

collaborative team of nurses to conduct seminars, providing information necessary to make quality decisions regarding the management of skin and wound care problems. This facilitates a high standard of care leading to positive, long-term and cost-effective clinical results. Their vision is to listen to customers and satisfy their needs, achieve excellence in the manufacture and distribution of quality products, and become the industry's leading skin and wound care educators. In accepting an intrapreneurial role within a company, it is also important for the nurse to understand and be in agreement with the company's vision and philosophy in order to facilitate expression of the vision, goals and plans in her consultative and educational role.

CONCLUSION

'The surest security today comes from a willingness to take risks', according to Pritchett¹⁹. Pritchett encourages each of us to consider 'stop doing what comes naturally' and instead 'do what works', i.e. to take the initiative, spend energy on solutions, and take more risks. To make an impact in health care, one must welcome destruction, make mistakes and aim for total quality¹⁹. It is important to have faith in opportunities and take advantage of those opportunities to enhance health care and give the best care possible at the least expense.

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The role of the advanced practice nurse in assessment of diabetic feet to prevent and treat foot ulcers

Michele R. Burdette-Taylor

Smith & Nephew United Inc., Largo, Florida, USA

An advanced practice nurse is an essential component of the multidisciplinary team in primary care practice. The purpose of this paper is to describe a model specifically designed to teach nurses practising at an advanced level to assess, document, intervene and refer patients as needed for diabetic foot care, prevention and aggressive treatment. Nurse practitioners and clinical nurse specialists are instrumental in re-designing the patient care delivery system to meet healthcare needs and reduce the current astronomical healthcare costs¹.

Diabetes mellitus is increasingly prevalent among older Americans. The elderly population will increase from the current 12% of the total population to an estimated 25% in the next century, which means that the incidence of diabetes mellitus will also increase². Many of these patients will be seen and managed in a primary care setting by an advanced practice nurse³.

AMPUTATIONS

Diabetic foot ulcers are estimated to affect 15% of all diabetics, which equates to 210 000 ulcers annually in the USA⁴. A similar incidence has been measured in the UK. Of these 210 000 ulcers, 50 000 will result in a lower-extremity amputation⁵. This is a major health, quality-of-life and financial issue in the primary care setting.

Foot ulcers precede 84-85% of the 50 000-plus amputations performed annually⁵. Of all the amputations, 30 000 are directly related to the neuropathic and vascular complications of diabetes⁵. Prevention, early detection, aggressive treatment and prevention of recurrence must be incorporated into the advanced practice nurse's role in order to reduce the number of amputations. By assessment with the deliberate intention of identifying those diabetics who are at risk due to

neuropathy, mechanical stress, and/or angiopathy or ischaemia, advanced practice nurses could be at the forefront of prevention of amputation and dramatic cost reduction⁶.

ROLE OF THE ADVANCED PRACTICE NURSE

The role of the advanced practice nurse is based on the expert clinical knowledge and skills which are practised in a primary care setting⁷. Fifty per cent of the amputations performed annually are preventable through a comprehensive programme of assessment, intervention, and prevention of injury and recurrence^{8,9}. The major causal sequence leading to an amputation involves neuropathy leading to minor trauma which results in a cutaneous ulceration with possible failure of wound healing^{8,10,11}. This particular causal sequence leads to gangrene or infection with resultant amputation. The goal is to eliminate any one of these components to reduce the risk of amputation¹⁰.

The role of the advanced practice nurse is to organize and coordinate services and resources to meet the needs of the patient population¹², in this case the high-risk diabetic population. An advanced practice nurse in a primary care setting should focus on the delivery of high-quality care in order to achieve desired physical outcomes and cost control¹³. In this setting, the nurse provides the necessary patient education, prevention measures, thorough assessment, and referral for those patients identified as at high-risk for ulceration. When diabetic foot ulcers are prevented, there is a dramatic improvement in the quality of life as well as tremendous cost savings^{5,11}.

PREVENTION OF AMPUTATIONS

One of the most important aspects in the prevention of diabetic foot ulcers is the cooperation and understanding of the patient and family. Education should help the patient and family understand how foot lesions occur and measures for prevention and/or healing of a wound¹⁴. The patient and family must participate in the prevention, early detection, and treatment of a foot ulcer to prevent amputation.

The goal of the American Diabetic Association is to reduce amputations by 40% by the year 2000 through an inter- and multidisciplinary team approach⁴. Guidelines from the American Association of Diabetes Educators have been published outlining the need for education, reduction of risk factors, identification of those at risk for ulcer development due to ischaemia and/or neuropathy, and utilization of a team to treat complicated problems aggressively¹⁵. Even though these guidelines have been published, there is little primary care awareness of these standards, and there is no published evidence of any impact of these standards on primary care and diabetic mortality⁹. In studies that were published citing a 44–50% reduction in amputations, healing was attributed to a comprehensive programme of assessment comprising physical examination and history, including vascular, neuropathic, dermatological and musculoskeletal examinations and evaluation¹¹. The primary care provider could and should be the trail-blazer in effecting changes in healthcare practice to reduce amputations, thus reducing mortality and costs while improving the quality of life and health.

Unfortunately, foot assessment and care programmes are not universally accepted. Educators, clinicians and patients are overwhelmed in their attempt to teach and learn diabetes management techniques and foot care guidelines¹⁶. The research that has been published in the last two years proves the simple effectiveness of basic, routine, and thorough assessment by a primary care provider as the answer to reduction of amputations¹⁷. From research, knowledge can be transferred to practice through intensive and specific educational objectives¹⁸.

