

# Using the new T.I.M.E. Clinical Decision Support Tool to promote consistent holistic wound management and eliminate variation in practice: Part 4 at Silver Chain Group, Perth, Australia

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This is the fourth article in a multi-centre, international series that explores the use of a newly developed wound assessment and decision-making tool, based on the well-established T.I.M.E. wound bed preparation framework (Moore et al, 2019). A team of non-wound care specialists in Australia used the new T.I.M.E. Clinical Decision Support Tool (CDST) to help guide wound bed preparation, dressing selection and ongoing management of chronic wounds. Five case studies are presented here.

In Australia alone, treatment of chronic wounds costs at least US\$2.85bn per year (Norman et al, 2016), which is, in part, due to an increase in the prevalence of wounds associated with a growing older population. Consequently, there is a huge demand on wound care services.

Silver Chain is the largest non-profit community nursing organisation in Australia, providing a care service for in-home health and aged care in four Australian states. Last year, the organisation conducted 2,597,388 care visits and 78,000 referrals over 40 locations, the greatest proportion of which were wound related. Establishing a diagnosis, promoting consistent holistic care, deciding appropriate treatment and evaluating wound progression can be challenging when clinical time is limited, and resources are over-stretched among specialists. However, if assessment is performed incorrectly, this can lead to delayed healing and/or serious complications (Timmins, 2009).

Tools that are evidence-based and that assist in wound assessment and clinical decision-making would be beneficial to promote consistent holistic wound management and eliminate variation in practice (World Union of Wound Healing Societies [WUWHS], 2016).

**T.I.M.E. Clinical Decision Support Tool**  
The T.I.M.E. CDST has been developed with

input from an international group of experts [Box 1], to provide support to healthcare professionals making clinical decisions, while reducing variation in practice and helping to improve wound outcomes. A non-product-specific version of the tool [Figure 1], as well as a Smith & Nephew product-specific version [Figure 2] are available.

Holistic wound care and the involvement of a multidisciplinary team (MDT) are, therefore, central features of the T.I.M.E. CDST. The T.I.M.E. CDST uses an 'ABCD and E' approach to facilitate clinical decision-making:

