute to overcrowding in the ED, leading to decreased patient satisfaction, reduced provider productivity, increased patient length of stay (LOS), delays in care, higher rates of patients leaving without being seen (LWBS), and increased morbidity and mortality (Chang et al., 2018).

Nurse practitioners (NPs) may be one of the solutions to the rising demand for emergency care. Multiple international studies have suggested that the implementation of NPs into EDs improves patient outcomes overall compared to other providers (Carter & Chochinov, 2007; Fowler et al., 2019). NPs are registered nurses with additional education at the master's or doctoral level, who integrate their knowledge of advanced practice, health promotion, disease prevention, and other related theories to provide comprehensive health services (Almost, 2021). NPs are capable of autonomously diagnosing and treating illnesses, ordering and interpreting tests, prescribing pharmaceuticals, performing medical procedures, and working as educators and researchers (CNA, 2020). NPs can diagnose and treat acute and chronic diseases, participate in the promotion, maintenance, and rehabilitation of patient health, educate patients and communities in injury and illness prevention, and support end-of-life care (CNA, 2020). The education of NPs allows them to work as front-line clinicians and as educators, researchers, and key holders of leadership positions involving organizational change.

Assessing systems and patient-level healthcare outcomes, like those described above, is a vital aspect of identifying challenges and improving patient care (Fowler et al., 2019; Kleinpell, 2013). Kleinpell (2013) states that assessing the outcomes after implementing NPs and their contribution is vital for their utilization. It is especially beneficial to measure health outcomes in relation to other providers such as physicians, physician assistants, and residents (Kleinpell, 2013). However, preliminary searches of multiple databases showed that most of the data on patient outcomes post-introduction of NPs into EDs are not from Canada but originate mainly from the United States (US), United Kingdom (UK), and Australia. Despite similarities in those healthcare systems, their unique characteristics also need to be considered. The International Profiles of Health Care Systems Report by The Commonwealth Fund (2017) demonstrated the differences in healthcare coverage in the US in that 66% of individuals receive coverage through their employers, while Canadians have universal coverage with 67% buying complementary coverage for noncovered benefits. Additionally, the Canadian healthcare system penalizes its specialist physicians financially if the patients they see were not referred, creating larger wait times, in contrast to the US system where there is minimal gatekeeping and is dependent on the patient's private insurance. Likewise, the difference in the Canadian, Australian, and UK provider compensation varies in fee-for-service rates, incentive pay, and pay-for-performance models (The

Commonwealth Fund, 2017), making the data not necessarily transferable.

Rural and remote EDs and urgent care centers face the unique challenge of limited advanced healthcare provider availability, leading the communities to rely solely on nursing staff for their healthcare needs and decreased hours of operation (Martin-Misener et al., 2020). Reduced hours of operation result in increased burden and costs to the population, as they must travel to seek services in more urban settings resulting in disruption in continuity of care. With the maldistribution of physician supply between urban and rural Canadian cities (Fleming et al., 2018), the implementation of a rural ED NP may provide the biggest positive change in patient outcomes.

A preliminary database search has shown a large amount of international data on the roles and outcomes of NPs in the ED setting, with limited Canadian data available. However, as it is important to understand the Canadian context for NP practice in this setting, this scoping review will summarize Canadian evidence on the impact of NPs' roles in EDs and highlight potential gaps and implications for health systems and practice.

PURPOSE

The purpose of this scoping review is to examine available evidence regarding the impact of NP roles on healthcare outcomes in Canadian EDs. A preliminary search of CINAHL, MEDLINE, and SCOPUS did not identify similar reviews. The review maps out the types of research designs, outcomes addressed, measurements, and findings to make recommendations for further research in the field and identifies possible gaps in knowledge in Canadian research evidence. Since there is some, albeit limited, Canadian data available on the influence of ED NPs on patient outcomes, this summary of Canadian literature puts it all in one place and can be used to provide vital information to policymakers, practitioners, researchers, and the public across the country about the value of NPs. Additionally, identifying gaps in literature can generate further questions for research.

METHODS

This scoping review was informed by the methods outlined by the Joanna Briggs Institute (Peters et al., 2020). Reporting was guided by the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018).

