

Management of a diabetic foot ulcer by specialist nurses in Iran



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Foot ulcers are a serious complication of diabetes that are associated with adverse consequences and high costs, as well as having a significant impact on quality of life. In this case, a man was brought to a clinic in Iran with a diabetic foot ulcer of 1 month's duration. He had seen several physicians, and the decision had been made to amputate his leg. However, when he was seen at the authors' clinic he was reassured that amputation could be prevented and given a treatment plan that was managed by specialist nurses. Although such specialist training is not widely available in Iran, it would positively improve wound healing outcomes.

The first author is a GP in Iran who worked at the Emam Khomeini Clinic, a charitable diabetes organisation in Tehran, as a volunteer. The organisation includes endocrinologists, surgeons, GPs, and nurses who are trained specifically in wound management and diabetes. Patient presentations are varied, and include diabetic foot ulcers and infections. However, the cooperation between the trained nursing staff and clinicians results in positive outcomes for many patients.

This case report outlines the management of an individual with a diabetic foot ulcer who presented at the Emam Khomeini Clinic, Tehran, Iran. The principles of diabetic foot management are discussed, as well as the advantages of training specialist nurses in diabetic foot care.

THE PATIENT

Mr A is a 73-year-old widower who has two adult children. He lives alone and is a retired labourer with a history of type 2 diabetes for the past 8 years. He first began to control his diabetes by means of oral treatment, but after 3 years he was advised to use insulin to control his diabetes. However, he refused therapy because of his fear of needles and injections. Mr A also had a history of hypertension and dyslipidaemia. Treatment of Mr A was irregular. Two years previously he had undergone photocoagulation for retinopathy. He was, and continued to be, a chronic smoker.

Mr A's foot ulcer appeared approximately 1 month before he presented at the Emam Khomeini Clinic, Tehran, Iran. He initially assumed that he had a blister caused by his shoe, but

as time went by it grew worse and eventually became infected. Although his son took him to see several physicians, Mr A did not agree to be admitted to hospital.

Mr A had been prescribed oral antibiotics (amoxicillin and ciprofloxacin), but did not use them regularly. He also used self-dressing and topical remedies. As a result of this, the ulcer was becoming larger and increasingly infected. It was recommended that Mr A be admitted to hospital with a diagnosis of a diabetic foot ulcer, but he would not agree to this; instead, he preferred to undergo amputation rather than undertake a period of hospitalisation. He insisted upon this method of getting rid of the ulcer, as he was exhausted by its effects, as well as facing the continual costs of treatment, dressing changes, and visits to the doctor.

Mr A was initially brought to the outpatients' clinic to receive a diabetes card, which gives all people with diabetes in Iran access to free services, such as insulin, a blood glucose-monitoring device, and retinopathy and nephropathy screening. He was first seen by one of the clinic's experienced trained nurses who then referred him to the consultant. She insisted that Mr A's foot ulcer was manageable with proper home care and follow-up without the need for amputation. Initially, Mr A and his family did not accept treatment as they did not trust the nurse's ability to manage such a problem. However, after comprehensive explanation and having been shown some examples of successful experiences with similar patients, they agreed to this course of action.

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PHYSICAL EXAMINATION

Mr A's lesion measured 4 cm x 3 cm with an ulcerated area at the base of the fourth and fifth metatarsal involving the interdigital cleft and extending to the forefoot. His dorsalis pedis artery and posterior tibial artery pulses were feeble. Postural hypotension was present. Sensory impairment was revealed by the 10-g monofilament test^[1]. On close examination, the swelling showed callosity and a grade 2 ulcer, as measured by the Wagner grading system for diabetic foot ulcers^[2]. However, Mr A reported no pain from the ulcer. On probing the wound with a blunt, sterile probe, it was found to be of full thickness, extending to the underlying bone. Neurological assessment with vibration perception threshold revealed a loss of sensation in both of Mr A's feet. Further observations are highlighted in *Box 1*.

Mr A did not wear appropriate shoes, and frequently wore shoes without socks. The shoes in question had a tough inner lining and a bulky section within the toe area. There was insufficient space lengthwise to accommodate his feet properly, and the sides bulged when worn.

TREATMENT AND MANAGEMENT

The management of diabetic foot ulceration is based upon the principles of wound debridement, identification and management of infection, the use of dressings to maintain a moist healing environment and offloading/redistributing pressure away from the wound^[3].

Mr A's treatment started with ciprofloxacin 400 mg intravenously twice-daily and metronidazol 500 mg three times a day. The wound was debrided to healthy tissue and there was a moderate amount of wound exudate. An appropriate hydrocolloid dressing (Comfeel®, Coloplast) was selected as a primary dressing to absorb the exudate and provide a moist environment for healing. A secondary polyurethane foam dressing, Allevyn® (Smith & Nephew), was applied. These dressing were chosen as they are semi-permeable to water vapour, occlusive to wound exudate and absorbent^[4]. Additionally, they are available in Iran (as some medical products are sanctioned) and were acceptable to Mr A.

