Comparing wound classification systems: Impact on diabetic heel ulceration

KEY WORDS
- Assessment
- SKIN Bundle
- Ulceration
- Wound classification

Background: Ulcer classification systems can provide a framework for healthcare staff to predict potential risk and prompt the right care at the right time. **Aim:** To explore if consensus is achieved when two wound classification systems are applied to grade a foot lesion by two different specialist clinician groups, nurses and podiatrists. **Method:** A typical ulcer was compared using the European Pressure Advisory Panel and University of Texas tools. **Conclusion:** Both systems achieved consensus on ulcer depth, but the Texas system also indicates perfusion or infection. This supports a more informed rationale for treatment.

ALISON RODGERS
Senior Diabetic Podiatrist , NHS Greater Glasgow and Clyde, UK

ELEANOR SCOTT
Tissue Viability Nurse Primary Care, NHS Greater Glasgow and Clyde, UK

LYNN WELSH
Tissue Viability Nurse Primary Care, NHS Greater Glasgow and Clyde, UK

Diabetes is one of the most prevalent and serious chronic conditions currently affecting the UK population (Boulton et al, 2005). General practices are often the frontline service in delivering the care for this chronic disease and as a result community nurses are often the first to detect diabetic foot ulcers (Turns, 2012). Krishnan et al (2008) demonstrated that early identification of individuals at risk of ulceration and rapid access to multidisciplinary specialist care can improve patient outcomes. Positive outcomes include reduction in ulcer duration, decreased amputation rates and increased survival.

Classification systems in general can provide a framework for healthcare staff to improve their ability to predict potential risk and prompt the right care at the right time (Schaper, 2004). Benefits of using classification tools are that they can also be used to aid diagnosis and stratification; gain consensus in documentation; and represent a common language to communicate with other medical professionals. Ultimately, they can inform treatment pathways and support best practice.

AIM

The aim of this article is to explore if two wound classification systems are applied to grade a foot lesion by two different specialist clinician groups will consensus be achieved and how may it in turn inform the ongoing management plan.

The wound classification systems utilised are European Pressure Ulcer Advisory Panel (EPUAP) for pressure ulcer classification (EPUAP, 2009), most commonly used by nurses, and the University of Texas classification system for diabetic foot lesions used by podiatrists (Armstrong et al, 1998)

The University of Texas classification has been adopted by SIGN (2010) and NICE (2004) as the preferred system for recording diabetic foot wounds.

The EPUAP classification tool was developed as a 4-year collaborative effort between EPUAP and the American National Pressure Ulcer Advisory Panel (NPUAP) and is widely used (EPUAP, 2009).

BACKGROUND

In order to provide discussion points, an outline of a "typical" patient will be considered. Mr J is an 85-year-old gentleman who lives alone. He is housebound with limited mobility and his two sons are his main carers. Mr J has type 2 diabetes (diagnosed 1998), left ventricular failure (LVF), chronic obstructive pulmonary disease (COPD) and was recently diagnosed with cognitive impairment due to cerebrovascular disease, all of which are being managed by his GP practice.

Wound presentation

Initially, the community nurse identified an ulcer on the plantar aspect of Mr J's left heel. The duration or cause of the wound was unknown (*Figure 1*). He has diabetic neuropathy (0/10 sites using a 10-gm monofilament) and bilateral venous

Figure 1. Ulcer on Mr J's heel.

insufficiency. Vascular status was ascertained with all pedal pulses (dorsalis pedis and posterior tibial) palpable using a Doppler ultrasound,. There were no clinical signs of infection, therefore antibiotic therapy was not indicated.

THE NURSE PERSPECTIVE

For all patients admitted onto the community nurse caseload, a pressure ulcer risk assessment is completed at initial encounter. Pressure ulcer tools include Waterlow Pressure Ulcer Risk Assessment Score (Waterlow, 1988) and the Braden Scale (Bergstrom et al 1987).

