Comparing the cost effectiveness of nurse practitioners and physicians

A systematic review

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Introduction: Due to the demand for efficient, cost effective and patient friendly health care, the role of nurse practitioners in Dutch hospitals is increasing. According to the available evidence, the service provided by nurse practitioners is equivalent to that provided by physicians. With the aim of reducing health costs, nurse practitioners can take over some tasks of physicians and facilitate communication between patients and physicians. However, there is no consensus on their cost effectiveness. The aim of this review was to determine whether nurse practitioners improve the cost effectiveness of health care services.

Method: We systematically reviewed randomized controlled trials that investigated the cost effectiveness of nurse practitioners in health care in comparison with physicians. We combined the MESH terms Nurse Practitioner and Cost Effectiveness, and included English articles published between 2000 and 2010. All articles had to show the health care costs and the effects of the treatment. Selection was not based on specific patient characteristics, on the specialty of the nurse practitioner and the physician, or on the type of effectiveness outcome.

Results: We included six randomized controlled trials in our review. Two of these indicated that nurse practitioners resulted in lower health care costs during the trial and two showed no difference in costs. The remaining two did not statistically analyze their results, so no conclusion could be drawn from them.

Conclusion: Although the results from the reviewed studies were not unequivocal, over the long term nurse practitioners may improve the cost effectiveness of health care services.

Introduction

Modern health care should be efficient, cost effective and above all patient friendly. This has led to an expansion of the role of nurses who take over some of the tasks of physicians. Nurse practitioners (NPs) are advanced-level clinical nurses who have received additional education and training. NPs are able to practice autonomously, make clinical decisions and instigate treatment. Consequently they are fully accountable for their own practice [1].

The aim of this review was to determine whether NPs improve the cost effectiveness of health care services. Previous studies have unanimously shown positive results about patient satisfaction and the role of NPs [2-5]. Moreover, we could not find a single study indicating that NPs provide inferior service, so clinical quality does not appear to be an issue either. NPs can safely provide care management of patients equal to that provided by physicians [6]. However, there is no consensus about the cost effectiveness of NPs. Some studies have shown similar or even higher health care costs compared to physicians [4]. Other studies have shown lower health care costs and improved cost effectiveness of NPs [7].

We systematically reviewed the literature using PubMed to determine the cost effectiveness of NPs. We addressed the following research question: are NPs cost effective compared to physicians?

Method

To determine whether nurse practitioners are cost effective compared to physicians, we used PubMed to search for randomized controlled trials comparing nurse practitioners to physicians. Our search criteria were the following: literature in English published between 2000 and 2010 combining the MESH terms Nurse Practitioner and Cost Effectiveness. To prevent older studies from influencing the results, we included only the most recent publications. Inclusion criteria: full texts had to be available for all articles and the results had to show the costs and the effects of the treatment. Exclusion criteria: articles were excluded when they used physicians assistants instead of physicians. Selection was not based on specific patient characteristics, on the specialty of the nurse practitioner and the physician or on the type of effectiveness outcome.
We found 216 articles of which 11 met the inclusion criteria. These eleven studies were read and evaluated manually. Subsequently, 5 more articles were excluded based on missing results, different comparisons or the use of a nurse practitioner in a different setting. This is shown in Figure 1.

The remaining 6 articles underwent a systematic quality check using a 7-point system, which is shown in Table 1. This system was based on the Delphi list [8]. An article had to have at least a score of 4 out of 7 to be included in the study. The results of this quality determination are shown in Table 2, together with the other aspects of the included studies.

### Results

The main results of each study are shown in Table 2. Chan et al. demonstrated that over a follow-up period of six months the costs of anti-ulcer drugs were significantly lower in the patient group treated by gastro-intestinal nurse practitioners (GNPs) than in the group treated by general practitioners (GPs) [9]. The symptom improvement in the GNP group, measured with the Gladys score, was also significantly better. The Gladys score is a self-reported questionnaire about disease burden and symptoms [10]. Furthermore, patients reported that the GNPs helped them to improve their lifestyle better than the GPs did.