Home care was made by the practice nurse for redressing within 48 hours, and a weekly review appointment was made within the diabetic foot clinic. For blood pressure control, the angiotensin-converting enzyme inhibitor enalapril 5 mg/day was commenced. Mr A also improved his insulin regimen and began

to achieve optimum blood glucose levels. It is important to maintain the principles of optimum wound management; at each visit, Mr A's wound was assessed by the trained nurse for signs of infection, as infection in the diabetic foot can spread rapidly^[5].

During the first week, the diameter of the wound remained the same, but the exudate had decreased considerably. Mr A's blood glucose was under control and slight physical activity was initiated by the nurses. Two weeks after initiation of treatment, the diameter of the wound was 2.5 cm x 3 cm. Systemic antibiotics were discontinued and oral antibiotics were started (amoxicillin 500 mg every 8 hours and ciprofloxacin 500 mg every 12 hours). The dressing had been changed twice a week by the nurse. During this time, Mr A and his family had been taught how to change the dressing, how to interpret glucose meter readings, and how to administer appropriate insulin dosages.

By week 4, the diameter of the wound was 1.0 cm x 1.5 cm. Mr A was completely satisfied with the care he had received and the treatment process.

By week 6, the wound had reduced to 0.5 cm x 0.5 cm, the oral antibiotics were stopped and Mr A had learned how he could take care of his foot, how to clean his foot and nails, and how to choose suitable shoes. He was also aware of appropriate physical activity, and he and his family had learned how they could screen Mr A's foot. He agreed to come to the clinic for follow-up appointments and screenings at least every 3 months. Mr A's ulcer was fully healed by week 12.

SPECIALIST NURSE TRAINING

At the Emam Khomeini Clinic, all nurses are trained in educating people with diabetes, particularly those at risk of foot ulcers. This enables them to become familiar with the basics of foot care, teaches them how to perform physical examinations and to take care of their feet on a daily basis, and encourages them to carry out a series of simple tasks in order to help prevent foot ulcers or recurrence. Tasks include checking shoes before wearing them, keeping feet clean, continued care of the skin and nails, maintaining good blood glucose control, regularly changing the dressing, and moisturising and cleaning the wound.

DISCUSSION

Trauma to the foot in people with diabetes is one of the most important factors in the development of an ulcer, particularly in the presence of sensory

Box 1. Observations made on presentation of Mr A to the clinic

- Plain radiography: osteomyelitis, osteolysis soft-tissue gas, medial arterial calcification
- Technetium-99m methylene diphosphonate bone scan: osteomyelitis, neuropathic arthropathy
- Calluses: discolouration, sub-callus, haemorrhage
- Fissures and nail appearance: onychomycosis, dystrophic calcification, paronychia, signs of atrophy
- Pulse rate: 96 bpm
- Blood pressure: 154/98 mmHg
- Fasting blood glucose: 205 mg/dL
- HbA_{1c}: 75 mmol/mol (9.0%)

References

1. Mayfield JA, Sugarman JR (2002) The use of the Semmes-Weinstein monofilament and other threshold tests for preventing foot ulceration and amputation in persons with diabetes. *J Fam Pract* 49(Suppl 11): S17–29
2. Wagner FW (1981) The dysvascular foot: a system for diagnosis and treatment. *Foot Ankle* 2: 64–122
3. Hinchcliffe RJ, Valk GD, Apelqvist J et al (2008) A systematic review of the effectiveness of interventions to enhance the healing of chronic ulcers of the foot in diabetes. *Diabetes Metab Res Rev* 24 (Suppl 1): S119–44
4. Hilton JR, Williams DT, Beyker B, Miller DR, Harding KG (2004) Wound dressings in diabetic foot disease. *Clin Infect Dis* 39(Suppl 2): 100–3
5. Edmonds M (2005) Infection in the neuroischaemic foot. *Int J Low Extrem Wounds* 4(3): 145–53
6. Knox RC, Dutch W, Blume P, Sumpio BE (2000) Diabetic foot disease. *Int J Angiol* 9: 1–6
7. Shahshahani MS, Salehi S, Rastegari M, Rezayi A (2010) The study of optimal nursing position in health care delivery system in Iran. *Iran J Nurs Midwifery Res* 15(4): 150–4
8. Dargis V, Pantelejeva O, Jonushaite A et al (1999) Benefits of a multidisciplinary approach in the management of recurrent diabetic foot ulceration in Lithuania: a prospective study. *Diabetes Care* 22(9): 1428–31
9. Boulton AJ, Kirsner RS, Vileikyte L (2004) Neuropathic diabetic foot ulcers. *N Engl J Med* 351: 48–55
10. Peimani M, Tabatabaei Malazy O, Pajouhi M (2010) Nurses' role in diabetes care. *Iran J Diabetes Lipid Disord* 9: 1–9
11. Jonmohammadi N, Roshan M, Rouhi M, Ganji S (2010) Management of diabetic foot ulcer in Babol, North of Iran: an experience on 520 cases. *Caspian J Intern Med* 3(3): 456–9
12. Ramachandran A (2004) Specific problems of the diabetic foot in developing countries. *Diabetes Metab Res Rev* 20: 123–33
13. Registered Nurses' Association of Ontario (2005) *Nursing Best Practice Guidelines*. RNAO, Ontario
14. Adib Hajbaghery M, Salsali M (2005) A model for empowerment of nursing in Iran. *BMC Health Serv Res* 5(24): 123–31

