
COST ANALYSIS OF A NURSE PRACTITIONER IN A GENERAL PRACTITIONER'S CLINIC

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December 22, 2015

EXAMPLE

Cost analysis of an NP in a GP clinic

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EXAMPLE

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ABSTRACT

This project will examine the financial impact of the work environment of a Nurse Practitioner (NP) on Vancouver Coastal Health's (VCH) budget. It will evaluate the cost effectiveness of having the NP work from a General Practitioners (GP) clinic compared to the community healthcare clinic in the hospital. NPs are working in many different primary care areas, as a specialist or as generalist in a primary care setting. Compared to physicians, patient satisfaction and quality of care have been equal or higher than care provided by physicians. NPs are effective in the reduction of patient unattachment and reduction of emergency department (ED) visits. Although NPs take often more consultation time and sometimes conduct more preventative actions, their work can be comparable or even more effective compared to other providers.

This study hypothesized that the NP's direct patient time and accessibility increases in the GP clinic, leading to a reduction of ED cost. ED and hospitalization cost of NP patients one year prior to attachment will be compared with one year after attachment. Cost effectiveness will be calculated by deducting incremental work environment cost by avoided ED and hospitalization cost.

INTRODUCTION

In September 2014, Vancouver Coastal Health's (VCH) Home and Community Care (HCC) employed a nurse practitioner (NP) in Powell River, British Columbia (E. Berukoff, personal conversation, December 8, 2015). An NP, a Registered Nurse with additional Master's level training, can diagnose, treat, refer and prescribe drugs (CRNBC, 2015, para. 1; CRNBC, n.d., p. 5). After working from the home and community care unit, conducting elder outreach and operating a primary healthcare clinic for vulnerable populations, the NP relocated her practice to a general practitioner's (GP) clinic in August 2015 (E. Berukoff, personal conversation, December 8, 2015). Relocation of the NP to the GP clinic enabled the NP to work collaboratively and receive collegial support. In the Lower Sunshine Coast, where NPs work in isolation, NP turnover has been high (M. Antolovich, personal conversation, November 30, 2015). This project will examine the financial impact of the work environment of the NP on VCH's budget. It will evaluate the cost effectiveness of having the NP work from the GP clinic compared to the community healthcare clinic in the hospital.

It has been recognized that NP funding, which has been directly provided by the Ministry of Health, does not adequately cover overhead (Ministry of Health, 2015, p. 122). Although the Ministry of Health's policy paper indicates that the creation of inter-professional care teams is the direction of the future, it is unclear if any additional funding will be made available in the near future (British Columbia, 2015, p. 8350). Due to limited overhead, the NP received only a minimum of clerical support in the hospital and had limited access to treatment space (M. Antolovich, personal conversation, November 30, 2015). Other Health Authorities in BC have been covering overhead from their own budget and, on several occasions, additional funding has been transferred to enable NPs to work in private GP clinics (C. Bratseth, personal conversation, December 7, 2015). VCH has taken the stance not to pay overhead (P. Townsley, personal conversation, November 30, 2015).

As part of the A GP for Me project, the Division of Family Practice (DoFP) was able to secure funding to pay a year of overhead to support relocation of the NP in a GP clinic (Powell River Division of Family Practice, 2015, p. 35). In addition to collegial support for the NP, it is expected that relocation increases accessibility for patients, as the GP clinic can provide effective and adequate admin support and access to treatment space (C. Bratseth, personal conversation, December 7, 2015). The DoFP is currently looking for additional funding to enable the NP to continue

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working in the GP clinic and allow for a proper cost effectiveness analysis. In anticipation of the additional funding, this report provides a rationale for the cost effectiveness analysis.

The next section of this report contains a literature review that provides insight into four themes that will support the development of the methodology for the cost effectiveness analysis: quality of care; patient satisfaction; patient attachment; and cost. It is followed by a description of the methodology. The report closes with an overview of the references.