Eligibility

All qualitative, quantitative, and mixed-method designs were included in the review. To be included in this review, papers needed to be set in the ED anywhere in Canada. Furthermore, studies had to involve NPs practicing in the ED and focusing on measuring outcomes to be included. Papers that discussed Physician Assistants and NPs in the same study, but separated the outcomes were also included. Conference abstracts, editorials, and unpublished studies were excluded. Studies were also

excluded if they were unavailable online due to time constraints. Inclusion and exclusion criteria are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria for the Scoping Review

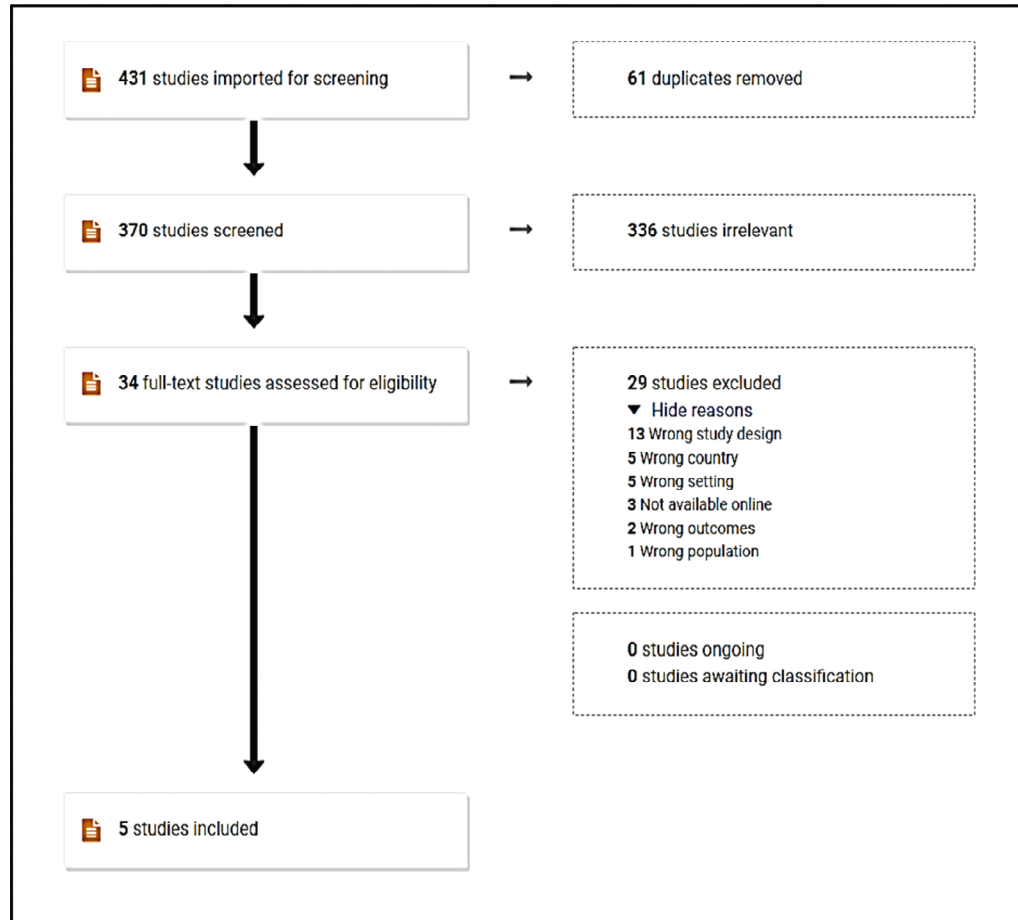
Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Peer-reviewed literature: original research • English language only • Available for online access • The study was done in Canada • The study setting is in an emergency department • Relevant to the research question: <ul style="list-style-type: none"> ○ Involves the measurement of outcomes ○ Involves Nurse Practitioners 	<ul style="list-style-type: none"> • The publication is in a language other than English and without an English translation • The publication is only available as a hard copy • Study done outside of Canada • The study setting was not in an emergency department • The publication is not relevant to the research question: <ul style="list-style-type: none"> ○ It does not involve the measurement of outcomes ○ Does not involve Nurse Practitioners

Search strategy

Given the limited number of Canadian studies evident during the preliminary investigation, no chronological limitations were applied to the literature search. Databases searched included: CINAHL, EMBASE, SCOPUS, Cochrane Library, and MEDLINE.

Based on consultation with a University of Alberta thematic expert, the terms used to search the databases include “Nurse Practitioner” OR “NP” OR “Advanced Practice Nurse” OR “APN”, “Emergency Department” OR “Emergency Service” OR “Emergency Medicine” OR “Emergency Nurse Practitioners” OR “Emergency Patients” OR “Emergency” OR “ED” OR “Triage”, and “Canada” along with all provinces and territories and their major cities. A pre-defined filter strategy for the term “Canada” was used in the event there was no mention of the country but only the province or city. The term “Outcomes” was not used as one of the search terms as it may be omitted in some studies creating a lower yield for the search. Instead, the screening and eligibility stage ruled in the studies appropriate and relating to outcomes for the scoping review. The detailed search strategy for CINAHL can be found in Appendix I. The final search results were exported into Covidence, and duplicate papers were removed with the help of the software. The PRISMA-ScR flow diagram is included for transparency of the review process (Tricco et al., 2018), and is seen in Figure 1.