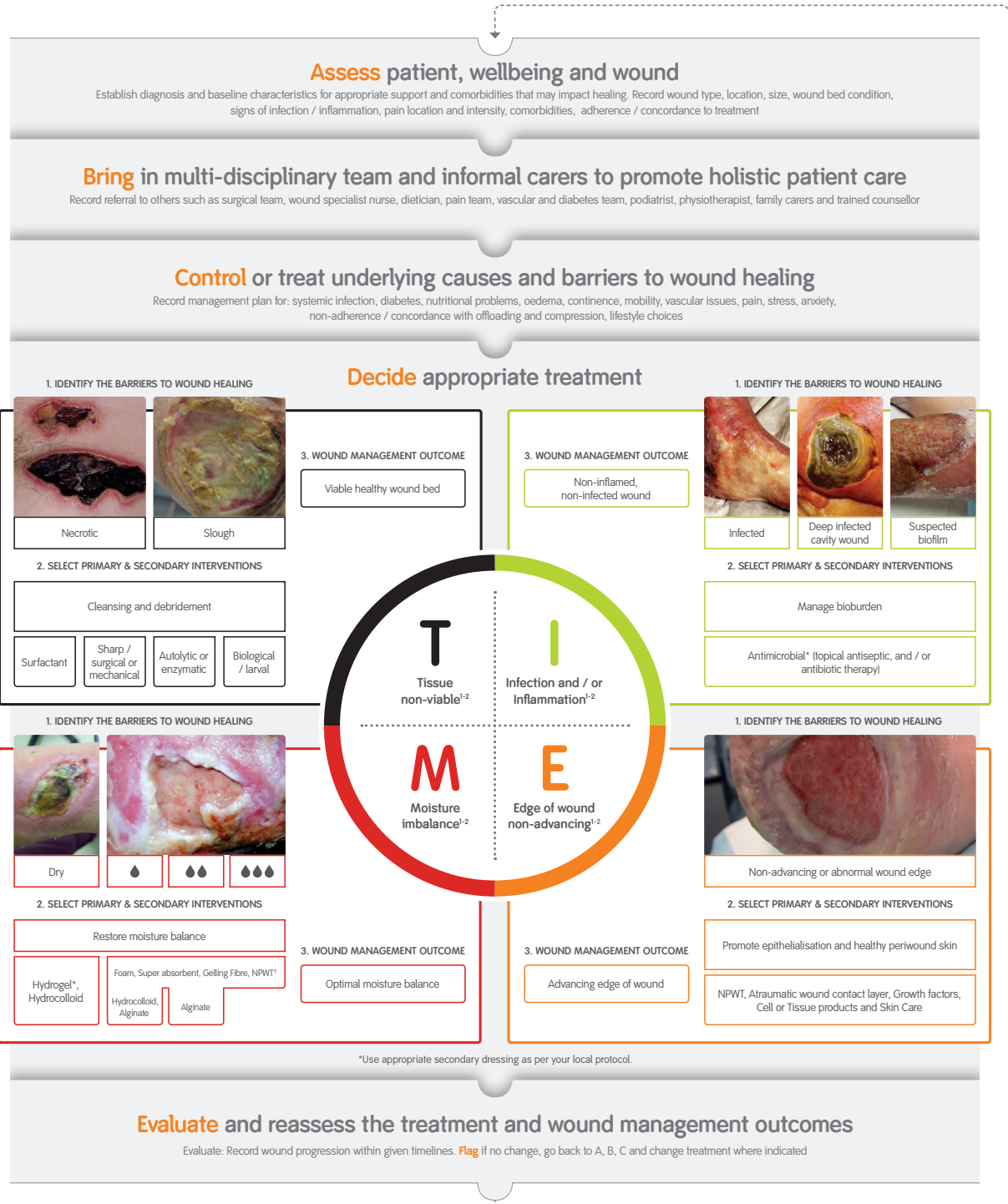
- **A** - Assessment of the patient, wellbeing and wound
- **B** - Bringing in a MDT
- **C** - Controlling and treating the underlying causes and barriers to wound healing
- **D** - Deciding on the most appropriate wound treatment to implement and the desired wound management outcome
- **E** - Evaluation and reassessment of how the wound is progressing and if the wound management goals have been achieved.

### Evaluating the T.I.M.E. CDST

A multi-centre international clinical evaluation was commenced in November 2018 to evaluate the newly developed T.I.M.E. CDST. Four centres were involved: one in Canada (Woo, 2019), one in Denmark (Jelnes et al, 2019) and two in

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# T.I.M.E. clinical decision support tool



