Lower Extremity Amputation in People with Diabetes as a Marker of Quality of Diabetes Care

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Abstract

Diabetes is a common chronic disease, which can lead to a number of complications including lower extremity amputation (LEA). On-going management of diabetes requires the provision of good quality care. Assessing the quality of diabetes care is difficult. Measurement of quality has been described in terms of structures, processes and outcomes. This article focuses on the long-term clinical outcome of LEA, as an indicator of the quality of diabetes care.

Keywords: Diabetes; Amputation; Diabetes care; Healthcare

Abbreviations:

AHRQ: Agency for Healthcare, Research and Quality; CIHI: Canadian Institute for Health Information; LEA: Lower Extremity Amputation; MDT: Multidisciplinary Team; NHS: National Health Service; OECD: Organisation of Economic Co-ordination and Development

Introduction

Diabetes is a chronic disease, requiring lifelong management in order to avoid complications including lower extremity amputation (LEA). Quality of diabetes care emerged as an international concern in the 1980’s. In 1989, health departments across Europe signed the St Vincent Declaration, an international endeavour to improve the quality of diabetes care [1]. The onus was placed on individual governments to develop strategies to meet agreed targets. Over the next decades, countries developed various programmes for diabetes management, including integrated care. In general, consensus exists on the principle of integrated care for diabetes management but opinions differ on how best to implement integrated care in practice [2].

Good quality care involves meeting and going beyond an acceptable level of performance by providing a safe and effective healthcare service. Improving quality of care is recognised as an essential element in the provision of effective healthcare. However, measuring and monitoring quality of care is complex and different approaches exist. One approach is to develop a set of specific indicators that would capture important performance aspects, be scientifically sound and be potentially feasible [3]. Indicators may be related to structures, processes, or outcomes of care [4]. International consensus does not exist as to which indicators should be used and various organisations around the world have developed sets of indicators to assess the quality of diabetes care. The Organisation of Economic Co-ordination and Development (OECD) Quality Indicators Project recommend a set of nine quality indicators for diabetes care as outlined in Table 1.

<table>
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| Processes of diabetes care | Annual HbA1c testing  
Annual LDL cholesterol testing  
Annual screening for nephropathy  
Annual eye examination |
| Proximal Outcomes | HbA1c control  
LDL cholesterol control |
| Distal Outcomes | Lower-extremity amputation rates  
Kidney disease in persons with diabetes  
Cardiovascular mortality in patients with diabetes |

Table 1: OECD Indicators of quality of diabetes care.

There is considerable overlap between the indicators chosen by many organisations including the OECD, the Agency for Healthcare, Research and Quality (AHRQ) in the US, the Australian Institute of Health and Welfare (AIHW), the Canadian Institute for Health Information (CIHI) and the National Health Service (NHS) in the UK [5-8]. All sets of indicators include LEA rates. Thus, LEA is recognised internationally as a marker of quality of diabetes care [3].

A LEA is a significant complication of diabetes that is costly to individuals economically, socially and psychologically. It is a potentially preventable complication [9]. A LEA can be major or minor depending on site of amputation. Although an international standardised definition is lacking, the definition that appears most frequently in recently published literature defines a major LEA as through or proximal to the ankle joint and a minor LEA as one distal to the ankle joint (Figure 1) [10,11].

An early minor LEA can prevent a later major LEA [12]. Thus, minor LEAs may reflect improved quality of care with earlier
intervention which consequently prevents the progression from minor to major LEA. For this reason and as the functional outcomes for major and minor LEAs differ markedly, it is prudent to examine major and minor LEA rates separately. Trends in major and minor as well as total LEA rates are increasingly recognised as informative and reflective of the quality of diabetes care.

When incidence rates are only expressed in terms of the ‘at risk’ population, these figures are dependent on the prevalence of known diabetes. If the prevalence of diabetes is not well documented, the use of the total population in the denominator may be preferable. If a community adopts systematic screening for diabetes, diabetes will be diagnosed earlier in some patients and an increased number of patients who undergo LEA will be classified as being diabetes related. The increased effectiveness of such screening programmes may mask a decrease achieved by improvements in diabetes care. The value of expressing incidence in terms of the total population is useful for assessing the social and economic cost, while using the population ‘at risk’ as the denominator facilitates examination of the effectiveness of clinical care [18].

Worldwide, studies are demonstrating LEA risk reduction in people with diabetes with better organised care, including the establishment of multidisciplinary teams (MDTs) and structured care pathways and protocols [20,21]. There is a shift towards better organised care and trends in future LEA rates will hopefully reflect improved care and fewer LEAs for people with diabetes.

References


Measurement of LEA Rates in People with Diabetes

Many countries around the world have reported trends in LEA rates over time [10,13-15]. In 2011, a review of the global incidence of LEA in people with diabetes described a large variation in LEA rates in different populations [16]. LEA incidence rates are useful for comparison between countries, benchmarking against best practice and tracking of potential improvements [17]. All countries should be encouraged to record and analyse such data.

Different methods have been used to calculate incidence, with differing definitions of LEA and various numerators and denominators [18]. Authors need to be cognisant when using LEA rates for the purposes of benchmarking that results should be compared to data from studies of similar methodology. To calculate a LEA incidence rate, a numerator and denominator are needed. For the numerator, the number of amputees, amputations or admissions can be used [19]. Much debate occurs on the use of an appropriate denominator. Many authors advocate that LEA incidence rates are expressed per population with diabetes and per total population and are interpreted depending on the purpose of the information [11,18].


