

Wound care management in Indonesia: issues and challenges in diabetic foot ulceration



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The increasing prevalence of diabetes mellitus has been linked with increased morbidity and mortality, especially when associated with diabetic foot ulcer (DFU). To improve the care of patients with DFU and provide an evidence-based multidisciplinary approach, the Indonesian Wound Care Clinician Association continuously develops best clinical practice and disseminates this information through Indonesian ETNEP certification. DFU management focuses on: prevention; wound care protocols; off-loading; and adjunctive (alternative) therapy. DFU characteristics should be assessed using the modified Bates-Jensen score to evaluate and predict the wound-healing process. Management recommendations include debridement every 2–4 weeks, continued use of offloading, and adjunctive wound therapy. Although, these protocols have attempted to delineate DFU management, they do not cover all aspects of this complex condition.

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There are 415 million people aged 20–79 years with diabetes worldwide, almost 153 million of them live in the Western Pacific region (Ogurtsova et al, 2017). The number of people with diabetes is predicted to rise to 642 million worldwide by 2040 (Ogurtsova et al, 2017). Indonesia has approximately 258 million citizens, making it the world's fourth most populated country. It is one of 21 countries and territories in the International Diabetes Federation Western Pacific region. According to the International Diabetes Federation (2017), about 10.3 million Indonesians have diabetes.

DFU is not unpreventable. Most DFU cases are preventable (Driver et al, 2014). DFU prevention is important, as recent research has revealed that >15% of DFUs will progress to amputation (Liu et al, 2018). Furthermore, after amputation, 13–40% of people will die within a year, and 39–80% within 5 years (Driver et al, 2014). This is a comparable mortality to that caused by all types of cancers (34.2%) within the same period (Driver et al, 2014).

Challenges

It is a huge challenge for wound care clinicians to reduce the mortality associated with DFUs. The Indonesian Wound Care Clinician Association (InWCCA) develops high-quality wound care

systems to improve DFU outcomes in Indonesia. Improvements are limited, however, because modern wound care dressings are not currently available through national health insurance. The Government plans to provide universal health coverage by 2021 through its social security programme (Badan Penyelenggara Jaminan Sosial), but by only providing health insurance is not enough to overcome DFU management problem nationally. There is need for sustained and robust action from the Government to formulate health policies, strategies and action plans to tackle the increasing prevalence of diabetes, particularly in relation to the management of DFUs (Soewondo et al, 2013).

There are also other challenges that need to be overcome. In Indonesia, the dominant staple food is rice, which has a high glycaemic index (GI). This may be an obstacle for people trying to control their blood glucose. Many Indonesians struggle to change their diet, particularly when reducing their consumption of high GI foods or substituting high GI foods for lower GI options. Furthermore, myths persist that deter dietary changes. For example, some individuals believe that people with chronic wounds should not eat fish as it may cause the wound to itch, that chicken will make the wound slimy, or that meat in general should be avoided as it may produce foul wound odours.

Table 1. Modified Bates-Jansen score (maximum score of 50)

Item	Assessment
Wound size	Length x width <5 cm ² Length x width 5<20 cm ² Length x width 15<40 cm ² Length x width 40<85 cm ² Length x width >85 cm ²
Wound stages	Stage 1 Stage 2 Stage 3 Stage 4 Un-stage
Wound base edge for granulation tissue	Intact skin Red-granulation tissue 100% Red 50%, yellow/black 50% Red 25% Slough/necrotic 100%
Type of exudate	Bloody Serosanguineous Serous Purulent Foul purulent
Amount of exudate	Dry Moist Mild/small Moderate Heavy
Surrounding skin color	Pink or normal Red bright Hypopigmentation Dark red Hyperpigmentation
Surrounding skin	Soft and healthy Visible, fused with the base Visible, not fused with the base of the wound Clear, not fused with wound base Fibrotic, hyperkeratosis
Epithelisation	75–100% epithelisation 50–75% epithelisation 25–50% epithelisation <25% epithelisation None
Oedematous	No swelling Oedema—non-pitting oedema Pitting oedema <4 cm Pitting oedema >4 cm Crepitus
Wound tunnels	None <2.5 cm—all around 2.5–3.5 cm <50 % 3.5–4.5 cm >50% >4.5 cm all around

As a result of these myths, patients' diets tend to lack protein, which is essential for supporting wound healing.

