Critical event analysis: Reflecting on major amputations

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ARTICLE POINTS

1 According to the authors, reviews of major amputations should concentrate on failures of systems of care and not individual errors.

2 Reflective practice can be used as a tool in aiming to prevent diabetic foot-related amputation.

3 In Salford, an annual 'critical event analysis' (CEA) of major amputations is carried out in a non-judgemental supportive environment.

4 The CEA has led to several changes in practice.

5 The authors recommend this process to all diabetic foot teams as an excellent method of assessing and improving the services they provide.

KEY WORDS
- Amputation
- Audit
- Critical reflection
- Changes in practice

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Introduction

Annually, since 1997, the diabetes services in Salford in the northwest of England have systematically reviewed the care of all people with diabetes who have undergone a major amputation, with the main aims of learning from identified errors and making changes to practice, hence reducing the number of future amputations. The authors call this process 'critical event analysis' (CEA). This article describes the CEA process, highlighting two case studies where the review of major amputations led to changes in practice by the multidisciplinary team in the Salford area.

Neuropathy, peripheral vascular disease and infection are the major lower limb complications of diabetes. They can lead to one of the most dreaded outcomes of diabetes: amputation. Many amputations may be preventable. Reducing amputations in people with diabetes by 50% was a key objective in the St Vincent Declaration (World Health Organization and International Diabetes Federation, 1990).

The psychological and practical impact of limb loss on the person with diabetes notwithstanding, there is appreciable morbidity and mortality associated with an amputation. Deerochanawong et al (1992) reported a mortality rate of 10% within 30 days of amputation and a 50% survival rate at 30 months. Nineteen per cent of patients had a further amputation within the 36-month follow-up period.

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The process

The annual CEA is an integral part of a wider system of a continuous foot care audit in Salford. This city-wide, multidisciplinary, whole-population audit involves primary, secondary and tertiary care centres. The audit was described by Middleton et al (1997). The audit is supported by a patient-held record system and multidisciplinary whole-district guidelines. It provides clinical indicators such as:

- the number of patients who develop foot ulcers
- ulcer healing rates
- time taken for ulcers to heal
- the number and level of amputations.

Figure 1 outlines the major diabetic foot-related amputations in Salford over recent years as identified in the audit. The audit team moved on to develop the CEA, which was seen as the final stage of the audit cycle. The pathway to ulceration had been reviewed and it was intended that the CEA would review the causal pathway to major (in this case defined as above-ankle) amputation.

Patients reviewed in the CEA are identified as having had a major amputation using a variety of methods including electronic databases, staff knowledge and searches of operating reports. The case notes of this group of people are then reviewed by an expert panel that consists

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2 The CEA follows the 'What?' method of clinical reflection (Driscoll, 2000).

of the lead podiatrist and consultant diabetologist. The panel identifies key staff involved in a patient's care and a member of the multidisciplinary team is asked to review in detail the case history. All the members of the wider diabetic foot care team are then invited to a meeting and each case is presented and then discussed by the team.

The CEA process is outlined in *Figure 2*. It comprises two main activities:

- critical reflection
- identification of changes that might improve future patient care.

Critical reflection

The CEA follows the 'What?' method of reflection (Driscoll, 2000):

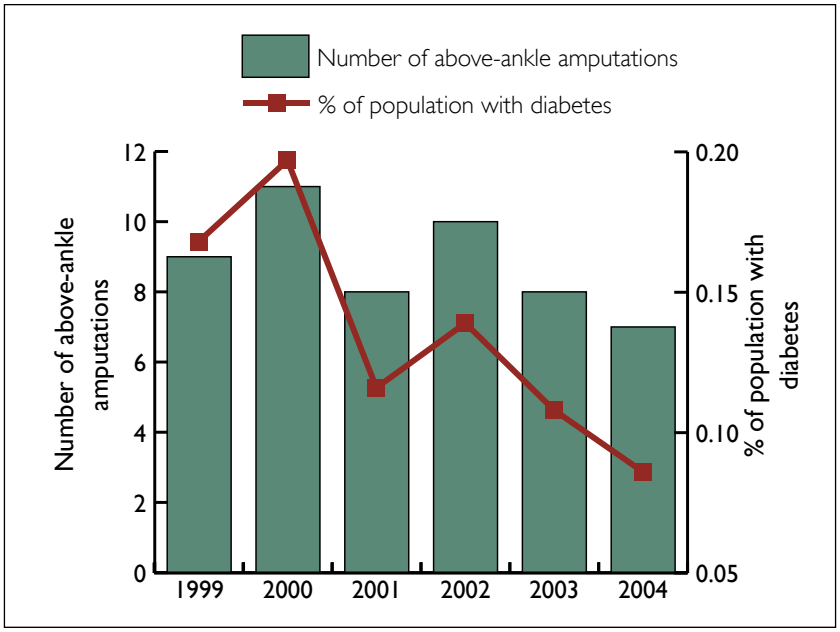
1. What? A description of the event.
2. So what? An analysis of the event.
3. Now what? Proposed actions following the event.

