Developing meaningful performance indicators for a diabetes high-risk foot service: is it hot or not?

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ABSTRACT

Diabetes-related foot ulceration is the leading cause of non-traumatic amputation and leading cause of hospitalisation for people with diabetes in Australia. It is associated with depression and high mortality. High-risk foot services (HRFS) in Australia, like the Diabetes Centre at Royal Prince Alfred Hospital, are providing specialised multidisciplinary management for patients and some data on the healing outcomes and improvement in processes has been published. Performance indicators are a key mechanism in the quality improvement process. Excluding national amputation rates, there is no agreed set of performance indicators for monitoring outcomes or processes associated with the management of diabetic foot disease in Australia. This article discusses the processes for selecting and defining indicators that can lead to improving care and outcomes for people with diabetes-related foot ulceration and includes and describes the experiences of measuring outcomes and developing performance indicators for HRFS in the Sydney Local Health District. In time, we anticipate the formulation of national and international consensus performance indicators for diabetes HRFS that can be applied locally to particular patients, ulcer types and models of health care delivery.

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INTRODUCTION

Diabetes-related foot ulceration is the leading cause of non-traumatic amputation and leading cause of hospitalisation for people with diabetes in Australia[1]. With 5.1% of people in Australia now diagnosed with diabetes and a progressively ageing population, we can anticipate managing an increasing number of people with diabetes-related foot ulcers (DFU)[2]. For those who develop DFU, the experience will involve frequent visits to health professionals, months of intensive treatment and, for many, hospitalisation. Whilst most patients will progress to healing, the resource input will be high[3] and many will re-ulcerate in the subsequent months or years[4,5]. Moreover, there is a strong association between having diabetic foot complications and clinical depression and the mortality rate in this patient population is high[6-8]. It is within this context that the importance of optimising the quality of care provided to patients should be considered.

Australia's performance in managing diabetes-related foot ulceration appears to lag behind many other developed countries[9]. In the United Kingdom (UK), the amputation rate is half that of Australia's urban-dwelling people with diabetes[10,11]. This comparison is possible due to the Australian Institute of Health and Welfare publication of the performance indicators for hospitalisation and amputation rates in people with diabetes[10]. While this represents an important indicator of overall national performance, results derived and reported more locally are better for facilitating service development and improvements in patient outcomes. This is illustrated in the UK where, in a geographically defined area, amputation rates were reduced by 70% over 11 years and attributed to multiple improvements that were driven by annual reporting of local performance data[12].

One of the main sources of performance information related to the foot health status of people with diabetes is the Australian National

Diabetes Information Auditing and Benchmarking (ANDIAB) project[13,14]. This audit has been conducted since 1998 and is used by the National Association of Diabetes Centres (NADC) to drive quality improvement across its accredited centres. The nationwide data-gathering exercise reports outcomes and describes the characteristics of the population of patients attending participating diabetes services using well-defined criteria. The audit (now called the National Diabetes Audit), provides the most reliable indicator of the prevalence of foot ulceration (2.1%), its main risk factors, amputation and percentage of patients with diabetes who see a podiatrist (49.6%) in Australia. The audit shows increased prevalence of foot ulceration over time. The audit is designed to allow individual services to benchmark against their peers and national guidelines in a range of key areas. While some diabetes centres provide management of DFU, the audit does not aim to measure service quality at this level.

Within the context of Australia now having established many dedicated services for the management of diabetes-related foot complications and the ongoing translation of clinical documentation to electronic medical record, there is a need to work towards an agreed dataset and defined set of indicators to measure service quality and support improvement.

The aim of this article is to discuss the aims and processes for selecting and defining indicators that can lead to improving care and outcomes for people with DFU and communicate the experiences of the Diabetes Centre, Royal Prince Alfred Hospital (RPA) in measuring outcomes and developing performance indicators for high-risk foot services (HRFS) in the Sydney Local Health District (SLHD).

QUALITY AND PERFORMANCE INDICATORS: DEFINITIONS AND RATIONALE

Quality of care in health can be described as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"[15]. To measure quality at a system level, we need a set of performance indicators to quantify the degree to which recognised standards and evidence-based guidelines are adhered to and the extent to which desired clinical outcomes are achieved for patients. A set of indicators will, therefore, seek to include clinical outcomes as well as the structural and process indicators that influence patient outcomes. Indicators can also be used to measure cost-effectiveness and patients' experiences or satisfaction. By using systematic auditing or monitoring of indicators that are specific to the services being measured, the opportunity to flag areas in need of more targeted investigation and improvement is achieved.