Erroneous beliefs also exist around wound treatment. For example, some community groups believe that neuropathic ulcers should be managed by the application of heat, which may lead to further tissue damage and thermal injury. Others believe that an infected wound has to be treated using benzene or kerosene, as these substances will eradicate the microbes.

These cultural factors often impair wound healing and education remains our best tool in eradicating these obstacles.

DFU management in Indonesia

DFUs make up almost 90% of wounds treated at private nursing clinics. Therefore, the InWCCA developed a clinical best practice protocol which is disseminated through Indonesian Enterostomal Therapy Nursing Education Programmes. The program is recognized by The World Council of Enterostomal Therapists. The InWCCA has also developed a "Stop Amputation, Do Early Prevention" DFU awareness programme that aims to improve the patient care and provide an evidence-based, multidisciplinary approach.

The best practice advocated by InWCCA focuses on four areas of DFU management: DFU prevention; wound care management protocol; off-loading; and alternative (adjunctive) therapy.

DFU prevention

The loss of protective sensation due to neuropathy leaves patients with diabetes at an increased risk of developing a DFU. DFU prevention focuses on patient education, support and encouraging positive self-care behaviours. Daily foot inspection, careful nail cutting, gentle bathing of feet in tepid water and moisturising the skin, e.g. with coconut soap, are components a good foot care regimen. Methods of preventing thermal or mechanical injury should be explained. The use of appropriate footwear should be emphasised. Patients should also be educated in the cardinal signs of infection (heat, redness, pain, swelling and pus) and advised on where to seek help should they notice any of these symptoms.

Sensation in the feet should be assessed with a 10g Semmes Weinstein monofilament and 128 Hz tuning forks. If neuropathy is present, patients should be informed that they are at increased risk of developing a DFU. This knowledge may encourage them to practice good foot care and take extra precautions to lower their risk of DFU.

Wound care management protocol

The modified Bates-Jensen score is recommended to predict and evaluate the wound healing process. Based on clinical evidence it takes 12 weeks on average to promote wound healing, as measured by the 10-item Bates-Jensen tool. Each item is scored from 1 to 5

[Table 1], to give a maximum score of 50.

The protocol includes the optimisation of glycaemic control, nutrition, oxygenation and management of other systemic conditions. The wound healing process will be suboptimal until appropriate diabetes management is accomplished, as hyperglycaemia detrimentally affects healing and the immune system, predisposing patients to infection. The protocol advocates DFU management based on the TIME (Tissue; Infection/inflammation; Moisture; and Edge of wound) principle (Leaper et al, 2012). It is divided into the classification of the ulcer, safe debridement and dressing selection.

Classification is based upon clinical evaluation of DFU size, tissue loss, depth of the ulcer, wound edges, undermining and the type of necrotic tissue present. Completion of the rating sheet enables the current wound status to be identified and predicts the healing outcome. Evaluation should be carried out once a week and whenever a change occurs the wound.

A protocol should be followed to ensure safe debridement in the clinical setting. Initial wound bed preparation accelerates the healing process or facilitates the effectiveness of therapeutic measures (Dowsett and Newton, 2005) by moving a chronic wound into an acute phase. Debridement should remove obvious necrotic tissue and reduce the bacterial burden. Repeated debridement may be needed to maintain an optimal wound bed. Various methods can be used to debride a wound, such as autolytic,

mechanical, biological, hydro pressure (or pressure irrigation using ultrasonic dental tools), and/or conservative sharp wound debridement. The wound should be cleansed to remove contaminants from the wound surface as part of wound bed preparation (Cutting, 2010). A moist wound environment promotes cell migration and matrix formation (degli Agosti et al, 2004). In principle, the ideal dressing should create a moist environment, manage exudate levels, support autolytic debridement and have an antimicrobial component, as well as requiring limited nursing time to apply and having low financial cost. Access to modern dressings is limited as they are expensive; however, the principles of an ideal dressing should be applied wherever and however possible. Metcovazin is an inexpensive topical zinc-based cream that promotes moisture balance within the wound and allows easy removal of the old dressing. It is locally produced and contains chitosan, petroleum jelly and zinc. Zinc cream has several unique features, as it is not only promotes a moist wound environment but also facilitates tissue regeneration (George and Gitarja, 2011). Gauze impregnated with Metcovazin is commonly used as a primary wound contact dressing in Indonesia.

