



The effect of nurse prescribers on glycaemic control in type 2 diabetes: A systematic review and meta-analysis

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ABSTRACT

Background: The creation of advanced nursing roles in diabetes management, with specific skills such as nurse prescribing, has resulted in nurses taking on roles that have traditionally been associated with doctors.

Objectives: We aimed to examine the effectiveness of nurse-led clinics, in which nurses were involved in prescribing, on haemoglobin A1c (HbA1c) among people with type 2 diabetes.

Methods: We systematically searched the literature, Medline, the Cochrane Central Register of Controlled Trials (CENTRAL), EMBASE and Allied Health Literature database guide (CINAHL) databases, to identify randomised controlled trials (RCTs) assessing the effect of nurse prescribers on HbA1c. We focused on randomised controlled trials which compared nurse prescriber interventions with usual care in adults aged 18 years or over with a diagnosis of type 2 diabetes. The main outcome measure was change in HbA1c levels. We performed a random effects model meta-analysis to assess the pooled effect size of the intervention. Studies were divided into two groups according to the role of nurses in the intervention. In one group, the nurses supplemented a team, as an add-on to usual care; in the other group, they worked independently, and were compared directly to a doctor. **Results:** Nine RCTs were identified and included in this study. All studies were from developed countries, with a medium risk of bias and a moderate heterogeneity between studies. In the five RCTs in which nurse prescribers supplemented a team, there was no significant difference in change of HbA1c compared to usual care (-0.34 percentage points; 95% CI: -0.71, 0.02). In the four RCTs in which nurses replaced doctors, the outcomes of nurse prescribers were comparable to those of doctors. No data on adverse events were available.

Conclusion: There was no clear evidence of benefit on glycaemic control, when nurses who undertake prescribing work alongside a doctor and other practitioners. However, in those studies in which nurses replaced physicians, the glycaemic control was comparable between nurses and doctors. Therefore, there may be value in providing nurse-led prescribing services where there is limited access to doctor-led services.

What is already known about the topic?

- The creation of advanced nursing roles in diabetes management, with specific skills such as nurse prescribing, has resulted in nurses taking on roles that have traditionally been associated with doctors.
- The effect of nurse prescribers on glycaemic control has been evaluated in randomised clinical trial studies and showed inconsistent findings.

What this paper adds

- Nurse prescribers can be split into two types based on their role in prescribing: independent prescribers and supplementary prescribers who work in a team in collaboration with doctors.

- When nurses replaced doctors the result was comparable to that of doctors, thus there is value in implementing nurses, when there is limited access to doctors.
- There is no evidence of benefit on glycaemic control when nurse prescribers work as a supplementary prescribers.

1. Introduction

In 2015, the International Diabetes Federation (IDF) estimated that one in 11 adults had diabetes and around 46% of adults with diabetes were undiagnosed (IDF, 2015). Diabetes imposes a high burden of disease on developing countries which are experiencing rapid health transition (Boutayeb, 2006). Four out of five individuals with diabetes now live in poor countries, with the largest numbers being of working

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age (IDF, 2015). With a rapidly increasing population and limited health care resources, there has been a challenge in diabetes management (Blonde, 2005). Nurse-led diabetes clinics are an innovative way of potentially improving diabetes management (Allen et al., 2011, Aubert et al., 1998, Bilous et al., 2011, Cardenas-Valladolid et al., 2012, Davidson et al., 2006, De Pue et al., 2013, Denver et al., 2003, Ercanfang et al., 2010, Jutterstrom et al., 2016, Lenz et al., 2002, Scain et al., 2007, Smith et al., 2004, So et al., 2003, Vrijhoef et al., 2002). Nurse-led diabetic clinics are varied in terms of structure and work delegations. In traditional models of nursing care in diabetes, nurses have the role of providing patient support and education, often with a specific focus on the administration of insulin. In recent years, some clinics have expanded the role of nurses to include the prescribing and monitoring of drug therapy (Carey and Courtenay, 2007). In such settings, nurses work as substitutes for, or to complement, physicians in the management of diabetes. The main aim of this model of care is to enable patients to access safe and effective health care in a timely manner. Prescribing of medication involves initiation, stopping or changing the dosage of medications. Nurse prescribers can operate within a number of frameworks, ranging from relative freedom in regard to all the aspects of prescribing, including drug selection, to protocols that limit their role to specific drugs and very specific indications. Both regulatory environments and training are relevant to the framework adopted in any particular setting.