Developed with the support of Glenn Smith<sup>3</sup>

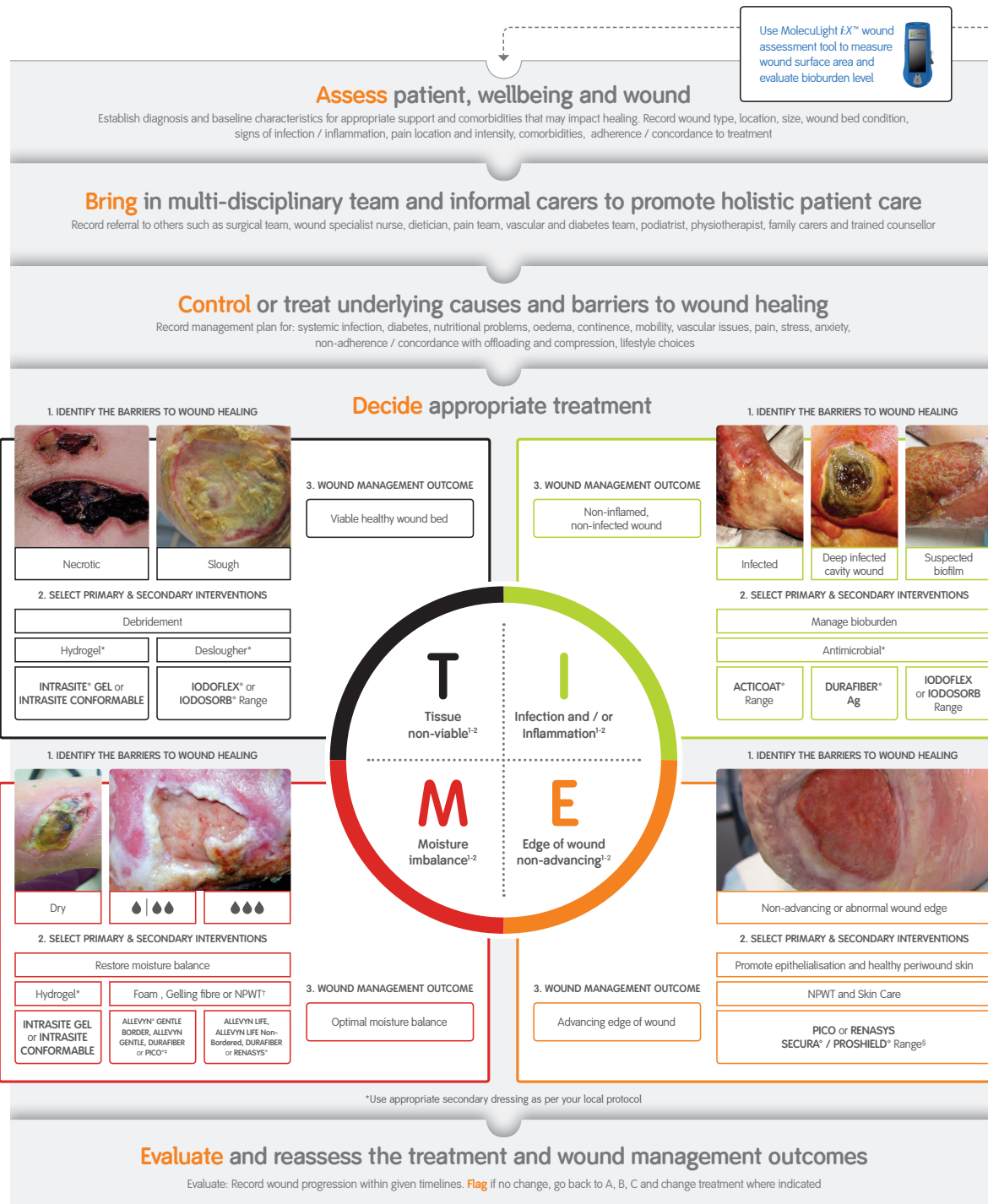
\*Use appropriate secondary dressing as per your local protocol. †NPWT: Negative Pressure Wound Therapy. ‡Level of exudate for wounds suitable for NPWT.

Reference: 1. Schultz GS, Sibbald RG, Falanga V et al., Wound bed preparation: a systematic approach to wound management. Wound Rep Reg (2003);11:1-28. 2. Leaper DJ, Schultz G, Carville K, Fletcher J, Swanson T, Drake R. Extending the TIME concept: what have we learned in the past 10 years? Int Wound J 2012; 9 (Suppl. 2):1-19. 3. Smith G, Greenwood M, Searle R. Ward nurse's use of wound dressings before and after a bespoke educational programme. Journal of Wound Care 2010, vol 19, no. 9

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Figure 1. The T.I.M.E. clinical decision support tool — a non-product-specific version.

## T.I.M.E. clinical decision support tool



Developed with the support of Glenn Smith<sup>1</sup> and Moore et al. 2019<sup>2</sup>

†NPWT: Negative Pressure Wound Therapy. ‡Level of exudate for wounds suitable for NPWT. §SECURA Range includes SECURA Moisturising Cleanser, SECURA Total Body Foam, SECURA Dimethicone Protectant, SECURA Extra Protective Cream, No Sting Skin Prep, PROSHIELD Range includes PROSHIELD Plus and PROSHIELD Foam and Spray. ¶ALLEVYN Range includes ALLEVYN LIFE, ALLEVYN GENTLE BORDER and ALLEVYN GENTLE BORDER LITE.