Off-loading

DFUs on the sole of the foot are often associated with moderate to high pressures, primarily due to foot deformity, limited joint mobility and neuropathy. Off-loading devices, such as total contact casts, reduce pressure on the sole of the foot and may aid in reducing the patient's activity levels. Off-loading has become the mainstay of DFUs treatment.

Protective and comfortable footwear should be recommended for any patient at risk of DFUs and for those who have already had a DFU.

Advocating suitable footwear in patients at high risk of DFU and implementing offloading are cost-effective actions that help improve the patient's quality of life by preventing DFU recurrence.

Adjunctive (alternative) treatments

Adjunctive, or alternative, therapies have been used in Indonesia to accelerate wound healing in patients with DFUs. However, there is no strong recommendation to use these treatments due to its limited evidence from clinical trials to support their use. Patients may be treated with a combination of electrical stimulation, ozone and infrared therapies.

Several studies have found that electrical stimulation accelerates wound healing and/

autohaemotherapy, where blood is withdrawn, mixed with ozone and put back in the body. The method we use in Indonesia was using ozone machine and plastic, the wound was placed inside the plastic then the ozone air was flowed to the plastic using a cannula.

Infrared light may have a positive effect on wound healing (de Abreu Chaves et al, 2014) as it has demonstrated increased migration, viability and proliferation of diabetic cells in vitro (Hourel, 2014). It has been shown to have beneficial effects on diabetic ulcers that are unresponsive to conventional treatment; however, well-designed clinical studies are needed as the current studies are limited and reported responses vary due to methodological heterogeneity (Hourel, 2014).

Case studies

Case studies 1–3 demonstrate the challenges associated with DFU management and some of the creative innovations used in Indonesia to address these problems.

Statutory changes

A number of statutory changes are underway that will change how wound care patients are treated and develop nursing practice in Indonesia in the next few years, although there are a number of issues to overcome. The Ministry of Health regulation statute number 148/2013 is currently in force, despite the Nurses Act being passed in 2014, as the manual for the Nurses Act has only recently been established. The law itself is not technically applicable without the manual, therefore the old statute still applies.

To address this situation, the InWCCA and Ministry of Health have created a task force develop a standard for private nursing practice. This standard will give nurses who wish to run private practices as individuals or groups a stronger legal standing when it is passed. The draft was presented at the 7th Asia Pacific Enterostomal Therapy Nurse Association conference in Bogor, Indonesia, in April 2017 and the final version will hopefully be published later this year. It will provide more than 10000 certified wound clinicians with clear and applicable standards for managing their patient's wounds in clinical practice.

The Indonesian Nurses Act 2014 defines nurses as vocational (on completion of a 3-year diploma) or professional, which is separated into two tiers. The first is those who complete bachelor degree and the second is those who finish master degree (they set out the role of

Table 2. Mrs A Modified Bates-Jensen examination scores

Item	Initial	5 weeks
Wound size	4	3
Wound depth	5	4
Wound bed for granulating tissue	4	3
Exudate type	2	1
Exudate amount	4	2
Surrounding skin colour	4	5
Surrounding skin	3	2
Epithelialisation	5	4
Oedema	4	1
Wound tunnel	1	1
Total	36	27

Case Study 1

Mrs 'A' is a 40-year-old woman who was diagnosed with type 2 diabetes, two years prior to presentation with an ulcer. The DFU had been present for the past 2 weeks and had deteriorated, becoming painful. The wound bed was necrotic and sloughy with significant malodour. She scored a total of 36 on Bates-Jensen examination [Table 2].

The wound was cleansed using wound soap and saline. Conservative sharp wound debridement was then performed to remove the necrotic tissue and sloughy tissue. The wound was treated with zinc cream to facilitate autolytic debridement and an antimicrobial dressing containing cadexomer iodine. An absorbent dressing was applied and fixed in place with a crepe bandage.