neuropathy. Although this trauma could be a puncture wound or a blunt injury, the most common one is repetitive stress trauma^[6], such as that caused by Mr A's unsuitable footwear.

Foot ulcers are a serious complication of diabetes that are associated with adverse consequences and high costs, as well as having a significant impact on individuals' quality of life^[7]. Care of this group demands a multidisciplinary approach^[8]. A specialised, interdisciplinary team should work closely with patients and their families to effectively manage and treat diabetic foot ulcers^[9], as evidenced in Mr A's case. However, this level of care is not yet accessible to all people with diabetes in Iran, and few patients with foot ulcers receive effective wound management^[10].

In a study in Mazandaran, Iran, of 520 people with diabetic foot problems^[11], it was clear that inappropriate quality of ulcer and foot care occurred in 54% and 66% of participants respectively, and most people were treated surgically (28% debridement and 57% amputation). The authors concluded that the main reason for this inappropriate service was the lack of nurses trained in wound management in the country.

Although some people with diabetes, particularly those with foot ulceration, believe that their condition should be treated by physicians (as Mr A and his family believed at first), the role of non-physician healthcare providers has been accepted by patients in many countries^[12]. Nurses are well placed to provide high-quality care and to undertake a leading role in wound management, specifically in the care of people with diabetes^[10]. Furthermore, nurses can facilitate and positively influence wound healing outcomes by promoting, collaborating, and participating in interdisciplinary care teams^[13]. However, the role of nurses in Iran and other developing countries is unclear, and there is a lack of a defined philosophy for nursing in Iran.

In a study conducted by Adib Hajbaghery in Iran in 2005^[14], clinicians were interviewed regarding their opinions, perceptions and experiences about their work in health care. The main obstacles were identified as public culture, organisational structure, high workload, lack of higher education, and a physician-centeredness that conceals the role of nurses in patient care.

Providing continuing clinical education is recognised as a critical way for nurses to maintain competency within a clinical setting and to become lifelong learners^[10]. Trained nurses play a key role in the management of diabetic foot ulcers, such as educating

and encouraging individuals with diabetes to participate in proper foot care and foot screening, and testing for signs and symptoms of foot ulcerations. If such assessments were routine within the healthcare system in Iran, these tests would have been performed earlier, before Mr A presented to the clinic, and could have prevented his ulcer worsening.

CONCLUSION

Patient education, comprehensive foot screening, correct dressing choice, effective debridement, and routine follow-up, are the most effective strategies in preventing and managing diabetic foot ulcers. Specialist nurses are well placed to provide effective foot ulcer management and treatment; however, nurses in some developing countries, such as Iran, highlight a lack of specialist training as an obstacle to effective healthcare provision.

Fortunately, in Mr A's case, his foot was saved from amputation as a result of the optimal home wound care and follow-up treatment he received from the healthcare team, particularly the trained nurses. Moreover, Mr A's quality of life improved, enabling him to interact and integrate socially within his environment, to participate in diabetes group activities and classes after becoming mobile and to enjoy his improved wellbeing.

However, from this case and many similar cases in Iran and other developing countries, it is clear that there is a lack of services that are mainly provided by specialist nurses. In Mr A's case, despite benefitting from this service, his infected ulcer would not have initially occurred had his feet been screened regularly, had he been taught about personal foot care sooner, and if he and his family had trusted the nurse's abilities.

A multidisciplinary team approach is needed to deal with the complexity of the diabetic foot ulcer, and nurses should be provided with skills for effective management. The main components of a diabetic foot service, such as education, screening, wound management and follow-up for preventing recurrence, may be provided by trained nurses, as is happening in many countries such as the UK. Currently, nurses have shown a strong commitment to change and improve the healthcare services and systems in Iran. Nursing in Iran has seen great progress in recent years. Restructuring nursing services in Iran would eliminate barriers to poor-quality nursing care, inadequate educational preparation, role ambiguity and low self-esteem among nurses. ■