Reference: 1. Schultz GS, Sibbald RG, Falanga V, et al. Wound bed preparation: a systematic approach to wound management. *Wound Rep Reg* (2003);11(1-28). 2. Leaper DJ, Schultz G, Carville K, Fletcher J, Swanson T, Drake R. Extending the TIME concept: what have we learned in the past 10 years? *Int Wound J* 2012; 9 (Suppl. 2):11-19. 3. Smith G, Greenwood M, Searle R. Ward nurse's use of wound dressings before and after a bespoke educational programme. *Journal of Wound Care* 2010, vol 19, no 9. 4. Moore Z, Dowsett C, Smith G, et al. TIME CDS: an updated tool to address the current challenges in wound care. *Journal of Wound Care*, vol 28, no 3, March 2019: 154-161.

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Figure 2. The T.I.M.E. clinical decision support tool — including Smith & Nephew products.

### Box 1. Timeline of the T.I.M.E. CDST.

- Original T.I.M.E. concept developed to provide a structured approach to wound bed preparation (Schultz et al, 2003)
- Other assessment tools are available for wound bed preparation that draw on the concept of T.I.M.E. (i.e. Triangle of Wound Assessment [Dowsett et al, 2015], TIMES [Wounds UK, 2016] and TIMERS [Atkin et al, 2019])
- Survey conducted at the European Wound Management Association (EWMA) conference 2018 showed that although T.I.M.E. is universally the most widely used assessment tool, 40% of respondents answered that they do not use any formal framework to guide wound bed preparation in practice (Ousey et al, 2018)
- The T.I.M.E. CDST was developed as a more user-friendly version of T.I.M.E. with input from an international group of experts, prompted by development in technologies and interventions. The tool addresses holistic assessment including protection of surrounding skin and importance of patient involvement, while eliminating variation in practice (Moore et al, 2019).

Australia (Swanson et al, 2019 and the centre which is the subject of this report). At each centre, the T.I.M.E. CDST was used by non-wound care specialists in the management of up to five patients with a range of wound aetiologies. The T.I.M.E. CDST was used at each review to guide wound bed preparation and dressing selection, alongside local protocols and guidelines. Each patient was monitored and reviewed for up to a month, and parameters of wound healing were recorded, such as wound size, condition of the wound bed, how the wound is progressing and the degree to which the wound management goals have been achieved. This article focuses on the experiences at Silver Chain Group in Perth, Western Australia.

### Using the T.I.M.E. CDST in practice

Registered nurses who work for Silver Chain undergo wound assessment and management education on commencement and regularly thereafter. However, keeping abreast of advances in wound-healing science can be challenging and clinical decision support tools such as the T.I.M.E. CDST could aid in overcoming many of these challenges. Five non-specialist registered nurses employed at three separate Silver Chain service centres in Perth were randomly selected

and invited to participate. The organisation's Human Research Ethics Committee approval was obtained, along with informed nurse and patient written consent. The participating nurses underwent education on the T.I.M.E. CDST and were provided with the generic tool. Regular follow up with the non-specialists was carried out throughout the study.

Although the principles of T.I.M.E. (Schultz et al, 2003) were already known to staff, it was decided that the T.I.M.E. CDST project offered an opportunity to evaluate the utility of the algorithm when used in conjunction with the organisation's electronic point of care data management system. The non-specialists also reported that the study provided an opportunity to consolidate their learning and grow in confidence. The five cases are presented below. All the cases describe how the T.I.M.E. CDST was used in the real world to guide treatment of lower-limb wounds in patients with complex comorbidities. In this case series, the generic T.I.M.E. CDST [Figure 1] was used and the dressings available within the organisation within each category were listed in the electronic data collection wound module.