Figure 1. PRISMA article selection flow sheet



Data selection and charting

Independent double-screening of each title, abstract, and full-read of the selected articles was performed by two reviewers (T.B. and U.P.) Any disagreements or inconsistencies during the screening process were resolved through discussion (Tricco et al., 2018). There was never a need for the involvement of a third party for the review process, as there were no significant discrepancies that were not resolved through discussion. According to Tricco et al.'s (2018) PRISMA-ScR protocol, additional analysis, and screening for bias across studies are not applicable for scoping review.

Two reviewers developed and evaluated a data-extraction tool to determine the suitability of the chosen variables. The same two reviewers independently used the tool to extract the data and then shared their respective tables. The two tables were then combined into one summative table and approved by both reviewers before data synthesis. Data extracted included the setting and location, the aim of the studies, sample size, methods used, intervention type and duration, and outcomes measured. The tool and data extraction table is available in Appendix II.

RESULTS

The initial search identified 431 studies for screening, 61 of which were removed as duplicates. Three hundred seventy articles were screened for title and abstract, with 336 studies deemed irrelevant. A total of 34 studies went through a full-read review, with 29 excluded and 5 included. Reasons for exclusion included wrong study designs, wrong country, wrong setting (not ED), not available online, wrong outcomes, and wrong population. The study selection process is shown in Appendix III.

In all five included studies, outcomes were assessed in the ED in Canada when an NP was on site. Outcomes measured differed between studies and contained ED LOS, the proportion of patients who LWBS (Ducharme et al., 2009; Steiner et al., 2009), ED wait times (Steiner et al., 2009), the willingness to be treated by an NP (Moser et al., 2004), patient satisfaction (Thrasher & Purc-Stephenson, 2008) and overall quality of care (Shand et al., 2020). Three observational studies compared patient outcomes between NPs as an intervention group and physicians, the usual care group (Ducharme et al., 2009; Shand et al., 2020; Steiner et al., 2009). Table 3 in Appendix II summarizes the characteristics and main outcomes of the identified studies.

Characteristics of the studies

All studies were conducted in Canada but were localized to their respective provinces and included British Columbia (BC), Alberta, and Ontario. Studies reviewed were all completed in secondary or tertiary EDs and varied in sample size from 113 to 19592 patients. Study designs also varied and included a retrospective review of records (Ducharme et al., 2009), a prospective descriptive study (Moser et al., 2004), a prospective observational study (Steiner et al., 2009), a quantitative study (Thrasher & Purc-Stephenson, 2008), and a mixed methods study (Shand et al., 2020). Two of the five papers were multi-centered (Ducharme et al., 2009; Thrasher & Purc-Stephenson, 2008), involving six EDs each in their research. The other three studies were single-centered (Moser et al., 2004; Shand et al., 2020; Steiner et al., 2009). Data collection strategies included either self-reported surveys, or a review of ED electronic database from hospital health records. Data collection duration also varied, ranging from one week to four years.

Timeliness of Care and ED Length of Stay

Evidence on the timeliness of care and ED LOS when NPs are present in the ED is provided in three studies (Ducharme et al., 2009; Shand et al. 2020; Steiner et al., 2009). In a retrospective study of hospital records from six EDs in Ontario, the involvement of an NP in patient care increased the odds of the patient being seen within the benchmark wait time set by the Canadian Association of Emergency Physicians, National Emergency Nurses Affiliation, and the Association des Médecins d'Urgence de Quebec by 2.1 (95% CI 1.6-2.8, $p < 0.05$) times (Ducharme et al., 2009). Likewise, an NP being in the department, but not providing direct patient care, also showed an increase in the odds of the patient being seen within the set benchmark goals by 1.5 times (95% CI 1.3-1.8 $p < 0.01$) (Ducharme et al., 2009). Ducharme et al. (2009), after adjusting for hospital, time of day, and patient acuity, found a 48.8% (95% CI 35%-

62.7%, $p < 0.01$) decrease in mean ED LOS when an NP was directly involved in the patient's care – a reduction from 256.3 minutes down to 131.1 minutes. Similarly, when an NP was on duty, the mean ED LOS of patients decreased by 9.3% (95% CI 4.6%-13.9%, $p < 0.01$) – a reduction from 257.7 minutes down to 233.81 minutes (Ducharme et al., 2009). When adjusted for hospital, time of day, and patient acuity, there was a 29% (95% CI 4%-47%, $p < 0.05$) reduction in LWBS rates compared to when an NP was not on duty (Ducharme et al., 2009).

A mixed methods study out of one Alberta ED had similar findings of NPs associated with reduced wait times, but no statistical data was included in the publication (Shand et al., 2020). Additionally, revisit rates within 72 hours of the original patient visit were one of the lowest among comparator sites in the Edmonton zone for patients that were cared for by an NP compared to those cared for by other professionals (Shand et al., 2020).