LITERATURE REVIEW

Between November 15 and December 7, 2015 a comprehensive search was undertaken to locate published studies that would provide insight into the economic impact of the work of an NP, and, more specifically about the work environment. The databases searched were NHS Economic Evaluation, Cochrane and Google Scholar. The original search focused on the key terms “nurse practitioner”, “primary care”, and “cost” and identified peer reviewed articles published in 2012 or after. Based on these articles, search terms were expanded and additional studies were selected from the reference lists, and the timeframe was expanded to 2000. Three more articles with a focus on comparing costs and the quality of care between NPs and GPs were included after consultation with a nurse practitioner. An overview of the search keywords is provided in Table 1.

Table 1

Keywords used in the literature search

| <u>Role title</u> | <u>Setting</u> | <u>Effectiveness</u> | |
|-------------------------|-----------------------|----------------------|--------|
| Nurse practitioner | Primary care | Cost | |
| Advanced practice nurse | Primary health clinic | Impact | |
| | Emergency department | Effectiveness | |
| | Emergency room | Evaluation | |
| | Community | Outcome | |
| | Team | Impact | |
| | | Unattached patients | Access |
| | | | Visits |

Note. Adapted from *The impact of nurse practitioner services on cost, quality of care, satisfaction and waiting times in the emergency department: A systematic*, p. , by N. Jennings, S. Clifford, A. R. Fox, J. O’Connell, G. Gardner, 2015, *International Journal of Nursing Studies*, 52(1), 421-435.

To be included in the selection, articles had to be published in English, available online, and focus on NPs or registered nurses with a similar qualification. Outcomes had to focus on a) quality of care, b) economic impact, or c) team based care. In addition, studies were included if they would provide additional insight into the effect of attachment to a primary care provider, independent if this was an NP.

The literature review covers the following themes:

- Quality of Care (Allen, Himmelfarb, Szanton, & Frick, 2014; Horrocks, Anderson, & Salisbury, 2002; Kuethe, 2013; Lenz, Mundinger, Kane, Hopkins, & Lin, 2004; Litaker et al., 2003; Loveman, 2008)
- Patient Satisfaction (Horrocks et al., 2002; Martin-Misener et al., 2015; Mundinger et al., 2000; Lenz, Mundinger, Kane, Hopkins, & Lin, 2004; Litaker et al., 2003; Venning, Durie, Roland, Roberts, & Leese, 2000)

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- Patient attachment (Crooks, Agarwal, & Harrison, 2012; Ionescu-Iltu, et al., 2007; DiCenso, et al., 2013; Mian & Pong, 2012)
- Cost (Allen et al., 2014; Kralewski, Down, Curoe, Savage, & Tong, 2015; Venning et al., 2000)

The themes are strongly related and several articles provide insight into multiple themes. An overview of all the articles is provided in the appendix, whereby the systematic reviews are listed separately. Some studies included in a systematic review are discussed separately when they provided additional insight into a topic. These studies are marked in the appendix.

Quality of care

Since the early introduction of NPs, also called advanced practice nurses, research has been conducted to compare the quality of their care to the care of other health care professions. Studies investigating the quality of care often include the appropriateness of investigation; correctness of diagnosis; technical and communication skills; relevance of advice; record keeping; mortality; and patient health outcomes (Horrocks et al., 2002, p. 821; Lenz et al, 2004, p. 333).

In a systematic review, Horrocks et al. (2002, 820) compared the quality of care between NPs and GPs. The study included 34 studies from developed countries in different primary care settings, examining the impact of single consultations and longer care periods (p. 820). The study concluded that the quality of care of NPs was comparable to GPs, however, the NP took more time for their consultation (p. 820). This conclusion adds to the positive findings during thirty years of research concluding that care provided by NPs is equal to that of GPs (Lenz et al., 2004, p. 333).