### Case 1: Neuro-ischaemic diabetic foot ulcer

#### *Assess patient, wellbeing and wound*

A 73-year-old female had undergone a previous left forefoot amputation for advanced peripheral arterial disease 2 years prior. She then presented with a neuro-ischaemic foot ulcer on the dorsum of her left foot stump. This wound had been present for over 2 years' duration, measuring 84 mm (length) x 36 mm (width) x 5 mm (depth) [Figure 3a]. The presenting wound had been slow to heal due to complex comorbidities including obesity, oedema, hypertension and diabetes, which were managed with medications and regular appointments with the MDT. At initial assessment, levels of moderate exudate and a macerated wound edge were recorded. Intermittent pain was affecting the patient's quality of life (5 out of 10 and 7 out of 10 on the VAS), resulting in limited mobility and feelings of isolation.

#### *Bring in the multidisciplinary team throughout care*

The patient was reviewed by members of the MDT (i.e., podiatrist, endocrinologist, dietician and optometrist). In addition, the patient had regular ongoing appointments at the vascular clinic.

#### *Control or treat underlying causes and barriers to wound healing*

Patient education delivered by the nurse involved

## Case 1: Neuro-ischæmic diabetic foot ulcer



Figure 3a: Initial assessment.



Figure 3b: Review 4 (+28 days).

strategies and advice on nutrition and the need to promote improved health-seeking behaviours and management of her diabetes.

### Decide appropriate treatment

Below includes discussion of the wound assessments conducted using the T.I.M.E. CDST over the review period:

**T** – The wound bed comprised 75% slough and 25% granulation tissue throughout the review period.

**I** – No signs of infection.

**M** – Exudate levels were high, with surrounding tissue macerated. At every review, the dressing in place was saturated with wound fluid, requiring regular changes and the use of a gelling fibre dressing, along with a secondary superabsorbent dressing, which was found to be the most efficacious for exudate management. A padding bandage, crepe bandage and tubular non-compression retention bandage were also applied.

**E** – Wound edges were non-advancing and macerated, with surrounding skin pale in colour. At second review, poor circulation/blood supply was recorded. The shape of the wound was also described as irregular. A light moisturising lotion was applied to the lower leg to protect the periwound skin and the patient was instructed to apply this regularly between each review. At third review, the dressing was changed to a lipido-colloid protease inhibiting dressing and by final review edges were slowly advancing.

### Evaluate

The T.I.M.E. CDST helped to direct dressing selection for management of exudate and to facilitate discussions with the MDT to promote holistic patient care. By final review, the slow-healing wound was no longer painful to the patient and there was epithelial tissue starting to develop at the edges [Figure 3b].

## Case 2: Diabetic foot ulcer

### Assess patient, wellbeing and wound

A 76-year-old male presented with a diabetic foot ulcer on his left foot of 6 weeks' duration, measuring 27 mm (length) x 15 mm (width) x 1 mm (depth) [Figure 4a]. The patient had peripheral arterial disease, diabetes and hypertension. He had previously had a cerebrovascular accident (CVA), as well as a forefoot amputation following a bone infection. With previous treatment, the patient would frequently remove the dressing in place, leaving the wound exposed.

**Bring in the multidisciplinary team throughout care**  
The patient was referred to podiatry for callus

debridement. The wound became infected and deteriorated at second review [Figure 4b], resulting in a hospital admission. At this time, the patient was not seen by the non-specialist and the T.I.M.E. CDST was not in use. A surgical follow up with the vascular team was planned once infection had resolved. Following discharge into the community, the T.I.M.E. CDST was used by the non-specialist for another 2 weeks.

### Control or treat underlying causes and barriers to wound healing

The patient had been taking medication to treat type 2 diabetes mellitus. These included gliclazide, metformin and empagliflozin. He had also been taking pregabalin to treat neuropathic pain. Advice was given for the patient to inspect the foot for any further damage, to check the dressing in place is dry and intact and to wear recommended footwear.