Steiner et al.'s (2009) study, a prospective observational study out of one Alberta ED, grouped patients into two groups according to Canadian Triage and Acuity Scale (CTAS) scores: CTAS 1-3 and 4-5. NPs provided care autonomously in the CTAS 4-5 group (Steiner et al., 2009). Although Steiner et al. (2009) found an increase of 12% ($p < 0.001$) in patient throughput per shift, they did not find a significant difference in median wait times or ED LOS. Wait times (39 minutes) and LOS (77 minutes) were lower in the autonomous (seen by the NP only – CTAS 4-5) group compared to the wait times (65 minutes) and LOS (174 minutes) of the cohort (seen by a physician and NP) group (Steiner et al., 2009), with no standard deviations reported by the authors. Still, Steiner et al. (2009) attributed the decreased times to the autonomous NP group, which included follow-up outpatient intravenous (IV) therapy visits.

Access to Care

Overall, three studies assessed the effects of NP roles on access to care. In a retrospective study of hospital records from six EDs in Ontario, Ducharme et al. (2009) observed a 29% (95% CI 4%-47%, $p < 0.05$) reduction in LWBS rates with an NP on duty compared to when an NP was not on duty, when adjusted for hospital, time of day, and patient acuity. Throughout their four-year mixed-methods evaluation of one ED in Edmonton, Alberta, Shand et al. (2020) found that NPs improved access to care by reducing the number of patients who LWBS but did not provide statistical data. A prospective observational study found the LWBS rate was 1.8% lower during the NP shifts compared to the physician shifts but was not found to be statistically significant (Steiner et al., 2009).

Clients' Perspectives and Satisfaction with Care

Client perspectives were assessed in two studies. A prospective descriptive study out of the Vancouver General Hospital found that 72.5% (95% CI 65.8%-78.4%) of patients who visited the ED indicated a willingness to be treated by an NP, 67.3% of which were comfortable with being seen by just the NP, 21.3% said they would be comfortable only if also seen by a physician, and 4.7% did not respond (Moser et al., 2004). The 12.1% (95% CI 8.9%-17.3%) who did not want to be treated by an NP indicated they would

never be comfortable (36%) or that they would be willing if they presented with a different medical complaint, the treatment resulted in cost savings to the healthcare system, or if it resulted in a shorter ED wait time (64%) (Moser et al., 2004). In a study by Thrasher and Purc-Stephenson (2008) that had a self-reported patient survey throughout six Ontario EDs showed that 71% of respondents would prefer to see an NP, and 29% indicated they'd have liked to see a physician. Attentiveness, comprehensive care, and role clarity were the three subscales used to measure satisfaction and were measured on a 4-point Likert scale (Thrasher & Purc-Stephenson, 2008).

The 21-item scale was developed through a literature review and was examined by a panel of six practicing NPs for comprehensiveness, where the scale ranged from 1 (*strongly disagree*) to 4 (*strongly agree*) (Thrasher & Purc-Stephenson, 2008). It was found that: NPs spent enough time during the consultation, they took the problem seriously, and gave the patient a chance to speak ($M = 3.72$, $SD = 0.38$); patients were satisfied with the treatment and information provided by the NP ($M = 3.52$, $SD = 0.49$); the patients stated they had a good understanding of the NP role ($M = 2.99$, $SD = 0.66$) (Thrasher & Purc-Stephenson, 2008). The Likert scale scores were suggestive of patient satisfaction with NP care (Thrasher & Purc-Stephenson, 2008). Interestingly, gender, age, education, and health status were not significantly related to the subscale results (Thrasher & Purc-Stephenson, 2008). Additionally, patients with income levels above \$50,000 and those with prior exposure to NPs reported a higher level of satisfaction (Thrasher & Purc-Stephenson, 2008).

DISCUSSION

The main findings from this review suggest that in the limited Canadian studies that have been published demonstrated that, a high percentage of patients may be willing to be treated by an NP in the ED, there were high rates of satisfaction among patients treated by NPs, and decreased wait times, LOS, and rates of patients who LWBS were noted (Ducharme et al., Moser et al., 2004; 2009; Shand et al., 2020; Thrasher & Purc-Stephenson, 2008). This scoping review identified five studies addressing the outcomes of having NPs in Canadian EDs published between 2004 and 2020. Three studies compared patient outcomes between those patients treated by an NP and those treated by a physician (Ducharme et al., 2009; Shand et al., 2020; Steiner et al., 2009). Only one study discussed revisit rates within 72 hours of initial presentation and found their site with NPs to be one of the lowest comparator sites in the Edmonton zone (Shand et al., 2020), but unfortunately did not report on any data. Although two of the articles reported findings of decreased wait times, decreased LOS, and decreased rates of patients who LWBS (Ducharme et al., 2009; Shand et al., 2020), one did not show statistical significance in median wait times or ED LOS (Steiner et al., 2009). Tools for data collection of LOS, LWBS rates, and wait times were similar across the three studies that measured them (Ducharme et al., 2009; Shand et al., 2020; Steiner et al., 2009). Likewise, the two studies that measured willingness to be treated by an NP and

satisfaction utilized self-reported surveys (Moser et al., 2004; Thrasher & Purc-Stephenson, 2008).