Effective implementation of indicators relies on the availability of reliable data. For pragmatic reasons, the selection of an indicator may be based at least in part by whether the relevant data is accessible or not. As it is likely that busy clinicians will be recording the data, it is logical to seek to standardise clinical documentation to support the collection of information used for indicators. In this way, data collection for clinical indicators becomes part of work practice. Finally, to quote Gross: "For an indicator to be a useful guide in quality measurement and improvement activities, it must reliably index the variable factors that can be controlled by the health care organisation"[16].

The exacting requirement for describing indicators is well documented. Maine lists the characteristics of an ideal indicator as one which is based on agreed definitions, is exhaustively and exclusively described, is sensitive and specific, reliable and valid, relevant clinically, has explicit data specifications (denominator, numerator etc) and can be used to make comparisons[17].

Furthermore, as patient characteristics will influence outcomes, measures that define the patient group (or case-mix) need to be reported. Determining and reporting key characteristics that influence the outcome will add value to the interpretation of clinical outcomes, making results more meaningful and potentially aid benchmarking across services.

DEVELOPMENT OF QUALITY AND PERFORMANCE INDICATORS

The development of effective indicators warrants a robust process. Briefly, the development of performance indicators should be achieved through consultation between relevant stakeholders (clinicians, administrators and patients) using a consensus approach. The process involves consideration of the following:

- Evidence-based guidelines and agreed standards to determine what care patients should be offered.

- Definition of the indicator in terms of its rationale, numerator and denominator, the data source, baseline, frequency of review, population measured and other factors.

- Definition of terms and methods used, for example, how healing is defined.

- Usefulness and relevance of the indicator to patients, the organisation and clinicians.

- Feasibility of collecting the data reliably.

- Whether the outcome measured can be influenced by changes within the service.

- The number of indicators being adequate to report on key outcomes and processes without being so many as be too onerous to implement.

- Utility of the indicators for use over time and across services to benchmark.

INDICATORS FOR HRFS

HRFS provide a model of care that focuses on the management of people with DFU, offering multidisciplinary care from dedicated health professionals with expertise in the field. In Australia, they are staffed by podiatrists with differing engagement from medical, surgical and nursing disciplines. A recommendation of the Australian Diabetes Society Diabetic Foot Network was to include a mechanism

for collection of data on DFU across Australia[18] and the NSW Agency for Clinical Innovation Standards for High Risk Foot Services has included recommendations for standardised data collection that enables the reporting of clinical outcomes for the service be established[19]. While there is currently no agreed set of indicators to measure performance of HRFS nationally, individual services are reporting some outcomes.

The Royal Prince Alfred (RPA) Hospital, Department of Endocrinology, Diabetes HRFS, which was established more than 20 years ago, has a strong research focus. At its inception, a purpose-built database was developed. There is a well-defined process for the collection of discrete data using paper-based clinical forms which are then entered into the database. Data are collected on every foot ulcer (or case of Charcot's neuroarthropathy) on all patients at each clinic visit. The database has evolved over the years with outcomes data being extracted to inform specific projects. Results of specific investigations have led to reviewing of the factors associated with the outcomes and the introduction of remedial changes in practice.

Examples of past experience includes the analysis of improvements to better coordinate the care of people with diabetic foot complications across the Central Sydney Area Health Service (now Sydney Local Health District)[20]. Project outcomes measured the impact of "enrolment" in the program, defined as attending one of the three HRFS across the Health Service. The program augmented the existing HRFS and introduced better referral pathways, shared clinical guidelines, education of health professionals (chiefly general practitioners, community health nurses and podiatrists) determined to be the primary sources of referral. Process and outcome indicators were used. Results showed that minor, limb-saving amputations were increased and major amputation decreased, resulting in greater preservation of foot function. This mirrors the results of other studies[21,22] and despite debates about the applicability of minor amputation type to particular patients[23], is a reminder that, in general, reporting amputation level provides a more meaningful measure than total amputation rates. Length of stay (LoS) is an important performance indicator for hospitals and in this project was found to be shorter in patients known to the HRFS[20].

Time to referral was a novel indicator used in this project. The reason for inclusion was based on local clinic data that showed that patients who had taken longer to be referred to our service, had a higher prevalence of osteomyelitis and wounds that are deep to tendon or capsule. The importance of immediate management for foot ulceration is also now included as a recommendation of Australia's national guidelines for managing foot problems in people with diabetes and is based on the expert opinion[24].