### Decide appropriate treatment

Below includes discussion of the wound assessments conducted using the T.I.M.E. CDST over the review period:

**T** – At initial assessment, the wound bed comprised 80% slough and 20% epithelialisation tissue. As per the T.I.M.E. CDST, cleansing with saline and gauze was performed prior to each dressing change, along with callus removal by a podiatrist using sharp debridement. At each subsequent review, the amount of slough reduced. At final review, the wound bed comprised 50% granulation tissue and 50% epithelialisation tissue.

**I** – Infection was suspected at second review due to wound deterioration. The wound had purulent exudate, malodour and increased wound dimensions. The patient was admitted to hospital for antibiotic therapy and surgical debridement by the vascular consultant and was discharged after 10 days once infection had resolved. A non-adherent dressing impregnated with 10% povidone-iodine was selected for use to prevent further infection, and the patient was advised to wear a therapeutic shoe for dressing protection and offloading.

**M** – Exudate levels were low during the review period with the non-specialist, with minimal exudate visible on the dressing in place. Throughout the review period, a non-adherent antiseptic dressing was selected for use to maintain bacterial balance and reduce the risk of any further infection.

**E** – The edges were advancing, although the wound did increase in size following infection. By final review, edges were continuing to advance,

### Case 2: Diabetic foot ulcer

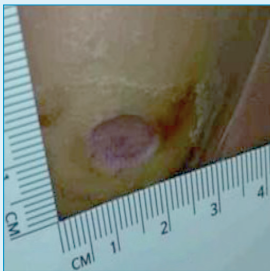


Figure 4a: Initial assessment.



Figure 4b: Review 2 (+25 days).



Figure 4c: Review 4 (+39 days).

### Case 3: Long-standing diabetic foot ulcer



Figure 5a: Initial assessment.



Figure 5b: Review 4 (+24 days).

and the wound measured 26 mm (length) x 6 mm (width) x 1 mm (depth). His foot was cleansed with moist commercial skin wipes and moisturiser was applied to the surrounding skin at each dressing change.

#### Evaluate

For this patient, the main areas of concern were non-viable tissue and infection. Although the wound deteriorated mid-study due to an infection, the T.I.M.E. CDST was able to help the non-specialist recognise this and refer appropriately. By final review, the wound had reduced in size, with increasing epithelialisation [Figure 4c].

### Case 3: Long-standing diabetic foot ulcer

#### Assess patient, wellbeing and wound

A 73-year-old female presented with a neuro-ischaemic ulcer on her left foot of 4 years' duration, measuring 12 mm (length) x 10 mm (width) x 2 mm (depth) [Figure 5a]. The patient had multiple comorbidities of rheumatoid arthritis, Charcot foot and peripheral vascular disease. The patient was unfit for surgery and all previous treatment for this long-standing wound had been unsuccessful.

#### Bring in the multidisciplinary team throughout care

Review by the specialist multidisciplinary foot team was already in place for this patient before the study period commenced and regular visits to a podiatrist and endocrinologist.

#### Control or treat underlying causes and barriers to wound healing

An orthotic boot had been provided to alleviate pressure, as pain had been reported when walking long distances (6 out of 10 on the VAS). Analgesics were prescribed for pain management. The patient was given advice with regards to the need to continue wearing the boot, and to attend regular appointments with the podiatrist for debridement of callus. Waterproof protectors were given to the patient to keep the dressing dry when showering.

#### Decide appropriate treatment

Below includes discussion of the wound assessments conducted using the T.I.M.E. CDST over the review period:

**T** – 100% granulation tissue was noted throughout the review period.

**I** – No signs of infection.

**M** – Exudate levels were high at every review, requiring the use of a soft-absorbent foam dressing containing a lipido-colloid protease

inhibitor dressing, in line with the evidence presented in the International Working Group on Diabetic Foot Guidelines (2019). The patient had been educated on how to remove and apply her dressings daily and was seen twice weekly by the non-specialist to review wound progress.