Waterlow risk assessment is one of the most widely adopted in the UK and was chosen in this case. A score of greater than 10 indicates that a person is at risk of developing a pressure ulcer. Mr J's score was 23, due to his age, reduced mobility and risk factors such as diabetes and an established foot lesion.

Since Mr J presented with a heel lesion, it was evident that his care plan should include treatment and prevention of further loss of skin integrity. Delayed or inappropriate treatment can often lead to ulcer chronicity complicated by recurrent infection, depression and lower extremity amputations (NICE, 2011).

The inclusion of diabetes as a risk factor, together with a foot lesion, can be used as a trigger for onward referral to the acute diabetes multidisciplinary team (MDT) by nursing staff. The role of the tissue viability nurse (TVN) in providing education to nursing staff in the pathway of care when a patient has a diabetic foot lesion is essential to ensure clinicians know when to refer in a timely manner.

Assessing the extent of tissue damage is important in all wounds, especially in diabetic foot and pressure ulcers (Ousey et al, 2012). The EPUAP tool classifies pressure ulcers as Grade 1–4, depending on depth (*Box 1*). Mr J's lesion was classed as a Grade 3 ulcer, which involves full thickness skin loss and damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.

Accurate assessment of pressure ulcers can be used to inform appropriate treatments and interventions. Education is therefore important to ensure that all clinicians know how to use the tool and can grade effectively.

A potential limitation of the EPUAP tool is that it identifies depth of ulcer, but does not take into account perfusion or infection; further clinical assessment is required for this (Lipsky et al, 2012). This classification system is not specific to the foot. There is a paucity of evidence with regard to inter-rater reliability between clinicians in using this tool to grade heel lesions. Studies tend to raise issues around identifying the difference between superficial lesions and moisture lesions (Beeckman et al, 2010).

Box 1. Scottish Adapted European Pressure Ulcer Advisory Panel Grading Tool.

Grade 1
Non-blanchable erythema (redness) of intact skin. Discolouration of the skin, warmth, oedema, induration or hardness may also be used as indicators, particularly on individuals with darker skin.

Grade 2
Partial thickness skin loss involving epidermis, dermis, or both. The ulcer is superficial and presents clinically as an abrasion or blister.

Grade 3
Full thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but not through underlying fascia.

Grade 4
Extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures with or without full thickness skin loss.

(NHS Quality Improvement Scotland,2009)

"Early identification of individuals at risk of ulceration and rapid access to multidisciplinary specialist care can improve patient outcomes."

"When all interventions are executed together rather than individually, better outcomes will be achieved."

Box 2. SSKINS Bundle to provide individualised care plan for Mr J.

Skin assessment	Grade 3 EPUAP pressure ulcer identified; no other lesions
Support surface	pressure ulcer orthosis required to offload pressure from rear foot.
Keep moving	Limited mobility; relies on others to carry out activities of daily living. Physiotherapy assessment for walking aids and occupational therapy assessment for home adaptations as required.
Incontinence	Assess for continence issues; provide urinal/commode if required
Nutrition	Encourage good nutrition/hydration
Self care	Provide support and education supplemented by written information (pressure break prevention leaflet). Assess cognitive function and literacy skills. Refer to Homecare for assistance with personal care and medication compliance.