Findings from systematic reviews have demonstrated a beneficial role of nurses in improving management of chronic diseases including diabetes (Rosemann, 2014, Tshiananga et al., 2012, Welch et al., 2010). However, these studies do not focus on nurse prescribers but describe the positive role of nurses on chronic disease management. In these settings, nurses facilitate continuity of care which is an important component of chronic disease management. It has been suggested that nurses can provide as high quality care as general practitioners (GPs) in the provision of first contact and ongoing care for patients (Arts et al., 2012, Sibbald et al., 2006).

A meta-analysis conducted in 2010 examining the effect of nurse case management interventions on glycaemic control reported a clinically significant improvement in blood glucose control as measured by HbA1c (Welch et al., 2010). Another systematic review conducted by Clark et al. (2010) demonstrated that nurse-led interventions, using structured algorithms for care, were associated with reduced levels of cardiovascular disease (CVD) risk factors, such as high blood pressure in diabetes. A meta-analysis by Martinez-Gonzalez et al. (2014) demonstrated no significant differences between nurse-led care and physician-led care in reducing HbA1c levels. This meta-analysis is limited in several ways. Firstly, it only included four studies reporting changes in HbA1c, and secondly it assessed the value of a broader intervention to reduce HbA1c including studies where nurses were not involved in prescribing and thus cannot provide clear evidence of the efficacy of nurse prescribers in the management of diabetes.

While the limited evidence which exists may suggest a role for nurses in the management of chronic diseases, it is unclear whether nurse-led clinics, whereby nurses are actually involved in prescribing, can improve diabetes management. We performed a systematic literature review and a meta-analysis to determine whether nurse prescribers are efficacious in the management of type 2 diabetes, using HbA1c as an objective marker of glycaemic control.

2. Methods

2.1. Data sources and searches

We conducted a systematic search for randomised controlled trials which compared nurse prescriber interventions with usual care in adults aged 18 years or over with a diagnosis of type 2 diabetes. The main outcome measure was change in HbA1c levels.

We included interventions in which nurses were involved in

prescribing glucose-lowering medication following protocols or algorithms with or without the direct supervision of a physician. Studies where nurses educated people without prescribing any medication, or those in which nurses provided self-management support only were excluded. The control group was generally defined as the traditional model of care or usual care. The usual care group receive their ongoing treatment provided by their physicians, who might either work alone or in a team including other health care staff (Table 2).

2.2. Search methods for identification of studies

The literature search strategy involved Medical Subject Heading (MESH) and text words that include “diabetes” and “nurse” or “nursing practitioners” and “trials”, supplementary table. We searched Medline, the Cochrane Central Register of Controlled Trials (CENTRAL), EMBASE and Allied Health Literature database guide (CINAHL) databases for randomised controlled trials published between January 1980 and May 2015 and then updated our search on 19th of July 2016. We restricted our search for English language studies because of the cost of translation. We screened the references of all retrieved articles to identify additional publications. Hand searches identified three more relevant publications for our study.

Two of the authors (MT and DJM) independently selected potentially relevant studies by screening retrieved citations and abstracts from the electronic searches. Each reviewer indicated whether the citation was potentially relevant, was clearly not relevant, or did not give sufficient information to make a judgement. If studies were potentially eligible or the reviewer needed more information before a judgement could be made, the full text was retrieved for further review. When the two reviewers disagreed on whether or not the study was to be included or had differing quality assessments, conflict was resolved by discussing with a third reviewer (JES). This occurred in two instances. In general, we classified studies into two categories regarding the role of nurse in disease management. In one category, nurses supplemented usual care in a team including a doctor, and the comparison arm was the same team, but without the nurse. In the other category, the nurse worked independently, and the comparison arm was a doctor working without a nurse. We categorised the studies based on this distinction and analysed these groups separately.

2.3. Data extraction and quality assessment

Two authors (MT and DNK) independently extracted details of the selected studies and checked the references of all included studies to find other potentially relevant studies. We contacted authors of all the papers included in the study to obtain necessary information not reported in the publication. Extraction of information included: year of publication, mean age of participants in each group, duration of diabetes, duration of follow up, country of origin, ethnicity of participants, presence of diabetes related complications, baseline and follow up HbA1c, sample size, components of intervention and control groups, types of intervention (nurses worked in a team or work independently) and the nature of the control treatment (physicians only or team work) using a structured data collection form.

We used the Cochrane collaboration’s tool for assessing risk of bias in clinical trials to assess the study quality and reporting bias (Higgins et al., 2003). A score between 6 (high quality) and 0 (low quality) was assigned for each study. Features of trial design included in the score are: the use of random sequence generation and allocation concealment (selection bias), blinding of participants and personnel (performance bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias) and selective reporting (reporting bias). We categorised the total score into the following groups: low risk (score 5 or 6), medium risk (score 3 and 4) and high risk of bias (total score less than 3).

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