A study performed in 1982 by McKenzie and Fisher, as mentioned by Lenz et al. (2002, p. 333-335), discovered NPs had a high success rate managing obesity and hypertension, which was linked to their focus on education, preventative care, and the family situation. Other studies found different results for NP care. Focusing on patients with cardiovascular diseases, health outcomes improved with interdisciplinary NP teams (Allen, Himmelfarb, Szanton, & Frick, 2014, p. 311; Litaker, et al., 2003, p. 229), while no difference in health outcomes were found for specialized NP or nursing care (Loveman, 2008, p. 2). No difference in health outcomes were found either for asthma patients seen by a specialist NP or specialist nurse (Kuethe, 2013, p. 1). Although health outcomes have been equal or better for care provided by NPs, Horrocks et al. mentioned in their review that they were unable to confirm NPs' ability to identify rare health issues (p. 822).

One of the most commonly used instruments to measure health-related quality of life is the SF-36, a survey that measures functional, physical and mental health and well-being (Drummond, Sculpher, Torrance, O' Brien, & Stoddart, 2005, Section 5.4.1, para. 7). Many studies discussed in this report used the SF-36 or a modification of this instrument (Litaker et al., 2003, p. 226; Munding et al., 2000, p. 61; Venning et al., 2000, p. 1049; Ware, n.d.). Changes in health outcomes were measured comparing pre- and post-test results, for example lipids, BP, and HbA1c (Allan et al., 2014, p. 309).

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Patient satisfaction

Both Horrocks et al. (2002, p. 821) and Martin-Misener et al. (2015, p. 6) found that patient satisfaction for care provided by NPs was equal or better than care provided by GPs, supporting the findings of several studies mentioned by Lenz et al. (2004, p. 333). Munding et al. (2000), one of the studies included by both Horrocks et al. (2000) and Martin-Misener et al. (2015), reported a slightly lower patient satisfaction related to provider attributes 6 months after the first clinic visit (Munding et al., 2000, pp. 59, 64). Munding et al. (2000, p. 60) compared the outcomes of previously unattached patients with asthma, diabetes and/or hypertension seen by NPs or GPs in similar care settings after visiting an emergency department. Although not conclusive, this difference in satisfaction could have been caused by the relocation of the NP clinic, as no significant difference in patient satisfaction was measured after exclusion of affected patients, nor after a two year follow up (Lenz et al., 2004, p. 343; Munding et al., 2000, p. 66). A higher satisfaction remained for the work of NPs when satisfaction was adjusted to compensate for longer consultation time (Venning, Durie, Roland, Roberts, & Leese, 2000, p. 1052), and for reduced waiting time in emergency departments (ED) in a study comparing the results of an emergency NP to physicians (Jennings et al., 2015, p. 431).

Patient satisfaction is commonly measured by a survey or interview, building on instruments tested and used in previous studies (Litaker et al., 2003, p. 227; Munding et al., 2000, p. 61).

Impact of patient attachment

A 2014 community health survey revealed that approximately 200,000 British Columbians are without a GP (Harnett, 2015). Unattachment has been linked to an increase of health risks (Crooks et al., 2012, p. 2). For people dealing with chronic illnesses it is even more difficult to find a family doctor, something potentially caused by the ability of Canadian GPs to select their patients (Crooks et al., 2012, p. 2). NPs are considered a key component to reduce unattachment and GP shortage (DiCenso et al., 2013, p. 240; Kralewski et al., p. e366). The integration of NPs into fee-for-service clinics in the BC interior, and NP-led clinics in Ontario where NPs work collaboratively with GPs and other healthcare providers, have been proven to increase patient's access to primary care (DiCenso, et al., 2013, p. 253).

Patient attachment is strongly related to reduction in ED visits, especially for a more vulnerable population. Mian and Pong (2012, p. e664) found a decrease in ED visits after attachment to a regular primary care provider for patients with a chronic disease, the same population targeted by Lentz et al.'s (2004, 348), who also registered a decrease. Contrary to expectations, Mian and Pong (2012, e664) noticed an increase in ED visits for the attached general population. They linked this difference to lack of timely primary health care access for attached patients, while unattached patients potentially visited a walk-in clinic for their immediate care needs. Increased ED use was also seen for adults over the age of 65 without a GP or for those seniors without a strong relationship with their GP (Ionescu-Iltu et al., 2007, pp. 1364-1365). The relationship was measured as the proportion of visits of a patient with their GP compared to their total primary care visits (p. 1363). Tung et al., (2012, p. 371) found that NP homevisits to adults over the age of 65 could also lead to a reduction in ED visits.