### Table 1 - Quality determination

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Population</th>
<th>Conditions</th>
<th>Follow-up</th>
<th>Measured unit</th>
<th>Results GP vs. NP (SD)</th>
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<td>Chan et al. 2009 [9]</td>
<td>University Hospital. NLIUb vs. acute ward.</td>
<td>Adult men and women. n = 175</td>
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<td>£35.5 (48.8) vs. £71.7 (83.1)</td>
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<td>Men and women. &gt; 16 year</td>
<td>Common conditions</td>
<td>Direct cost per consult.</td>
<td>£31.94 (36.29) vs. £40.15 (49.94)</td>
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<td>No cost-effectiveness was calculated. No adverse events and related costs.</td>
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<td>Hospital or Primary care. Usual care +NP vs. usual care + GP or cardiologist</td>
<td>Adult men and women. N = 228</td>
<td>Hypercholesterolemia and coronary heart disease who underwent coronary revascularization.</td>
<td>Total cost per patient independently.</td>
<td>£1573.31 vs. Not estimated</td>
<td>Drug compliance</td>
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<td>Williams et al. 2005 [13]</td>
<td>Primary care. Continence care NP vs. standard care.</td>
<td>Men and women &gt; 40 years.</td>
<td>Urinary incontinence and storage symptoms.</td>
<td>Total cost per patient.</td>
<td>£252 vs. £73</td>
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<td>All of the data at baseline, after 3 month and after 6 months were obtained by short-term outcome.</td>
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<td>Post acute recovering patients, medically stable and with no change in medical management.</td>
<td>Total cost per patient.</td>
<td>£5144 vs. £4100</td>
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<td>Venning et al. 2000 [16]</td>
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<td>Adult men and women. n = 1316</td>
<td>Common conditions</td>
<td>Total cost per patient.</td>
<td>£18.11 (33.43) vs. £20.70 (33.43)</td>
<td>0.247</td>
<td>This study only evaluated NPs who work alongside GPs. Return consults were not timed.</td>
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* A concealed treatment allocation means that a random assignment sequence is generated by an independent person not responsible for determining eligibility of the patients. This person has no information about the patients included in the trial and has no influence on the assignment sequence or the decision about eligibility of the patients.

* A nurse-led inpatient unit

* Quality determination

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Table 2 - Study specifications

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Discussion and conclusion
In this review we evaluated the cost effectiveness of nurse practitioners in comparison to physicians. The quality of the reviewed studies was ascertained with the systemic quality check. All 6 studies subjected to the test, scored at least 4 out of the 7 points. Of the 6 randomized controlled trials included in our review, 2 indicated that total health care costs of the NPs were lower during the trial [9,11] and 2 showed no difference in costs [14,16]. The remaining 2 studies did not present a statistical analysis, so no conclusion could be drawn from them [12,13].

Our review and the included articles had a few limitations. All six RCTs defined health care costs differently, making it difficult to compare the trials. Per study, however, the same definition applied to nurse practitioners and physicians. Therefore it was still possible to compare the results.

Not all studies included the effect of the treatment, which made the evaluation of the cost effectiveness less accurate. Venning et al. evaluated NPs who worked alongside GPs; this is not the same as our definition of a nurse practitioner [16]. Moreover, these NPs were required to have prescriptions signed by a GP, so they did not work autonomously, which also differs from our definition. The time for each consult included the time which was needed by the NPs to get a signature. On average, this took three minutes per consult. If this approval time was eliminated – assuming full autonomy – the average time for each NP consult would be reduced. As a result, the NPs could have significantly lower health care costs than GPs.

Harris et al. reported higher treatment costs in a nurse-led acute ward (nurse-led-inpatient unit – NLIU) than comparable physician-led wards [14]. However, the staff on the physician-led acute wards had more experience working together than the staff on the NLIU. If adjusted for this factor, the health care costs in the NLIU could be lower than reported.

When calculating costs Peaz et al. [12] did not consider drug compliance. Because the compliance in the NP group was significantly higher than in the standard care group, which included treatment by a cardiologist or GP, the reported costs could actually be lower.