In 2008, we published results and characteristics of our patient cohort at the Diabetes Centre RPA HRFS. Reported outcomes included a healing rate of 90% and recurrence rate of 50% over the three-year follow-up period with the median follow-up period of 26.4 months[25]. Multitvariate analysis showed that past ulceration, ischaemia and foot deformity were the strongest predictors but that only a small proportion of variation could be explained by these and the other

factors[19]. The exercise highlighted the importance of reporting follow-up time as re-ulceration is time-dependent. The inability to discern between patients with differing severity of sensory loss was also found to be a limiting factor and has led to changes in our recording of neuropathy status. The audit also pointed to the importance of past ulcer history on future ulcer occurrence, a reminder of the importance of patient factors in outcomes[25].

Within the SLHD we have used these, and other unpublished audits to investigate outcomes for our services at both RPA and Concord Hospitals. Refinements in the approach to data collection and analysis invariably result from the process; however, there has not been systematic monitoring of clinical outcomes over time.

Within Australia, outcomes reported by other sources that relate to outcomes for HRFS are broadly aiding in the development of process and performance indicators for widespread use. One example is the Queensland statewide strategy to improve the management of diabetic foot complications that was conducted across the state's ambulatory services. A central component was to embed clinical pathways and a statewide teleform was developed. This facilitated the reporting of data and supported their use of well-defined indicators to evaluate the implementation over 12 months. Process measures reported were related to patients having their risk assessed and important information on clinical status recorded. Amputation rates and average length of stay for hospitalised patients were each reported as reduced[26].

In Western Australia, Milne et al. have reported clinical outcomes for the Royal Perth Hospital service including ulcer healing rate, time to healing (conservative) and rate of amputation and patient characteristics but declined to include time to referral and re-ulceration rates[27].

In Victoria, Ogrin et al. published the experiences of their team at the Austin Hospital in collecting data electronically for use in improving clinical practice[21]. Patient information included age, sex, diabetes duration, presenting problem, ulcer location, presence of peripheral arterial disease (PAD), infection, peripheral neuropathy (PN) and previous amputation status of the cohort. The importance of time to referral was expressed and the treatment provided. No data on ulcer outcomes was presented[28].

Within the SLHD, we are currently developing a set of performance indicators to measure key processes and outcomes. These are being developed through discussions with staff and with reference to national[24] and international guidelines[29-30], other work referenced in this narrative and national consensus-based commentaries[31]. Our preliminary steps and outcomes have been reported at national diabetes meetings and presented to our Health District executive with further consultation anticipated. To date, the numerator has been patients attending the service for more than a "once-off" consultation with clinical indicators including: the time to ulcer healing; percentage healed within the specified follow-up period; as well as ulcer recurrence. The reporting of ulcer severity using validated grading system[32] and of patient demographics provides

Table 1: Proposed list of indicators to be defined for use in the SLHD HRFS

Outcome	Case mix	Process
Healing rate (%) of foot ulcers at 3 and 12 months	Patient demographics	Time to presentation from ulcer occurrence
Time to healing of foot ulcers overall and by Texas stage and grade	Ulcer severity using Texas stage and grade[32]	
Re-ulceration rate for patients attending the HRFS including follow-up period	Past history of foot ulceration	
Rate and level of amputation for patients attending the HRFS including follow-up period		

some context for the outcomes. Process indicators such as time to referral provide a surrogate measure for the success or failure of our referral pathway. The impact of the service on hospital admissions and lower limb amputations (both major and minor) is also being considered (Table 1). Part of the process for developing these indicators has been refinements to the methods for collecting data and rules to maintain data integrity. It is prudent to consider the capacity for data to be collected and reported simply when defining indicators for broader adoption. Knowing what data elements will be important for monitoring outcomes underpins decisions regarding what data to include in standardised paper and electronic forms. Collecting data systematically, using validated classifications, and including discrete and continuous data where possible as part of good clinical documentation negates additional data collection.

CONCLUSION

From these few examples, it is evident that our Australian HRFS are endeavouring with some success to use performance indicators in their pursuit of enhanced quality service for patients. It is with great interest that we review the peer-reviewed outcomes of our colleagues and learn from the experiences of others. Our HRFS within the SLHD will continue to develop and refine the set of indicators for use across the hospitals in our health district. If a set of performance indicators were to be developed for wider use, the opportunities for benchmarking and quality improvement would be enhanced. It is envisaged that, in time, national and international consensus performance indicators for Diabetes HRFS will be formulated that can be applied locally to particular patients, ulcer types and models of health care delivery.

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