The five included studies varied in size, with sample sizes ranging from 113 to 19592 participants, and therefore great heterogeneity in statistical power. Four of the five studies were limited in their data collection by either the total number of days (minimum one week) or the hours worked by the NPs, making them less able to account for seasonal variations or trends such as inadequate availability during flu season, hospital administrative changes, or staffing levels. Each study collected data from a single Canadian province, limiting generalizability across Canada. Variety in NP education and scope of practice between Canadian provinces further deteriorates generalizability. Additionally, NP background and experience were not considered across the five studies and had the potential to influence results. Steiner et al. (2009) had one NP for the duration of the data collection. The NP from the Steiner et al. (2009) study had a 4-month orientation period before data collection, potentially skewing results with a lack of experience in the ED setting.

An Australian prospective observational study (Fry et al., 2010) and a United States (US) retrospective review (Tucker & Bernard, 2015) had similar positive findings of decreased wait times, ED LOS, and LWBS rates when an NP was involved in patient care. Another Australian descriptive exploratory design that monitored a new NP model noted an increase in overall patient throughput (Plath et al., 2019), similar to the Tucker and Bernard (2015) US retrospective review study, and just like the findings of Steiner et al. (2009).

Thrasher and Purc-Stephenson (2008) had similar findings of high levels of satisfaction as two Australian studies that not only found high levels of satisfaction but also that NPs scored higher levels of satisfaction compared to other advanced providers (Dinh et al., 2012; Jennings et al., 2009; Lutze et al., 2014). Interestingly, patients were more satisfied with NP care in the ED if they had income levels above \$50,000 or had prior exposure to NP practice (Thrasher & Purc-Stephenson, 2008). In contrast, Steiner et al. (2009), found an increase in overall patient throughput per shift but no statistically significant evidence of decreased ED wait times or LOS.

Steiner et al. (2009) reported that stretcher and resource availability was more likely to influence wait times and ED LOS than the addition of another provider such as NP. However, as mentioned, Steiner et al. (2009) had a single NP during their data collection that only had a four-month orientation to the ED, suggesting that a lack of prior experience on the unit or previous experience in emergency care may have altered the outcome measurements. The scarcity of Canadian research on this topic leaves a gap to be filled for potential future research projects on cost-effectiveness and patient outcomes in the ED.

Limitations

This scoping review provides an assessment of the currently available evidence on ED NPs' influence on patient outcomes in Canada, but it has some limitations. Only studies available for online access were considered for inclusion, potentially limiting the total

number of articles reviewed. Likewise, only Canadian data were considered for this review, limiting generalizability to other countries.

Implications for Future Research and Practice

This scoping review has demonstrated the limited amount of recent literature on the study of Canadian ED NPs and patient outcomes. Although some provinces, notably Ontario, have staffed EDs with NPs for some time, other Canadian provinces have not. The focus of future research should be on identifying potential differences in NP education, licensing requirements, and scope of practice between Canadian provinces that might affect utilization patterns. Other factors, such as methods of physician remuneration in ED and availability of physicians may also play a role in decisions to staff EDs with NPs.

As more NPs get integrated into emergency practice, comprehensive evaluation frameworks assessing the effect of NP ED practice on patient outcomes will need to be developed and implemented for more consistency in the data across provinces. Furthermore, measuring tools and outcomes would benefit from standardization to allow for more generalizability in data. Having standardized definitions and tools would enable multiple projects to be completed through numerous sites across the country, thus, producing comparable data. Likewise, data collection needs to account for confounding factors and the effect of time, such as seasonal variability in patient illness presentation and staffing changes. In addition to the outcomes discussed so far, research focused on the cost-effectiveness of NPs in the ED may play a large part in future policymaker decision-making when creating funding for an ED NP role.

CONCLUSION

In Canada, NPs are educated to the master's or doctoral level, possess competencies to diagnose, prescribe, and treat patients within their legislated scope of practice, and they emphasize inter-and intra-disciplinary collaboration, health promotion, and holistic care (Almost, 2021). Adding an NP to the ED staff mix may improve wait times, LOS, rates of patients who LWBS, overall throughput, and patient satisfaction. This scoping review demonstrated that more up-to-date evidence is needed in the Canadian research literature to better determine the value of NPs in EDs.