SSKINS BUNDLE

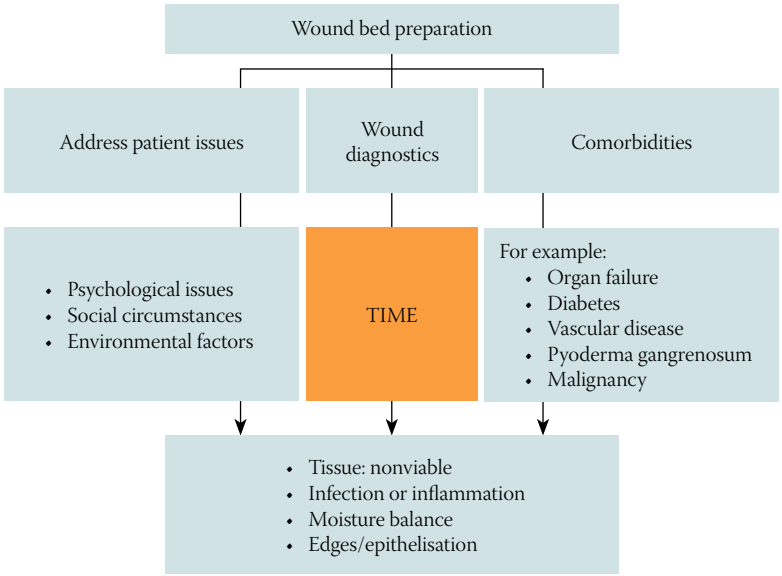
A Waterlow score of greater than 10 triggers a comprehensive nursing care plan for prevention of pressure ulcers; with a treatment plan if an area of ulceration is present.

A care bundle adopts an all encompassing approach i.e. when all interventions are executed together rather than individually, better outcomes will be achieved (Baxter and Downie, 2011) The SKIN care bundle was first developed in the USA (Whitlock and Rowlands, 2011) and has since been widely adopted and adapted as an integral part of planning care for people at risk of developing pressure ulcers (Broad, 2010; Baxter and Bartley, 2011). SSKIN stands for:

- Skin assessment.
- Support surface.
- Keep moving
- Incontinence
- Nutrition.

Across NHS Greater Glasgow and Clyde primary care clinical electronic nursing documentation, "self care" has been added to the bundle to become SSKINS. A person's ability to self care and carry out activities of daily living is assessed, thus empowering both patient and carers. It also provides a focus of discussion to engage the patient and carers in the care plan as well as a method of assessing the patient's health literacy (*Box 2*).

Box 3. Wound bed preparation and TIME



WOUND ASSESSMENT

Shultz and Dowsett (2012) state that educating clinicians on the principles of wound bed preparation (WBP) and using a structured approach improves healing rates.

Tools which provide a structured approach to wound assessment include WBP (Schultz et al, 2003) and applied wound management (Gray et al, 2010). Assessment of negative effects at the wound bed, which can result in barriers to healing, can be carried out using TIME which stands for:

- Tissue non-viable.
- Infection present.
- Moisture imbalance.
- Edges of wound non-progressing (Romanelli and Flanagan, 2005).

WBP which incorporates TIME is the locally adopted tool of choice in the reviewers' NHS primary care area and used by both nurses and podiatrists. This approach takes into account patient issues, as identified in the SSKINS bundle; co-morbidity factors (diabetes, LVF, COPD and cognitive impairment); and assessment of the wound bed using TIME.

Infection was not apparent in Mr J's case at this stage; however, this remains a high risk due to the presence of an open lesion. Further investigation was required to determine whether there was sufficient perfusion to progress the wound towards healing. Therefore, WBP needs to be combined with a holistic wound assessment, which will result in a clear understanding of treatment aims and highlight where therapeutic interventions are required in order to accelerate healing (Cook, 2012).

DIABETES PODIATRY PERSPECTIVE

The burden of diabetic foot disease is likely to increase; representing a major healthcare burden with significant morbidity. A recent study found that the risk of a person with diabetes undergoing a lower extremity amputation was estimated at 23 times that of a person without diabetes (Holman et al, 2012). NICE (2004) and SIGN (2010) clinical guidelines recommend that all people with diabetes are screened annually, with preventive and treatment interventions targeted at those at high risk.

Using a validated foot assessment screening tool, Mr J would have been assessed at high risk for developing a foot ulcer. Risk factors include neuropathy, vascular impairment and inability to self care. He should therefore have access to a specialist diabetic podiatrist. For those with foot complications or foot ulcers the recommendation are that the person is be referred to a specialist MDT within 24 hours (NICE 2004, SIGN 2010).