Reflection as a learning process

According to Driscoll and Teh (2001):

'Reflection is a process that allows practitioners to uncover and expose thoughts, feelings and behaviours that are present in a period of time. Hull and Redfearn (1996) assert that by understanding more about practice through reflection [...] practitioners can extend their personal and professional knowledge making the process of reflection more than just simply thinking about practice.'

Figure 1. Major (above-ankle) amputations in Salford over recent years.



The theory of reflective practice is attributed primarily to Donald Schön (1987); his work is based on the study of a range of professions. This sits comfortably with the multidisciplinary arena of the CEA.

Jarvis (1992) advocates the need for reflective practice, arguing that the individual nature of patients requires healthcare professionals to be reflective.

Healthcare professionals respond to untoward events in two ways (Schön 1983; 1987). The first is 'reflection in action'; this is the immediate response to an event. It is the ability to learn and develop continually by creatively applying current and past experiences and reasoning to unfamiliar events while they are happening (Schön 1983; 1987).

The second, 'reflection on action', is the underlying learning process within the CEA. It is a process of thinking back on what happened in a past situation, what may have contributed to the event, whether the actions were appropriate and how better understanding of the causative events may suggest changes to future practice (Schön 1983; 1987). The conscious act of reflecting on action can be difficult to achieve, as Bulman (2000) suggests:

'Reflection forces practitioners to face incongruity and uncomfortable facts.'

The CEA acknowledges this and ensures that it always focuses on the failure of systems of care and not the weaknesses of individuals. It is carried out in a non-judgmental, supportive environment in that individuals are never singled out for blame; instead, the CEA usually considers why a person did not act appropriately in a particular case (e.g. due to training needs).

Using learning to change practice

The CEA each year provides important learning points for the systems of diabetic foot care. It is clearly essential that to achieve the desired impact the knowledge gained from each event must be converted into effective action. The following case studies illustrate the process.

