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The Impact of Patient-Centered versus Didactic Education Programs in Chronic Patients by Severity: The Case of Type 2 Diabetes Mellitus

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ABSTRACT

Background: Education leads to better health-related decisions and protective behaviors, being especially important for patients with chronic conditions. Self-management education programs have been shown to be beneficial for patients with different chronic conditions and to have a higher impact on health outcomes than does didactic education. **Objective:** To investigate improvements in glycemic control (measured by glycated hemoglobin A1c) in patients with type 2 diabetes mellitus. **Methods:** Our comparative trial involved one group of patients receiving patient-centered education and another receiving didactic education. We dealt with selection bias issues, estimated the different impact of both programs, and validated our analysis using quantile regression techniques. **Results:** We found evidence of better mean glycemic control in patients receiving the patient-centered program, which engaged better patients. Nevertheless, that differential impact is nonmonotonic. Patients initially at the healthy range at the patient-centered program maintained their condition better. Patients close to, but not within, the healthy range benefited equally from attending either program. Patients

with very high glycemic level benefited significantly more from attending the patient-centered program. Finally, patients with the worst initial glycemic control (far from the healthy range) improved equally their diabetic condition, regardless of which program they attended. **Conclusions:** Different patients are sensitive to different categories of education programs. The optimal, cost-effective design of preventative programs for patients with chronic conditions needs to account for the different impact in different “patient categories.” This implies stratifying patients and providing the appropriate preventative education program, or looking for alternative policy implementations for unresponsive patients who have the most severe condition and are the most costly.

Keywords: chronic disease self-management, patient-centered education, quantile regression.

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Introduction

Education is a key input in the health production function [1]. It leads individuals to take better health-related decisions and develop improved preventative behavior in terms of diet, exercise, and lifestyle, both for themselves [2–5] and for their children [6,7]. Empirical studies identify strong correlations between education background and health status [8–10] and between income levels and health status [11,12]. Education is especially important for patients with chronic conditions or individuals at risk of developing chronic conditions; they suffer (or are at risk of suffering) from long-lasting conditions with persistent effects [13] that progressively diminish their quality of life, functional status, and productivity [14,15]. Therefore, it is important for patients with chronic conditions to learn how to live with their conditions, or for individuals at risk to prevent them. Moreover, the way in

which chronic conditions are prevented and treated is of public concern because at present these account for more than 70% of health expenditures [16,17], are estimated to account for 70% of the global disease burden, and will be responsible for 80% of deaths across the world by 2030 [18,19].

Patient self-management education programs have been shown to be beneficial for patients with different chronic conditions, such as asthma [20], cardiac disease [21], chronic obstructive pulmonary disease [22], and type 2 diabetes [23–27]. They have the potential to make patients’ lifestyle healthier, improve their quality of life, and so decrease the demand of health services provision and their health expenditures.

In this article, we focus on education programs for patients with diabetes mellitus (type 2 diabetes). Diabetes mellitus is a chronic disease in which the body fails to create, release, and/or respond to insulin, resulting in hyperglycemia (raised blood sugar

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levels) and systemic damage to many areas of the body, including the circulatory system, the nervous system, and internal organs. It is a major cause of morbidity and mortality, estimated to globally affect 9% adults 18 years and older [28]. Diabetes is responsible for enormous individual health costs related to direct and indirect effects of hyperglycemia on the human vascular tree. Its impact on patients' life expectancy and health-related quality of life depends on the severity and duration of hyperglycemia, that is, the extent by which a person's glycated hemoglobin A_{1c} (HbA_{1c}) blood sugar levels lie outside the healthy range (4.0–7.0 mmol/L) and the length of time for which this occurs. In fact, the largest prospective, randomized study to date involving patients with type 2 diabetes (UK Prospective Diabetes Study [UKPDS 35]) [29] estimated that each 1% reduction in HbA_{1c} level reduces the risk of deaths related to diabetes by 21%, myocardial infarction by 14%, and microvascular complications by 37%. Other studies with data from the United States [30–32] relate better glycemic control with fewer complications, hospital admissions, and lower health expenditures.

Diabetes is a largely “self-managed” condition. Day-to-day management is overwhelmingly in the hands of the patient, who must make long-term healthy lifestyle changes involving diet, exercise, and medication. Consequently, the quality of the diabetes education that patients receive shortly after initial diagnosis significantly influences their health choices, promoting diet, exercise, and lifestyle changes required to achieve and maintain healthy glycemic levels (i.e., within the range of 4.0–7.0 mmol/L).