Mr J was referred by the community nurse to the hospital-based MDT. Although, multidisciplinary foot services have shown a significant reduction in major amputations in individual centres (Krishnan et al 2008), access to the full MDT within one working day is not always possible, with the specialist podiatrist often being the first point of contact.

This highlights the importance of the TVN or appropriate specialist to work collaboratively with the multidisciplinary foot team to educate nurses in the shared care of the diabetic foot and to ensure sufficient knowledge of the pathways in place to ensure timely and appropriate referral to the multidisciplinary foot team.

Clinical presentation of diabetic foot ulcers can be as a result of a broad range of aetiological factors. The use of a validated scoring system, together with sound clinical judgement and knowledge, can help clinicians in assessment and management of wounds. The University of Texas grading system classifies wounds as I to III for depth, ranging from a healed lesion to wound penetrating to bone or joint; then A to D indicating if there is the presence of infection or ischaemia (*Box 4*). It may be viewed as a limitation of the Texas tool in that it does not take into account neuropathy, which in turn requires further assessment (International Working Group on the Diabetic Foot, 2011).

Mr J's ulcer was graded as II-C (i.e. wound penetrating to tendon or capsule with evidence of ischaemia). This provides greater information than EPUAP, which does not take into account perfusion or infection. However, both suggest consensus on depth of ulcer.

History of the wound was vague and attributed to the patient standing on an object without footwear. It did not have the appearance of a typical pressure ulcer because of its location on the plantar aspect of the foot. A plain X-ray ruled out the possibility of a foreign body in the wound and nothing abnormal was detected on imaging. Vascular input following an MRI scan of vascular supply indicated that there were no viable vessels suitable for surgical intervention. This, together with Mr J's psychosocial challenges, resulted in a decision to manage the heel lesion conservatively. Managing the lesion in this way has an impact on the rate of healing and the subsequent increase risk

"The use of a validated scoring system, together with sound clinical judgment and knowledge, can help clinicians in assessment and management."

Box 4. A summary of the University of Texas wound classification system of diabetic foot ulcers (Lavery et al, 1998)

Grade I-A	Non-infected, non-ischemic superficial ulceration.
Grade I-B	Infected, non-ischemic superficial ulceration.
Grade I-C	Ischemic, non-infected superficial ulceration.
Grade I-D	Ischemic and infected superficial ulceration.
Grade II-A	Non-infected, non-ischaemic ulcer that penetrates to capsule or bone.
Grade II-B	Infected, non-ischaemic ulcer that penetrates to capsule or bone.
Grade II-C	Ischaemic, non-infected ulcer that penetrates to capsule or bone.
Grade II-D	Ischaemic and infected ulcer that penetrates to capsule or bone.
Grade III-A	Non-infected, non-ischaemic ulcer that penetrates to bone or a deep abscess.
Grade III-B	Infected, non-ischaemic ulcer that penetrates to bone or a deep abscess.
Grade III-C	Ischaemic, non-infected ulcer that penetrates to bone or a deep abscess.
Grade III-D	Ischaemic and infected ulcer that penetrates to bone or a deep abscess.

"Classification tools, together with sound clinical judgement, are an adjuvant to best practice, and should never be utilised in isolation."

of infection. Offloading is an essential part of the treatment and orthotist input included a rear foot offloading device, with assessment for the need of further aids of daily living to minimise risks. Such aids are also included in the nursing SSKINS care bundle, demonstrating some consensus in assessment method. Wound care initiated would be as per local formulary guidance.

Texas classification provides greater information than EPUAP in the classification of the diabetic foot lesion. It also indicates that the more severe grades can be a predictor of outcomes, such as infection and amputation. (Maderal et al, 2012) This supports a more informed rationale for treatment and again emphasises the importance of multidisciplinary involvement in the management plan.