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APPENDIX I. Search strategy for Scoping Review for Nurse Practitioners in the Emergency Department.

Search ID	Search Terms	Search Options
S1	Nurse practitioner*	Expanders: Apply equivalent subjects Search modes: Find all my search terms
S2	Advanced practice nurs*	Expanders: Apply equivalent subjects Search modes: Find all my search terms
S3	S1 OR S2	Expanders: Apply equivalent subjects Search modes: Find all my search terms
S4	(MH "Emergency Service+") or (MH "Emergency Medicine") OR (MH "Emergency Nurse Practitioners") or (MH "Emergency Nursing+") or (MH "Emergency Patients") or "casualty department*" or ((emergenc* or "ED") N1 (room* or accident or ward or wards or unit or units or department* or nurs* or treatment* or visit*)) or (triage or (trauma N1 (cent* or care)))	Expanders: Apply equivalent subjects Search modes: Find all my search terms
S5	canad* or "british columbia" or "Colombie britannique" or alberta* or saskatchewan or manitoba* or ontario or quebec or ("new brunswick" not "new jersey") or "nouveau brunswick" or "nova scotia" or "nouvelle ecosse" or "prince edward island" or newfoundland or labrador or nunavut or nwt or "northwest territories" or yukon or nunavik or inuvialuit or Abbotsford or Airdrie or Ajax or Aurora or Barrie or Belleville or Blainville or Brampton or Brantford or Brossard or Burlington or Burnaby or Caledon or Calgary or Cambridge or "Cape Breton" or Chatham or Kent or Chilliwack or Clarington or Coquitlam or Drummondville or Edmonton or "Fort McMurray" or Fredericton or Gatineau or Granby or "Grande Prairie" or Sudbury or Guelph or "Halton Hills" or Iqaluit or Inuvik or Kamloops or "Kawartha Lakes" or Kelowna or Kingston or Kitchener or Langley or Laval or Lethbridge or Levis or Longueuil or "Maple Ridge" or Markham or "Medicine Hat" or Milton or Mirabel or Mississauga or Moncton or Montreal or Nanaimo or "New Westminster" or Newmarket or "Niagara Falls" or "Norfolk County" or "North Bay" or "North Vancouver" or North Vancouver or Oakville or Oshawa or Ottawa or Peterborough or Pickering or "Port Coquitlam" or	Expanders: Apply equivalent subjects Search modes: Find all my search terms



	"Prince George" or "Quebec City" or "Red Deer" or Regina or Repentigny or (Richmond not Virginia) or "Richmond Hill" or Saanich or Saguenay or "Saint John" or "Saint-Hyacinthe" or "Saint-Jean-sur-Richelieu" or "Saint-Jerome" or Sarnia or Saskatoon or "Sault Ste Marie" or Sherbrooke or "St Albert" or "St Catharines" or "St John's" or "Strathcona County" or Surrey or Terrebonne or "Thunder Bay" or Toronto or "Trois-Rivieres" or Vancouver or Vaughan or ((Halifax or Hamilton or London or Victoria or Waterloo or Welland or Whitby or Windsor) not (UK or "United Kingdom" or Britain or England or Australia)) or Whitehorse or Winnipeg or "Wood Buffalo" or Yellowknife	
S6	S3 AND S4 AND S5	Expanders: Apply equivalent subjects Search modes: Find all my search terms

APPENDIX II. Scoping Review Extraction Tool with Data

No.	Authors, year	Origin of study (setting)	Aim	Sample size (patients)	Method	Intervention type, comparator, duration, and implementation	Outcomes/ outcome measures	Main findings
1	Ducharme, Alder, Pelletier, Murray, & Tepper (2009)	Six Emergency departments, Ontario, Canada	“To assess and evaluate the impact of the integration of the new roles of primary health care nurse practitioners (NPs) and physician assistants (PAs) on patient flow, wait times, and proportions of patients who left without being seen (LWBS)”.	Data on 19592 patient visits was collected. PAs on duty for 1076 visits and directly involved in patient care for 396 of those visits. NPs on duty for 1744 visits and were directly involved in the care of 298 visits.	Retrospective review of health records on patient arrival time, time of initial assessment by a physician, time of discharge, and discharge status. Data collection: Each hospital provided the necessary health records data. The data included the date of the patient visit, time of triage, type of physician involved in treatment, type of enhanced provider (PA, NP) involved in treatment, CTAS score, wait time, and discharge disposition. Data analysis: Time intervals were measured for patients that were treated directly by an NP or PA, and these intervals were also compared between patients that were cared and were not cared for by an NP or PA.	Patients seen by NPs or PAs were the intervention group and the patients seen by physicians were the control group. Data collection occurred between Nov. 13, 2006 – Dec. 3, 2006, and Jun. 11, 2007 – Jun 29, 2007. The data was collected post patient visits, where all visits were recorded and screened for whether the patient was seen by the NP/PA or just the physician. No intervention was left in place after the conclusion of the study.	Patient flow, length of stay (LOS), and proportion of patients who LWBS, measured by reviewing health records of previous visits.	Adjustments for hospitals, time of day, and patient acuity were made. When an NP was involved in patient care the odds of them being seen within the benchmark wait time set by the Canadian Association of Emergency Physicians, National Emergency Nurses Affiliation, and the Association des Médecins d’urgence du Quebec were 2.1 times greater. An analysis was performed on the effect of the NP being on duty but not providing direct care to a patient also showed a positive odds ratio of 1.5 times higher that a patient would be seen within the wait time benchmark. The LOS, after adjustments for hospital, time of day, and patient acuity, showed a 48.8% decrease if an NP was involved, dropping from 256.3 minutes to 131.1 minutes. The mean LOS also dropped 9.3% from 257.7 minutes to 233.81 minutes. When an NP was on duty the proportion of patients who LWBS decreased by 29% when adjusted for hospital, time of day, and patient acuity.

