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Review

Diabetes as a case study of chronic disease management with a personalized approach: The role of a structured feedback loop

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ABSTRACT

As non-communicable or chronic diseases are a growing threat to human health and economic growth, political stakeholders are aiming to identify options for improved response to the challenges of prevention and management of non-communicable diseases. This paper is intended to contribute ideas on personalized chronic disease management which are based on experience with one major chronic disease, namely diabetes mellitus.

Diabetes provides a pertinent case of chronic disease management with a particular focus on patient self-management. Despite advances in diabetes therapy, many people with diabetes still fail to achieve treatment targets thus remaining at risk of complications. Personalizing the management of diabetes according to the patient's individual profile can help in improving therapy adherence and treatment outcomes. This paper suggests using a six-step cycle for personalized diabetes (self-)management and collaborative use of structured blood glucose data. E-health solutions can be used to improve process efficiencies and allow remote access. Decision support tools and algorithms can help doctors in making

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therapeutic decisions based on individual patient profiles. Available evidence about the effectiveness of the cycle's constituting elements justifies expectations that the diabetes management cycle as a whole can generate medical and economic benefit.

Contents

1. Introduction

Non-communicable diseases (NCDs) have recently gained growing attention from political stakeholders [1–3]. NCDs have been established as a clear threat not only to human health, but also to development of economic growth [4]. The leading non-communicable or chronic diseases now account for up to 86% of deaths in Europe [5]. In December 2010, the Belgian Presidency of the EU adopted Council Conclusions on ''Innovative approaches for chronic diseases in public health and healthcare systems''. The European Commission has initiated a reflection process to identify options for better response to the challenges of prevention and management of chronic diseases. The intention of this paper is to provide ideas on personalized chronic disease management which are based on experience with one major chronic disease, namely diabetes mellitus. The paper is not intended to contribute views on political, regulatory or funding issues, but is clearly focused on disease management at the level of patients and caregivers.

2. Diabetes: a case study for chronic disease management

This paper presents diabetes as a case study for personalized chronic disease management. Diabetes is one of the most common and costly chronic conditions in Europe and worldwide, and it is in many aspects a typical chronic condition. First, it is accompanied by serious comorbidities; second, it requires continuous care; and third, successfully managing diabetes cannot be accomplished without strong patient involvement.

2.1. *Comorbidities*

Diabetes is characterized by staged progression and worsening prognosis, accompanied by an increased risk of micro- and macro vascular complications [6,7]. Treatment of diabetes, however, may be associated with potential side effects, e.g. hypoglycemic episodes. Insulin therapy, sulfonylureas and glinides bear the risk of acute hypoglycemic episodes, which may lead to serious loss of control and are associated with increased morbidity and risk of death [8]. Repeated hypoglycemic episodes may be associated with damage to the central nervous system [9] and a greater incidence of dementia [10]. Comorbidities can be treated in an integrative approach which is based on guidelines and timelines and uses individualized treatment regimens, patient self-management, and monitoring by nurse care managers who work closely with physicians [11].

2.2. *Continuous care*

Only half of all European countries have introduced national diabetes plans [12], and several EU Member States have introduced programs for the management of chronic diseases. These programs include measures to improve coordination and quality of care, such as strengthening the role of nurses in the daily management of diabetes, case managers who coordinate care across different disciplines, or disease management programs built on evidence-based medicine [13]. However, in view of the rise in incidence of diabetes and other chronic conditions, any of these approaches will be challenged by growing time constraints facing caregivers.

2.3. *Role of the person with diabetes*

In chronic diseases, patients have to play an important and positive role in the management of their disease. In diabetes self-monitoring of blood glucose is an efficient way to enhance patient empowerment in the control of his/her disease which can enhance therapy outcome and patient motivation. Self-monitoring has laid the foundation for broader self-management, where patients are educated to derive appropriate action from their blood glucose monitoring results and, with the support of their doctor, can manage their condition independently [14–17]. In connection with acute complications such as hypoglycemia, self-monitoring may also contribute to enhanced patient safety [18]. Living with a