Changes in ED visits were mainly analyzed by accessing personal healthcare data (Tung et al. 367), sometimes it was determined via patient interviews, building on patients' recollection (Mian & Pong, e660).

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Cost

Besides consult duration and ED visits, NP costs are linked to other health service utilization, for example: the number and type of tests conducted or ordered; prescriptions; referrals, consultation time, and the number of return consults. A study examining same day appointments for NPs working beside GPs as part of a primary care team, found NPs conducting more tests, scheduling more return visits and having longer consultations than GPs (Venning, Durie, Roland, Roberts, & Leese, 2000, p. 1050). In particular, the NPs conducted more preventative screening (p. 1051). Other elements, such as medication prescription, were the same. Even with the longer consultation time and additional work, overall cost was lower for an NP, however, the difference was not significant (p. 1052).

In a recent study, Kralewski et al. (2015, p. 367) found that overall cost could increase and the quality of care could be negatively impacted if the roles of the NPs and GPs were not clearly defined. Lenz et al. (2004, p. 343), who studied a situation where the roles were clearly defined, did not find any significant difference in major cost components, such as specialist referrals, visits to the ED or inpatient hospital services. In addition, an evaluation of an NP/community health worker team that provided care to patients with cardiovascular diseases came out cost effective (Allen, Himmelfarb, Szanton, & Frick, 2014, p. 312).

Comparing different studies to determine overall cost effectiveness of an NP has proven to be difficult. Most studies use a unique approach. As a result, four of the five systematic reviews that had set out to evaluate the cost of an intervention were unable to formulate a conclusion. This means that there are many ways to calculate cost and benefits of the work of an NP.

METHODOLOGY

Intervention

The study will take place in Powell River, BC. The intervention is the relocation of the NP from the community healthcare clinic in the Powell River General Hospital to the Family Tree Health clinic.

The literature provides sufficient evidence that care provided by NPs leads to equal or improved health outcomes and patient satisfaction. The central hypothesis of this study is that the NP's direct patient time and accessibility increases when working in the GP clinic, leading to an increase in panel size and reduction of ED visits for existing patients. Reduction of ED visits of existing patients will be caused by the increased availability of the NP for non-urgent medical care. Because the NP focuses her practice on vulnerable patients, attachment of new patients will lead for them to a reduction of ED visits.

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Participants

Patients will be selected between February 1, 2015 and June 30, 2016 from the panel of patients from the NP working in the Family Tree Health Clinic in Powell River, BC. To qualify for participation, participants need to be:

- Able to speak and understand English
- 18 years or older
- Were unattached prior to visiting the NP
- Have visited the NP at least 2 times
- NP is the primary care provider (75% of their primary care visits are with the NP). This criterion is added to improve internal validity.

Patients with a life threatening disease and a life expectancy of less than 2 years will be excluded from this study.

Cost assignment

The incremental cost associated with the work environment of the NP in the GP clinic will be determined. Cost that remain unchanged are not included. Cost associated with working in the community healthcare unit will be calculated differently for each cost item. The clinic cost will be a percentage based on the work ratio of the NP compared to the GPs in the clinic. This decision was made because the GPs and NPs conduct similar work, while many different activities take place in the community health unit. A schematic overview of the NP work environment costs is provided in Figure 1.

Cost work environment = Total cost NP located in GP clinic – Total cost NP located in Hospital

Cost will not be discounted because the period of the intervention is 1 year.