**E** – Non-advancing wound edges were recorded until mid-study, due to persistent periwound callus and maceration. Following regular debridement, the wound edges slowly advanced and by final review the wound had decreased in size, measuring 8 mm (length) x 6 mm (width) x 3 mm (depth). Skin barrier film products were applied to the periwound skin for added protection.

#### Evaluate

By final review, the wound had reduced in size [Figure 5b] and the patient no longer experienced any pain. The T.I.M.E. CDST helped to improve assessment skills and decision-making and instil confidence in the non-specialist when making a referral.

### Case 4: Neuropathic diabetic foot ulcer

#### Assess patient, wellbeing and wound

A 67-year-old male presented with a neuropathic DFU on the plantar surface of his right foot measuring 19 mm (length) x 20 mm (width) x 5 mm (depth). It had been present for over 4 months. The patient had multiple comorbidities of retinopathy, gout, urosepsis, stage 3 chronic kidney disease, diverticulitis, hyperlipidaemia, coronary arterial disease and diabetes. Previous treatment included a non-woven dressing impregnated with amorphous hydrogel, along with a superabsorbent dressing as a secondary dressing.

#### Bring in the multidisciplinary team throughout care

The patient was seen by the podiatrist for sharp debridement and referral was made to a nurse practitioner at second review as the wound was not progressing. By final review, the wound was suspected to be infected. As a result, a general practitioner (GP) appointment was arranged to initiate antibiotic therapy, with advice given to the patient to attend hospital if signs of infection worsened.

#### Control or treat underlying causes and barriers to wound healing

The main barrier to wound healing for this patient was the large amount of slough, which was addressed through regular cleansing and autolytic debridement, with the aim of restoring

## Case 4: Neuropathic diabetic foot ulcer



Figure 6a: Review 2 (+14 days).



Figure 6b: Review 4 (+30 days).

moisture balance, as indicated by the T.I.M.E. CDST. Instructions were also given to the patient to keep the dressing dry when showering.

### Decide appropriate treatment

Below includes discussion of the wound assessments conducted using the T.I.M.E. CDST over the review period:

**T** – Non-viable tissue was a main concern throughout the review period. At initial assessment, the wound comprised of 10% granulation tissue and 90% tendon, which was identified following debridement. By second review, 100% slough was identified with macerated wound edges [Figure 6a]. As per the T.I.M.E. CDST, the wound was regularly cleansed with saline and autolytic debridement carried out using a hydrogel sheet dressing. By final review, the wound bed comprised of 80% slough and 20% granulation tissue.

**I** – Infection was suspected at final review due to signs of erythema, pain (8 out of 10 on the VAS), swelling and warmth. A cadexomer iodine paste dressing was applied to the wound surface to manage bioburden and aid autolytic debridement. As per the T.I.M.E. CDST, referral was also made to the GP to prescribe antibiotics to treat the infection.

**M** – Moisture imbalance was another concern, with low levels of purulent/serous exudate recorded. Dry slough was also noted at second review. As per the T.I.M.E. CDST, a hydrogel sheet dressing was selected for use to restore moisture balance.

**E** – The wound had raised, rolled and macerated edges and stayed the same in size, measuring 20 mm (length) x 20 mm (width) x 5 mm (depth) at final review [Figure 6b]. However, the macerated periwound skin appeared to improve with the management of exudate and use of skin barrier products.

### Evaluate

For this patient, non-viable tissue, moisture imbalance, infection and non-advancing edges were all areas of concern. Using the T.I.M.E. CDST assisted the non-specialist with decision-making and directing referrals to the MDT. The non-specialist was also in a position to be able to align the support tool with the workplace toolbox (products available) and consumables on procurement.

## Case 5: Venous leg ulcer

Assess patient, wellbeing and wound

This was an 88-year-old female who presented

with a sloughy venous leg ulcer on the back of her right lower leg [Figure 7a]. The wound had been present for 8 months and at presentation measured 64 mm (length) x 24 mm (width) x 2 mm (depth). It had previously been managed with 3-layer compression therapy; however, the patient would often interfere with the bandaging.