					Multivariate analysis tools were also used to determine the impact on wait times, LOS, and LWBS. SPSS 15.0 was used to perform the analyses.			
2	Moser, Abu-Laban, & van Beek (2004)	Vancouver General Hospital ED, Vancouver, British Columbia, Canada	“To assess the willingness of ED patients with minor problems to be treated by an NP and to determine the characteristics of the population.”	213 gathered through convenience sampling to maximize patient enrollment, however, six were excluded because of incorrect completion.	<p>A prospective descriptive study.</p> <p>On-duty triage nurses invited patients and provided them with a cover letter outlining the study; a survey focusing on demographic information, the patient’s presenting problem, and willingness to have an NP treat them; and a pen.</p> <p>SPSS was used to develop descriptive statistics and logistic regression modelling. Stata was used to identify confidence intervals for proportions and tests of differences.</p>	<p>Self-reported survey.</p> <p>No comparator noted.</p> <p>Data collection was done from April 10, 2000 – July 13, 2000, on weekdays from 8am to 4pm, and the patients’ must have presented with one of the following complaints: minor abrasions or lacerations, minor bites, minor burns, minor extremity trauma, cast check, earache, superficial foreign body, lice or pinworms, morning-after pill request, needlestick injury or body fluid exposure, prescription refill, puncture wound, sore throat, subconjunctival hemorrhage, suture removal or wound check, tetanus immunization request, toothache,</p>	<p>Willingness to be treated by an NP – measured by surveys collected at triage and waiting room. Survey consisted of 5 closed-ended demographic questions, 1 open-ended question to clarify the presenting complaint, and one 3-part closed-ended question regarding hypothetical willingness to have an NP treat this problem.</p> <p>Patient characteristics.</p>	<p>Out of 207 subjects, 150 of them (72.5%) were willing to be treated by an NP (95% CI, 65.8%-78.4%), 67.3% of which said they were comfortable being treated without direct physician assessment, 21.3% said they would be comfortable only if also seen by ED physician, and 4.7% did not respond to the question.</p> <p>12.1% of subjects were unwilling to be treated by an NP. 36% of those unwilling indicated they would never be comfortable, and 64% indicated they would be willing if: they had a different problem, if being treated by an NP resulted in cost savings to the system, or if it resulted in a shorter ED wait time.</p> <p>A logistic regression analysis showed the willingness to be treated by an NP was independent of age, gender, or education status.</p>

						or urinary tract infection (women). No intervention was left in place after the conclusion of the study.		
3	Shand, Klemmer, Grubb, Chesney, Olsen, and So (2020)	Strathcona ED, Sherwood Park, Alberta, Canada	To evaluate an “innovative care model with the aim of improved patient safety and quality of care delivered, incorporating a nurse practitioner (NP) model”.	Not reported.	Evaluations were completed over four years by the Alberta Health Services (AHS) evaluation team, and more recently, the AHS Clinical Workforce Planning team. Statistical data was drawn from sources including the Emergency Department Information System (EDIS), physician billing, National Ambulatory Care Reporting System (NACRS), Tableau, and e-CLINICIAN. Year 1: Patient interviews were completed to gather data on patient satisfaction and overall quality of care received in the ED by the NP or emergency physician. Years 2&3: The same approach continued, but included patient and caregiver	Community intervention over the span of four years (2015-2018). No comparator noted. Exact duration of evaluations was not reported but occurred annually over the span of the four years.	Patient satisfaction and overall quality of care.	Emergency Department: <i>Year 1:</i> NPs improved access to care and efficiency at the Strathcona Community Hospital ED, particularly by providing direct patient care, reducing the number of patients who left without treatment, and by reviewing diagnostic imaging and microbiology results. No statistical significance noted in patient satisfaction between NPs and physicians. <i>Year 2 and 3:</i> NPs improved access to care and patient flow in the ED. Patient and caregiver surveys showed that NPs treatment was prompt, respectful, and professional. Staff and physician surveys showed that NPs provided collaborative service, reduced wait times, and spent a good amount of time with patients. <i>Year 4:</i> NPs completed appropriate follow-ups, referrals, reassessments, and consultations. Revisit rates within 72 hours of the original patient visit was found to be one of the lowest at SCH amongst comparator sites in the Edmonton Zone. Lowest wait times found at SCH, and the rate of patients who left without treatment was also low. NP