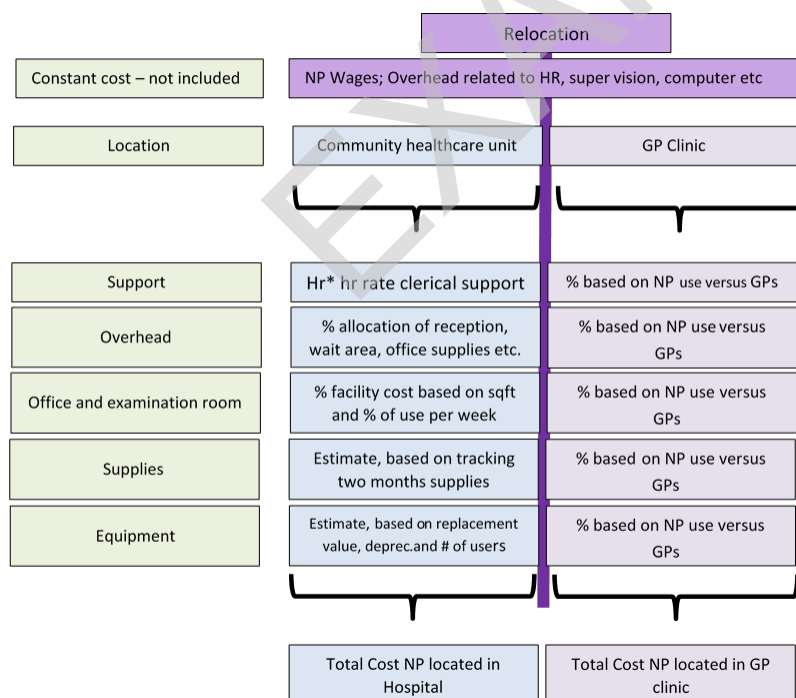


Figure 1. Schematic overview of the cost associated with the NP work environment

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Emergency department visits and hospitalization

The primary outcomes are changes in ED and hospitalization costs from 1-year before attachment to 1-year follow up. Based on the experience of the Health Connection clinic in North Vancouver, not only was there a reduction of ED visits, ED visit time reduced as well, leading to additional savings ((S. Edelman, personal conversation, December 7, 2015). Additionally, a reduction of hospitalization days is expected. The change in costs is visualized in Figure 2. For all research participants, the cost of all their ED visits, which will be the number of their visits times the duration of the visit for 1-year prior to attachment to the NP will be compared to the cost of all ED visit 1- year after attachment. For hospitalization cost, the cost for the total days in the hospital will be compared.

ED cost changes = Total cost ED prior to attachment – Total cost ED after attachment

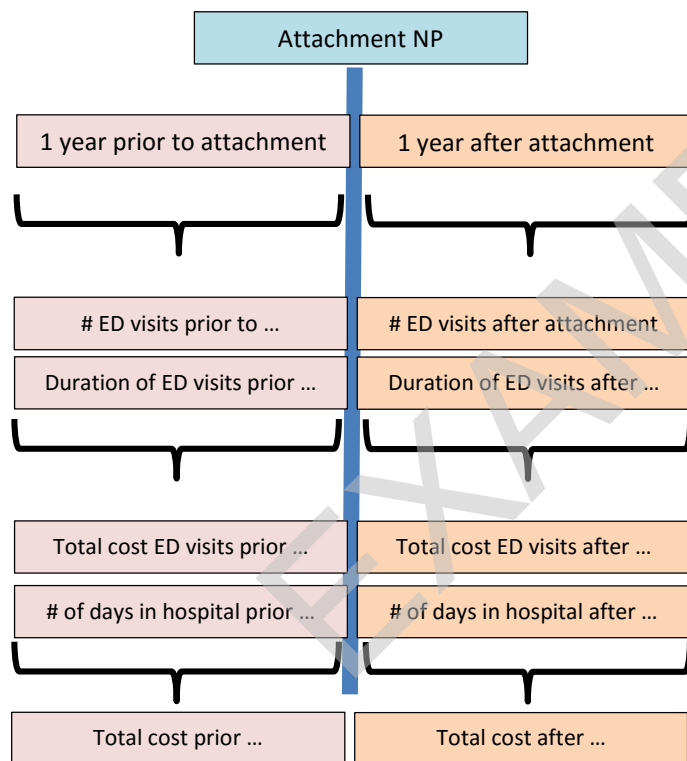


Figure 1. Overview of cost prior and after attachment

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Panel size

The NP started in the hospital less than 1 year prior to the relocation to the GP clinic and did not reach full capacity till a couple months prior to relocation. The NP's panel is still expanding and is expected to reach a status quo March 31, 2015. Based on these facts the following assumptions will be made:

- Maximum panel size in community healthcare clinic will be the number of patients in the NP's panel 1 day prior to relocation;
- Maximum panel size in GP clinic will be the number of patients in the NP's panel on April 1, 2015;

Increase in # of patients = Maximum panel size in GP clinic - Maximum panel size community healthcare clinic

Benefits

Benefits will be calculated by multiplying the additional number of patients the NP is able to attach, due to the increased panel, with the average ED cost saving per patient.

Benefits = # of increase in patients * Average cost savings per patient

Limitations

This research has a few limitations:

- Although the relocation of the NP into the GP clinic will most likely also impact the patients that are attached to the GPs in the clinic, this impact will not be taken into consideration in this evaluation.
- The NP has been new to practice. It is unclear how much this has impacted the maximum panel size, ED visits and hospitalization.
- It is expected that the biggest gain will be seen shortly after patients are attached. When the benefits will reduce they might not offset the additional cost for having an NP in a GP clinic.

NEXT STEPS

Feedback will be collected on the suggested approach and the potential off retrieving the required information will be reviewed with VCH.

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APPENDIX – OVERVIEW OF STUDIES

| Reference | Type | Objective | Patient Sample (setting and No of patients) | Setting (No of sites) | No and type of health care providers | Indicators | Main outcomes |
|----------------------------|---|--|--|--|---|--|--|
| Allen et al., 2013* | Randomized trial | Compare results of cardio vascular disease of NP/CHW team to regular care | 525 patients with cardio vascular disease; 261 in intervention group; 264 in control group | 2 community health centres in Baltimore | NP and Community Health Worker | Incremental cost and change in health outcomes | Management of cardiovascular risk factors by a NP/CHW team is cost effective. |
| Crooks et al., 2012 | Focus groups | Identify implications of unattachment for chronically ill patients | 26 Unattached marginalized chronically ill individuals | Low socio-economic neighbourhood in mid-sized BC city | n.a. | Qualitative implications of unattachment for chronically ill patients | Participants perceived negative results for their health due to unattachment and lack of a long-term trusting relationship with a primary care provider. |
| DiCenso et al, 2010 | Literature review, key informant interviews | Review of two models with NPs in primary care setting | 81 interviews with NPs, policy makers, educators and healthcare providers | 4 Fee-for-Service practice in BC; NP-led clinic in Ontario | 4 NPs; GPs; 6 NPs, 2 part-time GPs, RN and pharmacist | attachment; sustainability challenges; limitations and strength of the model | Fee for service model and NP led model are based on collaboration between NPs and GP and have led to an increase in attachment. Insufficient GP funding to support NP is a common challenge. |
| Ionescu-Ilttu et al., 2007 | Cross-sectional population based study | Impact of primary care characteristics on ED visits of adults over 65 | 95,173 people 65 or older | Quebec | n.a. | Use of ED in the 12 month prior to the survey | Lack of and lower continuity of care with GP, and low overall use of primary care increases emergency department use. |
| Kralewski et al, 2015 | Cross-sectional population based study | Impact of NPs on patient-level cost and care quality in primary care setting | 315,000 | 85 primary care clinics | NPs and GPs. United States | effectiveness; ED usage; hospitalization rates | If NP and GP roles are not well defined, increasing the NP to GP ratio could increase cost and decrease care quality. |