**Bring in the multidisciplinary team throughout care**  
Referral was made to a GP at second review due to signs of localised infection. However, a week later, infection was no longer suspected.

### Control or treat underlying causes and barriers to wound healing

A 3-layer compression bandage system was initiated again at first assessment to treat the underlying venous disease and the patient was given advice to keep the bandaging dry and intact.

### Decide appropriate treatment

Below includes discussion of the wound assessments conducted using the T.I.M.E. CDST over the review period:

**T** – At initial assessment, the wound comprised 50% slough and 50% granulation tissue. As per the T.I.M.E. CDST, the wound was regularly cleansed with saline, and a cadexomer iodine paste dressing applied as a deslougher, followed by application of a superabsorbent dressing. By final review, the wound bed comprised 80% granulation tissue and 20% slough.

**I** – Infection was suspected at second review, due to erythema, heat and a significant increase in sloughy tissue. As indicated by the T.I.M.E. CDST, the cadexomer iodine dressing was appropriate for the management of bioburden. Signs of infection had resolved a week later and infection was no longer suspected.

**M** – At second review, wound moisture levels associated with the suspected infection and oedema were high. Exudate levels then reduced to moderate. A superabsorbent dressing was used and changed every 3 days along with compression bandaging.

**E** – The edges were advancing throughout the review period. By final review, the wound had reduced in size and measured 42 mm (length) x 10 mm (width) x 1 mm (depth) with epithelial tissue at the edges [Figure 7b]. Moisturiser was regularly applied to the periwound skin.

### Evaluate

This wound was at risk of becoming infected. Following the T.I.M.E. CDST guided decision-

## Case 5: Pressure ulcer



Figure 7a: Initial assessment.



Figure 7b: Review 4 (+35 days).

making and appropriate product selection. By final review the composition of the wound bed had improved, and the wound had reduced in size.

## Discussion

In this case series, the most useful part of the tool for the non-specialists was the 'A (Assess), B (Bring), C (Control) and E (Evaluate)' approach, which ensured all patients received the same structured approach prior to treatment selection. The non-specialists reported that the T.I.M.E. CDST could be most helpful for the management of wounds that have the potential to heal, but that its use could be limited when treating wounds with little or no healing potential. For instance, in case 5 the patient's wound was considered to have limited healing potential by the non-specialist due to the client's comorbidities of chronic renal failure, severe tricuspid regurgitation, severe left and right atrial dilation, past cerebral vascular accident, severe pulmonary hypertension, atrial fibrillation, peripheral oedema, type 2 diabetes and congestive cardiac failure. Additionally, the client was noted to be non-concordant with care with regards to retention of dressings, due to reported itching. Therefore, the aim of care was to prevent infection and further deterioration of the wound.


For any strategy to be effectively implemented, education needs to be in place to support uptake by all healthcare professionals and support staff. In the case of the T.I.M.E. CDST, all should be familiar with the relevance and importance of the initial ABCD and E approach, as well as each element of wound bed preparation (i.e. T, I, M, and E). Additionally, resources to engage the patient in their wound care can be helpful.

The T.I.M.E. CDST is a tool that can be used and adapted to fit with local protocols and has been shown here to help support the non-specialist in clinical decision-making, provided they are competent to use it. The cases discussed in this article also highlight the importance of the MDT. Dressings available at Silver Chain were informally inputted into the generic T.I.M.E. CDST to help guide appropriate treatment and dressing selection. Following this case series, the non-specialists involved felt that the T.I.M.E. CDST had the potential to support wound bed preparation and dressing selection and should be adopted into their own care system.

## Declaration

This case series has been supported by Smith & Nephew.

## Conclusion

For the non-specialists who used the T.I.M.E. CDST in this case series, it provided consistent guidance on appropriate treatment and was particularly valuable in aiding communication between the non-specialists and members of the MDT. Tools, such as the T.I.M.E. CDST, can be used as part of a systematic and structured approach to wound management to promote consistent holistic wound management and eliminate variation in practice. 

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