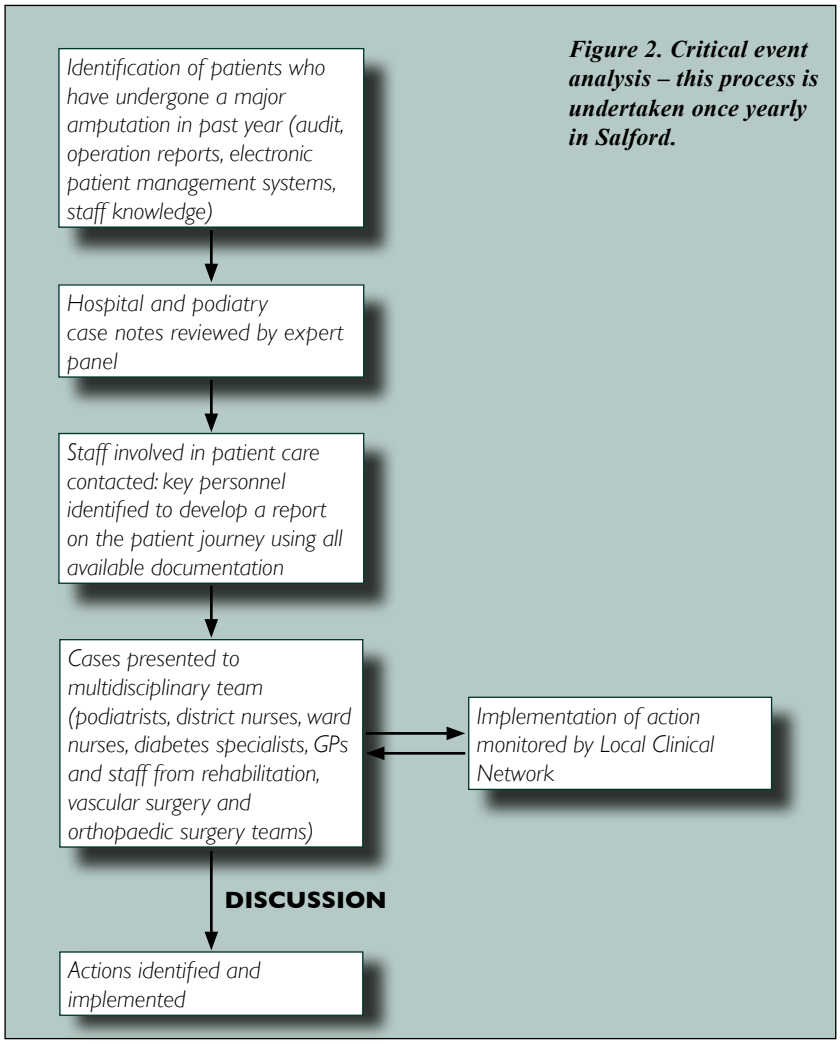


Figure 2. Critical event analysis – this process is undertaken once yearly in Salford.

Case study 1

Mrs X was an 81-year-old woman with type 2 diabetes, hypertension, peripheral vascular disease and a previous stroke. She was referred to the podiatry team by her GP with a Texas classification 2D (Armstrong et al, 1998) ulcer on the left posterior calcaneum. The wound was malodorous with a heavy exudate. The wound bed was sloughy and there was cellulitis extending 6 mm from the wound

Figure 3. The ulcer on initial presentation to the foot clinic. (Photo is courtesy of ZooBiotic Ltd, Bridgend.)

periphery (*Figure 3*).

The ulcer had developed 6 months previously during prolonged bed rest in hospital following a fractured femur. At referral she was being managed on an alternating pressure mattress with foam and hydrogel heel dressings and flucloxacillin 500 mg qds. The most recent HbA_{1c}, recorded 6 months previously while she was an inpatient, was 9.2%.

Clinical assessment revealed non-palpable pulses below the level of the popliteal artery and loss of sensation to a 10 g monofilament and 128 Hz tuning fork to the ankle. X-rays and a subsequent magnetic resonance scan revealed osteomyelitis of the calcaneum. Further vascular investigations revealed an ankle–brachial pressure index of 0.54 with monophasic, dampened waveforms.

The ulcer had sharp debridement; off-loading with a 'Foot waffle' air cushion (EHOB, Indianapolis, USA) and alternating mattress and intravenous antibiotics (clindamycin 600 mg tds, ciprofloxacin 500 mg bd) were commenced.

Subsequently, the vascular surgeons confirmed unreconstructable peripheral obstructive arterial disease. Following 4 weeks of unsuccessful conservative treatment (comprising the measures outlined above, plus local wound care and metabolic management) an above-knee amputation was performed.

Issues raised during the CEA

- *Why was the patient not referred to the multidisciplinary foot team when she developed an ulcer in hospital?* The patient was admitted to a surgical ward and then transferred to an elderly care ward. There were failures both in recognising the problem as a diabetic foot wound and in discharging without referral to the diabetes team.
- *Why was there no input by the multidisciplinary or podiatry teams into the patient's nursing home care?* The nursing home did not recognise the problem as a diabetic foot wound. The home was unaware of the district-wide procedure and protocols for the management of a diabetic foot ulcer.
- *Why was antibiotic prescription by the*

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1 The critical event analysis (CEA) process has now run annually for 8 years.

2 The two case studies in this article highlight the review process along with specific actions.

3 Many areas of practice have been altered following the CEA reviews. Some have been minor and others more major.

patient's GP inappropriate? The GP was unaware of the antibiotic prescription guidelines.

Actions after the CEA

- A training programme was developed for ward staff in conjunction with the tissue viability team. There was particular targeting of the education at non-medical wards where there may be less experience of diabetic foot disease. The existing district rolling programme was supplemented by this extra educational programme. The programme has four main themes: identifying the foot at risk, wound management, off-loading and health education.
- Clinical staff were encouraged to complete significant or critical event incident forms if similar problems developed.
- Nursing home staff were invited to free training sessions and visiting podiatrists reinforced the district guidelines at every opportunity. Nursing home managers were encouraged to release staff for training.
- The antibiotic prescription protocol was redistributed to all GPs and reinforced when asking a GP to prescribe antibiotics.