CONCEPTUAL FRAMEWORK

The theoretical underpinnings of the role of the advanced practice nurse in diabetic foot ulcer prevention lie in the fact that nurses are managing diabetics on a daily basis in primary care. The advanced practice nurses who are managing diabetics are in need of information, research and education to support their practice. Adult learning principles are necessary in designing curricula to enhance education at this level since adult learners bring a reservoir of experience to the learning situation¹⁹. With utilization of education based on research, nurses will move from competent to expert practitioner status by utilizing their intellectual orientation, integrating their knowledge, and refocusing their decision-making processes to ensure positive outcomes²⁰. Continuing education/staff development should be based on the use of theories and principles for adult learning throughout the assessment of learning needs, planning, implementation and evaluation²¹.

RISK FACTORS

The two major risk factors for ulceration in diabetic patients are ischaemia and peripheral neuropathy⁴. Other common risk factors are musculoskeletal deformities creating an abnormal foot anatomy, a limited range of motion or abnormal plantar surface pressures⁴. Physical limitations and psychosocial issues also affect the prevention of a cutaneous ulceration. Self-care deficits such as preparing meals, bathing, toileting and physically being able to inspect their feet or take their shoes and socks off affect the chances of developing an ulcer⁴.

ESSENTIAL ASSESSMENT COMPONENTS

There are key components that must be utilized in practice to prevent initial ulceration, reduce the risk of actual ulceration, aggressively treat a cutaneous ulceration and prohibit the recurrence of any ulceration. These key components are the initial non-invasive, inexpensive, quantitative steps that an advanced practice nurse could and should implement into practice immediately to prevent the most costly, complicated, traumatic and life-threatening situation for a diabetic patient. The importance of positive patient outcomes has grown dramatically in recent years. The major reason for this growth is the mounting evidence of the wide variation in outcomes of care, utilization of resources, and costs of care²².

The initial component is simple evaluation utilizing the diabetic foot risk and management tool to determine whether the individual has protective sensation, a history of ulceration, foot deformity, and adequate circulation. Once that investigation is complete, the individual is placed in a category between 0 and 3 and instructed on the frequency of visits and on footwear and/or orthotics needed for prevention²³.

Utilization of Wagner's foot lesion classification system is common practice for those treating diabetics with ulceration. The ulcer grade between 0 and 5 is directly determined from the degree and level of tissue injury. A lower grade indicates intact skin or a superficial injury, whereas a higher grade indicates that either the forefoot or the entire foot is gangrenous²⁴. This scale is important for documentation as well as for the communication between disciplines that is necessary for intervention to achieve a positive patient outcome.

The first and most important step in assessment is collection of the data from the patient and/or family. Information that must be collected includes the duration of diabetes and the blood glucose levels, any history of alcoholism and/or hypertension, and smoking history and practice. Assessment must be made of the patient's daily

activity, care-giver situation, comfort, and medication usage. In assessing the history, specific questions must be asked about previous ulcerations, podiatric care, referrals for orthotics and past follow-up.

The physical examination should be thorough but specific for indicators of superficial dermatological conditions, vascularity, and musculoskeletal deformities²⁴. Tools that are essential for assessment are a Doppler flowmeter for determining the presence of pulses and the ankle/brachial pressure index. A 5.07 Semmes Weinstein nylon monofilament is necessary for determining the individual's level of protective sensation and extent of sensory neuropathy. An external temperature probe is effective for assessing the external temperatures on the plantar surface of the foot. Temperature discrepancies between the feet or on the same foot could be indicative of a local infection, underlying osteomyelitis and/or a Charcot foot. In each case, there needs to be further invasive investigation for an accurate diagnosis. Other tools used in practice and helpful for collecting the quantitative data necessary for referral are a reflex hammer and tuning fork for assessing further neurological and sensory-level trauma.

If there is an actual ulceration, documentation must be concise, accurate and legible to achieve positive patient outcomes. Many disciplines are involved in the care of such patients and clear communication is essential to maintain quality and reduce costs. The essential components of documentation of diabetic foot ulceration are to identification of the location, size and grade of wound. Tracings and photographs are important for complementing the flow sheet or narrative and for education of the patient. The photographs can show the extent and improvement over time. Colour, odour, exudate, wound bed and surrounding skin characteristics should be noted. Diabetic foot ulcers can change very quickly from one visit to the next or between visits to practitioners in different disciplines. Assessment tools should be used to obtain a thorough picture of the underlying aetiology as well. These wounds must be monitored regularly and thoroughly to achieve wound healing.

CONCLUSION

Research has proven that diabetics have a 15 to 40 times greater risk of having an amputation than non-diabetics. The costs can be up to US\$80 000 per amputation. There is a greater than 50% chance that the contra-lateral limb will also require amputation within three to five years of the initial amputation⁸. These statistics alone justify drastic and immediate changes in our approach to the management of diabetic patients to prevent the vicious causal pathway leading to amputation¹. Advanced practice nurses are at the cutting edge of providing the comprehensive assessment, appropriate referral and follow-up necessary to prevent an actual ulceration, treat aggressively, and prevent recurrence. Positive patient outcomes will result from teamwork and shared resources, improved communication, customer satisfaction, and a sense of united commitment to achieve a goal²⁵.

The commitment to implement information and education that is based on research for the assessment and prevention of diabetic foot ulcers is essential for long-term positive patient outcomes, enhancement of professional practice, and containment of costs. Diabetic foot care and treatment must be case-managed and collaborative to be effective. For a few dollars spent pro-actively and a systematic method of teaching diabetics with the deliberate intention of prevention of

wounding, thorough assessment, regular and aggressive treatment plans to incorporate the team approach, and built-in prevention of recurrence, amputations will be automatically and significantly reduced.

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