In patient-centered education, self-management plans are developed and maintained through collaboration between patients, who raise their concerns, priorities, knowledge, and resources, and the clinical expertise of health care professionals. This definition of roles and responsibilities between patients and health care professionals is claimed to increase the intrinsic motivation of diabetic patients to persistently follow agreed plans and attend medical checks [33–36]. This patient-centered approach is part of a wider shift in health policy for long-term care toward the “empowered patient” model in many countries, and responds to rapidly rising diabetes-related health costs in national health systems [37,38].

The didactic education model is very different. In the didactic model, the patient is a passive recipient of standardized information provided to all patients. The health care professional is an expert who prescribes and defines good practice in diet, exercise, and lifestyle choices. The passive patient is then expected to adhere to the plans and prescriptions devised by the health care expert [23,33].

Hence, it is important to evaluate the impact of different education programs for diabetic patients. It has been proposed that patient-centered education programs for type 2 diabetes are more effective than didactic programs in changing behavior and ensuring compliance [24–27,39]. Nevertheless, empirical evidence on their benefits is mixed [25,26,40] and different issues have been raised in connection with previous trials. First, they do not directly compare patient-centered and didactic programs. Rather, control groups have consisted of patients receiving a mix of alternatives, or no formal education at all [26,40]. There might be selection bias because some trials include patients on medication to control their HbA_{1c} level. For these, reductions in recorded HbA_{1c} level may be due to teaching these patients how to take their prescriptions rather than how to make improvements in diet, exercise, and lifestyle. Second, the reporting period is many times too short. The literature finds [25] a difference of 0.92% ($P = 0.01$) in HbA_{1c} level between groups 6 months after the education program. This period, however, is generally considered too short a period for permanent lifestyle changes to occur [40] and it is commonly agreed that using a reporting period of 12 or

18 months is preferable. Third, there are important differences in the patient-centered programs in the trials, and there is a lack of consensus regarding the definition of patient-centered program, its content, or its delivery [41].

Our trial study addressed all the aforementioned issues. Furthermore, a novel contribution of our analysis is the application of simultaneous quantile regression analysis. Previous research on diabetes education has not considered whether differential improvements in diabetes control vary across the patient distribution. There are a priori reasons to expect differentials to be nonmonotonic. At one end of the distribution are patients who are healthy or close to the healthy glycemic range when initially checked and diagnosed. These patients may only need to make small lifestyle changes to improve their condition. At the other end are patients with the worst health conditions (including obesity). They face the biggest challenge in terms of making sustainable, long-term changes to diet, exercise, and lifestyle. Education programs, regardless of category, might not have enough impact on these patients to make them reach the healthy range. This article contributes to the literature by examining the relative impacts of alternative education programs across the patient distribution.

Methods

The Salford Trial

A total of 203 patients with type 2 diabetes were involved in the Salford trial. The trial group received a patient-centered program and the control group received a didactic education program. Issues of patient self-selection and general practitioner (GP) selection were dealt with. In Salford, all patients diagnosed with type 2 diabetes are referred to a specialist education unit and receive a formal education program within 1 month of diagnosis. In the trial, patients were randomly selected to attend either the didactic program or the patient-centered program. Of the 203 patients in the trial, 109 received the didactic program and 94 the patient-centered program. Other issues were taken into account. First, patients receiving medication to control their glycemic levels received education but were excluded from the trial. Second, all patients were drawn from the same set of six GP surgeries conforming to the Salford Primary Care Trust to guarantee homogeneity in patients—the city of Salford is a poor socioeconomic area with high unemployment, poor housing and social conditions, below national average education attainment, and overwhelmingly white, British ethnic background. All the same specialist education team delivered both programs in the same number of sessions (three 2-hour sessions held over 3 consecutive weeks) free for patients, at a set of venues that were local to patients within Salford.

In the didactic program, medical specialists stand in front of the group and deliver the same presentation to all the patients attending each session. The same information is provided to all the patients who may raise questions. It is not tailored to individual patients. The content of the didactic course provides information on the causes of the condition and symptoms, on diet and exercise, and on foot care. Besides the verbally provided information, patients receive a set of leaflets available for free from the National Health Service (NHS) and Diabetes UK.

The Salford patient-centered program had a “mediated learning” approach based on learning sets applied to groups of 10 to 20 people. In such a program, health care professionals (trained in a 2-day course) mediate discussions between patients on key areas of diabetes health and self-management. It delivers basic information so that patients can learn to use and critically

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