Case study 2

Mr Y was a 64-year-old man with type 2 diabetes managed on diet and metformin. He took no other medication and had regular, routine podiatry appointments at 3-monthly intervals. He lived alone, rarely left home and had not visited his GP for 9 years. He smoked and drank alcohol heavily. His first podiatry assessment 6 years previously had revealed peripheral neuropathy but no evidence of peripheral vascular disease. On a podiatry visit he reported significant leg pain suggestive of vascular insufficiency rest pain.

Examination of the feet revealed absent peripheral pulses and areas of tissue breakdown on the lateral border (*Figure 4*). Urgent Doppler assessment was arranged and a diagnosis of critical ischaemia was made. Mr Y was referred to the multidisciplinary foot clinic, from which he was admitted for pain-management medication review and an urgent vascular assessment.

Angioplasty failed to improve circulation, leading to a below-knee amputation.

Figure 4. The ulcer upon initial presentation to the multidisciplinary foot team.

Issues raised during the CEA

- *Social exclusion.* Mr Y had no interaction with health and social care teams. He consumed excessive amounts of alcohol and tobacco. However, the patient did have regular podiatry team contacts.
- *Why were the vascular asssments not documented during routine podiatry visits, as this was departmental policy?*

Actions after the CEA

- The case study was presented to all podiatry staff to highlight the social exclusion issues. Podiatry staff were encouraged to review patients more holistically and to act as a liaison between the patient and other services (e.g. GP or social services) to improve health and social outcomes.
- Podiatry staff were given training in documentation. A documentation policy was also introduced. Podiatry staff were also given training in primary and secondary vascular risk factor reduction. Staff who identify peripheral arterial obstructive disease should signpost the patient to services such as smoking cessation and liase with the GP regarding his or her blood sugar control, hypertension, anti-platelet therapy and lipid management.

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1 Salford diabetes services have developed a process of reviewing all major amputations.

2 This is carried out in a non-judgmental, no-blame environment with the emphasis on improving preventative care for patients at very high risk of diabetic foot-related amputation.

3 Action plans to address the identified issues have been developed and implemented.

4 The authors recommend this process to all diabetic foot teams as an excellent method of assessing and improving the services they provide.

Changes in practice

The CEA has now run annually for 8 years. The two cases above highlight the review process along with specific actions. Many areas of practice have been altered following the reviews. Some of the changes have been minor and others more major. They include the following.

- Dermatology education for podiatrists focusing on tumour recognition after a squamous cell carcinoma went unrecognised for a long time.
- Multiprofessional team-building. Problems have arisen due to uni-professional 'silo-working', such that the benefits achievable through the involvement of other disciplines were excluded. Following their identification, communication, liaison and awareness raising exercises were arranged.
- Improved transfer of care between different agencies. The movement of a patient from one health organisation to another was identified as a major risk. Communication failures had resulted in discontinuity, neglected interventions, risk and harm. Patients now carry a hand-held record to minimise this and further protocols were developed with neighbouring healthcare providers and within the healthcare economy to help prevent this.
- Identification and intervention for at-risk patients admitted to hospital for another reason. As identified in case study 1, at-risk patients may develop ulcers as a consequence of being in hospital. Further to the actions of the case study, there is work in progress to develop an 'alert' system. People who have been identified as at-risk via the foot-screening service will, on admission to hospital, generate an automatic referral to the podiatry team so that appropriate preventative care can be implemented.
- Training in consistent foot ulcer definition. Disparity in training and different professional perspectives led to cases where, because of mis-naming, established guidance and protocols were not being followed. A district-wide, multidisciplinary workshop developed agreed definitions that were disseminated and reinforced at training events.

Conclusion

Salford diabetes services have developed a process of reviewing all major amputations. This is carried out in a non-judgmental, no-blame environment with the emphasis on improving preventive care for patients at very high risk of diabetic foot-related amputation. The review has highlighted many system failures including poor communication, inappropriate and delayed referrals, protocol non-adherence and training under provision. Action plans to address the identified issues have been developed and implemented. We recommend this process to all diabetic foot teams as an excellent method of assessing and improving the services that they provide. ■

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