					<p>surveys, staff and physician surveys, and focus group discussions with NPs.</p> <p>Year 4: A comparative approach was utilized to determine how Strathcona Community Hospital compared with other EDs and Urgent Care centers in Alberta.</p>			<p>evaluation data also reported improved staff satisfaction.</p>
4	Steiner, Nichols, Blitz, Tapper, Stagg, Sharma, & Policicchio (2009)	Northeast Community Health Centre (NECHC), Edmonton, Alberta, Canada	“To determine whether adding a broad-scope NP would improve ED wait times, ED LOS, and LWBS rates.”	3238 patients seen and were eligible, between 68 NP shifts and 51 physician shifts.	<p>Prospective observational study.</p> <p>Data collection: Information about patient encounters by care providers, demographics, triage category, registration time, time seen, and disposition time were collected from the NECHC ED information system database.</p> <p>Data analysis: Statistical significance of observed differences in interval outcomes was assessed using a Wilcoxon 2-sample test. Significance in categorical outcomes was assessed using X² analysis. Mixed modelling methods</p>	<p>Intervention shifts, those with NP coverage, were compared to control shifts, or those staffed by physicians only. Data gathered was from Feb. 1, 2006 – Jul. 31, 2006, and involved all patients seen during the intervention and control shifts.</p> <p>Starting October 2005, an NP was introduced for select weekday day shifts, totaling 28 hours/week, with shifts starting at 730am or 10am. The NP was limited to practice autonomously with CTAS 4 and 5 level patients only.</p>	<p>ED wait times, LOS, and LWBS rates were stratified by CTAS level, and all data were captured using an electronic database.</p>	<p>CTAS levels were dichotomized into levels 1-3 and 4-5. The median number of patients seen on the intervention shifts was 28, and on control shifts were 25, indicating a 12% increase in patient throughput/shift ($p < 0.001$).</p> <p>There were no significant differences in median wait times or ED LOS.</p> <p>For all triage categories, LWBS rates were 1.8% lower during the intervention shifts, but were not statistically significant.</p> <p>Wait times and LOS were lower in the autonomous (seen by NP only – CTAS 4-5) group than for the cohort (seen by physician + NP) group – likely secondary to the autonomous group including IV therapy patient reassessments.</p>

					and mixed linear regression models also utilized.			
5	Thrasher & Purc-Stephenson (2008)	Six participating EDs, Ontario, Canada	“To measure patient satisfaction with care delivered by NPs in EDs in Canada.”	113 questionnaires were filled out appropriately.	A 21-item questionnaire was constructed after a thorough literature review. The questions chosen were examined by a panel of six practicing NPs with modifications done as necessary. Demographic information was collected and the frequency of ED visits for each patient.	Self-reported questionnaire. No comparator noted. Patients who were seen in an ED by an NP were eligible to fill out the questionnaire. There was no implementation of any kind post the one-week data collection period.	Patient satisfaction measured through a 21-item questionnaire that was constructed through a literature review, with items on the survey assessed by a 4-point Likert scale.	Internal consistency estimates for all three components (attentiveness, comprehensive care, and role clarity) ranged from 0.79 to 0.88. Strong positive relationship noted between attentiveness and comprehensive care ($r = .71, p < 0.05$). Patients who were satisfied with NP attentiveness were also satisfied with the level of comprehensive care they received. Moderate correlation found between role clarity and attentiveness ($r = .39, p < 0.01$) and comprehensive care ($r = .41, p < 0.01$). 71% of patients indicated they preferred to see an NP and 29% indicated they'd have preferred to see an MD. Three subscales were used to measure satisfaction and showed: NPs spent enough time in the consultation, took the problem seriously, and gave the patient a chance to speak; patients were satisfied with the treatment and health information the NP provided; the patients indicated they had a good understanding of the NP role. Gender, age, education, and health status were not significantly related to any of the subscale results. Income levels above \$50,000 showed a higher



								satisfaction. Additionally, those who have had previous experience with NPs reported higher satisfaction.
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