Mr J was discharged from MDT to shared wound care with district nursing and podiatry input to provide regular debridement and care of adjacent limb and palliative care due to micro- and macrovascular disease. Ongoing social care and healthcare, along with support for Mr J and his sons, was also required to help him remain at home and prevent hospitalisation from further complications of foot disease.

DISCUSSION

This review highlighted that both professional groups considered all aspects of care in patients with multiple chronic comorbidities, but also the points in practice at which continuity of care was at risk of variation. Variations identified were related to:

- The most suitable time to refer to the acute multidisciplinary foot team.
- Clear lines of professional responsibility.

Classification tools, together with sound clinical judgement, are an adjuvant to best practice, and should never be utilised in isolation. This can only be achieved when the clinician has the necessary knowledge and skills. Clinical judgement is therefore essential, not only in the application of classification tools to aid clinical decision-making, but also for the recognition of the roles of other multidisciplinary professionals in the management of chronic conditions such as diabetes.

A suggested method to standardise timely referral pathways and streamline interdisciplinary working would be to formalise an agreement about where triggers should be used to initiate the utilisation of assessment tools. In the acute care sector, Chadwick (2009) suggests that when Waterlow score is completed (within 6 hours of admission to hospital), a visual foot assessment is also carried out and where an active ulcer is present a referral should be made to relevant members of the multidisciplinary foot team.

On completion of Waterlow score in primary care at the time of the patient's initial admission to the caseload, a similar foot assessment could be prompted and information surrounding the patient's prior engagement with the general practice, podiatry team and history of annual foot assessment could be gleaned. Any active foot lesions identified at this stage using the EPUAP classification tool could then be referred to the community multidisciplinary foot team.

In detecting people with diabetic foot lesions the EPUAP classification is therefore of most value when utilised by clinicians who have sufficient knowledge of the diabetic foot, correct referral pathways and accessing appropriate services.

CONCLUSION

Shared care is an increasingly important part of evidence-based diabetic foot care, with most interventions involving close collaboration between primary and acute care providers. Timely access to specialist services requires understanding of the diabetic foot among non-specialist staff and clear referral protocols and pathways. It is therefore essential that if profession-specific assessment tools are to continue to be utilised, all multidisciplinary professionals are cognizant with the tools employed by their fellow disciplines.

The role of the TVN and diabetic specialist podiatrist working collaboratively is especially crucial in achieving this, as well as in the reduction of the risk of patients with diabetes in the development of foot lesions. Joint education workshops between podiatry and nursing teams led by TVN and diabetic specialist podiatrist services should be formalised to ensure continued collaboration.

As an additional support to the education framework, all clinicians should be encouraged to complete the online training available at

diabetesframe.org to raise awareness of the importance of early detection and prevention of foot ulceration in people with diabetes. WUK

REFERENCES

Armstrong DG, Lavery LA, Harkless LB (1998) Validation of a diabetic wound classification system: The contribution of depth, infection, and ischemia to risk of amputation. *Diabetes Care* 21(5): 855–9

Baxter S, Downie S (2011) Working to reduce pressure ulcers in Scotland. *Wounds UK* 7(3): 113–5

Baxter S, Bartley A (2011) Preventing Pressure Ulcers Driver Diagram & Change Package. Available at: bit.ly/139H98P (accessed 20.02.2013)

Beeckman D, Schoonhoven L, Fletcher J et al (2010) Pressure ulcers and incontinence-associated dermatitis: effectiveness of the Pressure Ulcer Classification education tool on classification by nurses. *Qual Saf Health Care* 19(5): e3

Bergstrom N, Braden BJ, Laguzza A et al (1987) The Braden Scale for predicting pressure sore risk. *Nurse Res* 36(4): 205–10

Boulton AJ, Vileikyte L, Ragnarson-Tennvall G et al (2005) The global burden of diabetic foot disease. *Lancet* 366: 1719–24