The study conducted by Williams et al. concerned a continence service provided by NPs, that delivered evidence-based interventions using pre-determined care pathways [13]. This treatment was compared with existing primary care including GP and continence advisory services located near patients. The focus of the study was more on the evidence-based interventions than on the added value of the NPs.

All of the studies that we included examined the effect of NPs on health costs in the short term. If the comparatively positive effects of treatment by NPs on lifestyle [12], compliance [12] and independence [14] were to persist, the long-term costs could decrease. We recommend a longer follow-up period to ascertain this possible decrease in costs.

Although we found no significant difference in cost benefits when comparing NPs to physicians across all the studies in our review, NPs could still be cost effective, especially over the long term if the following aspects will be taken into consideration.

Firstly, cost effectiveness might be achieved when NPs autonomously operate alongside physicians. The physicians can then focus on the more challenging patients and the NPs treat the common conditions. Using this approach, more effective treatment could be offered to patients which could ultimately reduce costs.

Secondly, cost reductions could become apparent over the long term due to improving effectiveness of NPs. As the NPs become more experienced, their effectiveness should improve. Among other things, this would result in fewer return consultations and briefer consultations [16]. Consequently, the long-term costs could be lower.

Thirdly, therapy compliance is better with NPs compared to physicians [9]. This could also improve the effectiveness of health care and thereby reduce costs.

Fourthly, patients report that NPs spend more time on lifestyle changes and risk prevention than physicians [9,12]. These changes could reduce medicine consumption and disease incidence. This could reduce health care related costs in society.

Finally, research shows that NPs perform better than physicians when it comes to patient satisfaction [2-5]. They also provide equal or superior health care service and safe care management [6].

When taking all these points into consideration, an NP program may be cost effective over the long term.

Although our review did not definitively show that NPs are more cost effective than physicians, we can conclude that NP programs are certainly effective in other ways. Moreover, it is likely that NP programs will become more cost effective over long term. Therefore, we recommend that investments in new programs should not be postponed, and we advise the hospitals to continue the existing NP programs.
Osteonecrosis in patients infected with HIV

A systematic review of the risk factors

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Objective: The prevalence of osteonecrosis is higher in HIV infected patients than in the healthy population. As a result of osteonecrosis, patients must undergo total hip arthroplasty surgery every 10 to 15 years. If we want to reduce the prevalence of osteonecrosis, especially in HIV infected patients, it is important to understand the HIV infection-specific risk factors for osteonecrosis.

Methods: We searched Pubmed for publications useful for our review. To be included in our review, the publications had to be written in English. We excluded review articles and articles that were not available for Erasmus MC online.

Results: After applying our exclusion criteria to the search, we ended up with 6 studies. Frequently recurring predisposing factors for osteonecrosis in HIV-positive patients are alcohol abuse, steroid use and hyperlipidemia. The studies we found through our Pubmed search investigated additional factors related to HIV infection.

Conclusions: Alcohol abuse, steroid use and low CD4+ cell count are risk factors for the development of osteonecrosis in HIV infected patients.

Introduction

Since HAART (Highly Active Anti-Retroviral Therapy) was introduced in 1996, the rates of mortality and severe morbidity related to HIV infection have been drastically reduced. HAART results in a longer life expectancy for HIV infected patients. Due to this longer survival, complications and comorbidities of HIV infection, such as osteonecrosis, have become increasingly prevalent. The pathogenesis of osteonecrosis is complicated and poorly understood. In patients with this disease, cell death in various bone components is caused by a lack of blood supply. Preliminary research has indicated a relationship between HIV infection and osteonecrosis.

The prevalence of osteonecrosis is higher in HIV infected patients than in the healthy population. Osteonecrosis is a serious complication of HIV infection and affects relatively young patients, mostly under the age of 50. Osteonecrosis induces progressive arthrosis; if this affects the hip, this ultimately requires total hip arthroplasty (THA) surgery every 10 to 15 years. This means that young people affected by osteonecrosis are subject to major surgery several times in a lifetime.

References