| Reference | Type | Objective | Patient Sample (setting and No of patients) | Setting (No of sites) | No and type of health care providers | Indicators | Main outcomes |
|--------------------------|---------------------------------|---|---|--|--|--|--|
| Lenz et al. 2004* | Randomized trial | Compare results of ongoing primary care between NP and GP | 460 adults - Patients that participated in Mundinger et al.'s research | 4 community clinics; 1 clinic at an urban academic medical centre. United States | 17 GPs; 7 NPs | Patient satisfaction; health status; healthcare utilization | Patient's outcomes were comparable for ambulatory care provided in similar conditions, with the only difference that GP patients averaged more primary care visits than NP patients. |
| Litaker et al., 2003* | Randomized trial | Comparing results for hypertension and diabetes patients of NP-GP team and traditional GP | 157 patients with hypertension and diabetes mellitus; 79 assigned to NP-GP team; 78 to GP | Clinic at Cleveland | NP and GP | Patient satisfaction; quality of life; health status, cost | Although personal cost is higher, patient satisfaction and health outcomes higher for patients with hypertension and diabetes for NP-GP team compared to traditional GP practice. Unclear if approach is cost effective. |
| Mian et al., 2012 | Telephone survey | Impact of access to GP on ED visits | 8502 residents aged 16 years or older | Ontario | n.a. | Use of ED in the 12 month prior to the survey | Reduction of ED use is linked to having a GP for people with a chronic disease and to better access to immediate care. |
| Mundinger et al., 2000** | Randomized trial | Compare results of ongoing primary care of NP and GP | Unattached patients with chronic disease after visiting ED: 806 seen by NP; 510 by GP | 4 community based primary care clinics; 1 primary care clinic at an urban academic medical centre. United States | 17 GPs; 7 NPs | Patient satisfaction; health status; healthcare utilization | Patient's outcomes were comparable for ambulatory care for NPs and GPs when working in similar conditions. Patients' satisfaction for some areas is higher for GP. |
| Tung et al., (2012) | Prospective descriptive design. | Impact of NP in home care on ED visits | 39 adults over 65 receiving home care; 30 in intervention group, 9 in control group | Participants in home care program in Edmonton. | NP and Community Health Worker | ED visits | Seniors receiving home visits and treatment by NP had less emergency department visits than control group 2 and 4 weeks after intervention. |
| Venning et al., 2000** | Randomized trial | Compare results of NP and GP for patients with same day appointment | 1716 Patients asking same day appointment: 661 seen by NP and 665 by GP. | 20 General practices in England and Wales | number of GPs unknown; 20 NPs working along side GPs | Patient satisfaction; health status; prescriptions; tests; referrals; return consultations; cost | For same day appointments, there was no significant difference in health status and prescriptions, but longer and more return consultations for NP. No significant cost difference. |

* Study included in Martin-Misener et al. (2015); ** Study included in Horrocks et al. (2002) and Martin-Misener et al. (2015)

Systematic Reviews

| Reference | Type | Objective | No of studies included | Indicators | Conclusion |
|-----------------------------|--|---|-------------------------------------|--|---|
| Horrocks et al. (2002) | Systematic review of randomized control trials | Comparing care of NP and doctors at first point of contact | 11 trials; 23 observational studies | Patient satisfaction; health status; cost; process | No difference in health status, prescriptions, return consultations, or referrals. NP had longer consultations, which might have lead to higher patient satisfaction and higher quality of care. |
| Jennings et al., 2015 | Systematic review of peer reviewed studies | Determine impact of NP in ED | 14 studies | Cost, quality of care, satisfaction and wait time | Emergency NP has positive impact on quality of care. Cost benefit analysis not possible. |
| Martin-Misener et al., 2015 | Systematic review of randomized control trials | Cost-effectiveness of NPs delivering primary and specialised ambulatory care. | 11 trials | Patient satisfaction, health status, cost; process | Equal or better patient results and potentially cost-effectiveness found for NPs in independent primary care roles. Further study needed for NPs providing specialized ambulatory care and in complementary roles |
| Kueth, 2013 | Cochrane Systematic Review | Effectiveness of independent specialist nurse for outpatient care for asthma. | 5 studies | Health outcomes; quality of life; cost; | No significant difference for care provided by a specialist Nurse or regular care. |
| Loveman, 2008 | Cochrane Systematic Review | Effects of diabetes specialist nurse on metabolic control of diabetes patient | 6 trials | Health outcomes; mortality; ED admissions; quality of life; cost | No evidence for specific improvements for care by diabetes specialist nurse compared to regular care. |