Broad N (2010) An introduction to the SKIN bundle and its implementation. Presentation. 16 June. Available at: bit.ly/UMizau (accessed 20.02.2013)

Chadwick P (2011) An action plan for the inpatient management of diabetic foot disease in line with 'Feet First'. *Wounds UK* 7 (4): 86–91

Cook L (2012) Wound Assessment. In: Ousey K, Fumarola S, Bianchi J, Pritchard B (eds) *The Missing Link. The Key to Improved Wound Assessment*. Mark Allen Healthcare, London: 4–6

European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel (2009) *Treatment of Pressure Ulcers: Quick Reference Guide*. National Pressure Ulcer Advisory Panel, Washington DC

Gray D, White R, Cooper P et al (2010) Applied wound management and using the wound healing continuum in practice. *Wound Essentials* 5: 131–9

Holman N, Young RJ, Jeffcoate WJ (2012) Variation in the incidence of amputation of the lower limb in England. *Diabetologia* 55(7): 1919–25

International Working Group on the Diabetic Foot (2011) *The Development of Global Consensus Guidelines on the Management and Prevention of the Diabetic Foot*. Available at: bit.ly/W7zKF7 (accessed 20.02.2013)

Krishnan S, Nash F, Baker N et al (2008) Reduction in diabetic amputations over 11 years in a defined UK population: benefits of multidisciplinary team work and continuous prospective audit. *Diabetes Care* 31: 99–101

Lipsky BA, Berendt AR, Cornia PB et al (2012) 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. *Clin Infect Dis* 54(12): 132–73

Maderal AD, Vivas AC, Zwick TG, Kirsner RS (2012) Diabetic foot ulcers: evaluation and management. *Hosp Pract (Minneap)* 40(3): 102–15

NHS Quality Improvement Scotland (2009) Scottish Adapted European Pressure Ulcer Advisory Panel Grading Tool. Available at: bit.ly/YgoX9S (accessed 20.02.2013)

NICE (2004) *Type 2 Diabetes: Prevention and Management of Foot Problems. Clinical Guideline 10*. NICE, London

NICE (2011) *Diabetic Foot – Inpatient Management of people With Diabetic Foot Ulcers and Infection. Clinical Guideline 119*. NICE, London

Ousey K, Fumarola S, Bianchi J, Pritchard B (eds) *The Missing Link. The Key to Improved Wound Assessment*. Mark Allen Healthcare, London: 4–6

Romanelli M, Flanagan M (2005) After TIME: Wound bed preparation for pressure ulcers. *European Wound Management Association Journal* 5 (1): 22–30

Schaper NC (2004) Diabetic foot ulcer classification system for research purposes: a progress report on criteria for including patients in research studies. *Diabet Metab Res Rev* 20 (Suppl 1): S90–5

Shultz G, Dowsett C (2012) Wound bed preparation revisited. *Wounds International* 3 (1): 25–9

Schultz GS, Sibbald RG, Falanga V et al (2003) Wound bed preparation: a systematic approach to wound management. *Wound Repair Regen* 11(Suppl 1): S1–28

Scottish Intercollegiate Guidelines Network (2010) 116. *Management of Diabetes: A National Clinical Guideline*. Available at: http://www.sign.ac.uk/pdf/sign116.pdf (accessed 20 February 2013)

Turns M (2012) The diabetic foot: an overview for community nurses. *Br J Community Nurs* 17(9): 422–33

Waterlow J (1988) The Waterlow card for the prevention and management of pressure sores: towards a pocket policy. *Care Science and Practice* 6(1): 8–12

Whitlock J, Rowlands S, Ellis G et al (2011) Using the SKIN bundle to prevent pressure ulcers. *Nursing Times* 107(35): 20–3

"Timely access to specialist services requires understanding of the diabetic foot among non-specialist staff and clear referral protocols and pathways."