The patient received standardised wound care for 5 weeks before returning to her village in a rural area. At her last appointment, her wound had significantly improved. There was a reduction in slough and the patient reported that her pain was now under control. The improved appearance of the wound was reflected in a significant improvement in Mrs A's Bates-Jensen examination score [Table 2].

Table 3. Mrs A Modified Bates-Jensen examination scores

Item	Initial	4 weeks
Wound size	4	4
Wound depth	5	3
Wound bed for granulating tissue	4	1
Exudate type	4	1
Exudate amount	3	2
Surrounding skin colour	4	1
Surrounding skin	4	2
Epithelialisation	5	5
Oedema	4	1
Wound tunnels	1	1
Total	39	21

Case Study 2

Mr 'B' is a 45-year-old man with diabetes who presented with a wound around the lateral malleolus. The wound had previously been treated with topical herbal therapy but had continued to deteriorate and was predominantly necrotic [Figure 1a]. On examination the patient had a Bates-Jensen score of 39 [Table 3].

The wound was washed with wound soap and mineral water then conservative wound debridement was used to remove the necrotic tissue and slough. The wound was treated using a combination of antimicrobial dressing with cadexomer iodine, topical Metcovazin and IntraSite Gel to support autolytic debridement, before being covered with an absorbent dressing fixed with gauze and a crepe bandage [Figure 1b]. After 4 weeks of care, granulation tissue had replaced the slough and necrotic tissue, and the Mr B's Bates-Jensen score had reduced to 21 [Figure 1c].



Figure 1. Mr B presentation at the start treatment [a]; after 2 weeks of treatment [b]; after 4 weeks after treatment [c].

the clinical nurse specialist (Suba and Scruth, 2015). When it comes into force, all nurses will be required to pass a competency examination. Importantly, the Nurses Act will authorise nurses to perform independent nursing practice, such as wound care in form of private nursing practice or on behalf with other practitioners. Such actions will be regulated by codes set out by the Ministry

of Health (Suba and Scruth, 2015).

Conclusion

There are many opportunities to improve the prevention, management and outcomes of DFUs. The InWCCA continue to improve current standards, working with the Government and educational bodies to spread knowledge and improve practice.

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Table 4. Case 3: Modified Bates-Jensen examination scores

Item	Initial	12 week
Wound size	4	2
Wound depth	5	2
Wound bed for granulating tissue	4	1
Exudate type	5	1
Exudate amount	5	1
Surrounding skin colour	4	1
Surrounding skin	4	2
Epithelialisation	5	2
Oedema	4	1
Wound tunnels	1	1
Total	41	14

Case Study 3

Mr 'C' is a 45-year-old man who presented with a large ulcer on top of his left foot. The wound bed consisted of 80% slough, 10% necrotic tissue and 10% granulation, and there was a deep abscess. After washing the wound with wound soap and sodium chloride, the necrotic tissue and slough was debrided. The wound was then treated using the same regimen as in case 2.

After 12 weeks of treatment, the wound bed was covered with granulation tissue, was epithelializing, and had decreased in size. At this time, the patient's Bates-Jensen score had improved from 41 to 14 [Table 4].

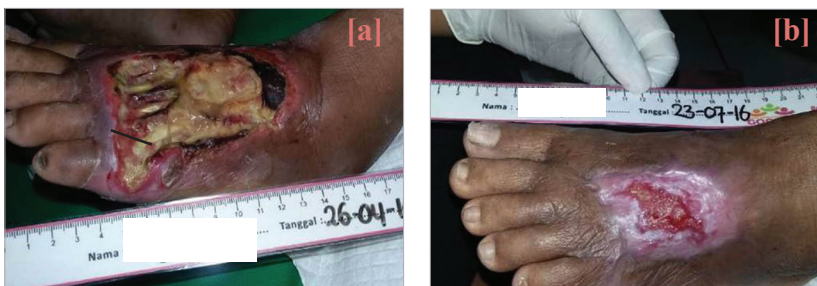


Figure 2. Mr 'C's wound was extensive and contained an abscess on presentation [a]; the wound was healing well after 12 weeks of treatment [b].

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