Using the new T.I.M.E. Clinical Decision Support Tool to promote consistent holistic wound management and eliminate variation in practice at the Cambourne Medical Clinic, Australia: Part 1

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This is the first in a series of articles 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 (Schultz et al, 2003). A team of non-wound care specialist staff in Victoria, 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.

Wound care is an ever-growing concern for healthcare systems across the world. In Australia alone, treatment of chronic wounds costs at least US$2.85bn per year (Norman et al, 2016). This is, in part, due to a growing older population, which is associated with an increase in the prevalence of wounds. This places a huge demand on wound care services to provide evidence-based care. In Australia, high initial treatment costs, poor financial incentives to invest in optimal care and limitations in clinical skills are barriers for evidence-based wound care (Norman et al, 2016). Delays in wound healing can lead to a failure to recognise deterioration and/or seek timely advice, increasing the likelihood of poor treatment choices (Dowsett and Hall, 2019). Tools that provide a structured approach to wound care and treatment options can help improve wound healing outcomes. In particular, tools that assist accurate and comprehensive wound assessment, and incorporate evidence-based wound management 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. framework

The original T.I.M.E. concept was developed by Schultz et al (2003) and provided a structured approach to wound bed preparation that addressed the following elements: **T**issue, **I**nfection and/or inflammation, **M**oisture balance and **E**dge of the wound.

It was anticipated that the framework would be a structured approach for clinicians to identify barriers to wound healing and to eliminate these through the application of appropriate techniques (Schultz et al, 2003). There are a number of assessment tools available for wound bed preparation, many of which draw on the original concept of T.I.M.E. (i.e. Triangle of Wound Assessment [Dowsett et al, 2015], TIMES [Wounds UK, 2016] and TIMERS [Wounds UK, 2018; Atkin et al, 2019]). Since its introduction, T.I.M.E. has been shown to enhance the knowledge of clinicians when used as part of a structured educational programme (Dowsett, 2009).

However, a survey conducted at the European Wound Management Association (EWMA) 2018 conference with 196 respondents, showed that, although T.I.M.E. is universally the most widely used wound assessment tool, 40% of respondents do not use any formal framework to guide wound bed preparation in practice (Ousey et al, 2018). This finding is supported by the recent Burden of Wounds study, which displayed inconsistencies in wound care practice in the UK (Guest et al, 2015). Suboptimal assessment of wounds contribute to a delay in healing and misused resources, while exposing patients to unnecessary risk (Johnson, 2015).

T.I.M.E. Clinical Decision Support Tool

In order to provide a more user-friendly version of T.I.M.E., the T.I.M.E. Clinical Decision Support Tool (CDST) has been developed with input from an international group of experts to enable more widespread use, with the aim of being the most robust tool available. A non-product

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Declaration
This case series has been supported by Smith & Nephew.

specific version of the tool *[Figure 1]*, as well as a Smith & Nephew product-specific version *[Figure 2]* are available.

The T.I.M.E. tool offers many benefits, such as reducing the burden of chronic wounds, addressing deficits in care and improving outcomes for patients.

The creation of the T.I.M.E. CDST was prompted by:

- Developments in our understanding of biofilms and evolution of advanced technologies and interventions (Leaper et al, 2012)
- The need to manage and protect the surrounding skin, addressed in the adaptation of the TIMES tool (Wounds UK, 2016)
- The increased awareness of the importance of patient involvement and self-management (Wounds International, 2016)
- The need for holistic wound assessment and involving the multidisciplinary team (Wounds UK, 2018).

Holistic wound care and the involvement of a multidisciplinary team 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 - A**ssessment of the patient, wellbeing and wound
- **B - B**ringing in a multidisciplinary team
- **C - C**ontrolling and treating the underlying causes and barriers to wound healing
- **D - D**eciding on the most appropriate wound treatment to implement and the desired wound management outcome
- **E - E**valuation 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, one in Denmark and two in Australia. At each centre, the T.I.M.E. CDST was used by non-wound care specialist clinicians 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 1 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 of the Cambourne Medical Clinic based in Victoria, Australia.

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

The lead nurse specialist invited practice and community nurses to take part in a study using the T.I.M.E. CDST to investigate how it would help to complete holistic wound assessment and guide treatment for non-specialists in wound care.

An expression of interest was posted on social media with information regarding the study, (i.e. when and where the first meeting would take place, a brief outline of the purpose of the study and benefits of participation). Six nurses expressed interest.

Two practice nurses agreed to carry out five clinical assessments. They were both given a 'wound book' that provided information on basic wound management and dressings. They were also given a folder with the required printed handouts that included: a weekly T.I.M.E. CDST form to complete, a poster of the T.I.M.E. CDST, nurse reflection and perception forms and patient consent forms. They were also provided with instructions on documenting assessment, photographing wounds and gaining patient consent and consent for publication from GPs and practice managers.

The two practice nurses were already familiar with the concept of T.I.M.E. and felt comfortable with completing the weekly wound assessments as they had experience in wound management. The lead nurse specialist contacted both practice nurses a week later in order to review documentation and provide any additional guidance and support.

The Wound Assessment Tool (WAT) currently used by these clinicians provides similar information to the T.I.M.E. CDST, but is often reported to be too complicated. It was hoped that the T.I.M.E. CDST would help simplify the core assessment and documentation requirements and facilitate better care.

The five cases are presented below, cases 1 and 2 are described in detail and cases 3, 4 and 5 are summarised in *Tables 1–3*. All the cases describe how the T.I.M.E. CDST was used in the real world, alongside local clinical pathways.

Case 1: Buruli ulcer (or Bairnsdale ulcer)

***A**ssess patient, wellbeing and wound*

A 51-year-old male presented with a wound of 6 weeks' duration just above the medial aspect

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

Assess patient, wellbeing and wound

Establish diagnosis and baseline characteristics for appropriate support and comorbidities that may impact healing. Record wound type, location, size, wound bed condition, signs of infection / inflammation, pain location and intensity, comorbidities, adherence / concordance to treatment

Bring in multi-disciplinary team and informal carers to promote holistic patient care

Record referral to others such as surgical team, wound specialist nurse, dietician, pain team, vascular and diabetes team, podiatrist, physiotherapist, family carers and trained counsellor

Control or treat underlying causes and barriers to wound healing

Record management plan for: systemic infection, diabetes, nutritional problems, oedema, continence, mobility, vascular issues, pain, stress, anxiety, non-adherence / concordance with offloading and compression, lifestyle choices

Decide appropriate treatment

T — Tissue non-viable[1-2]

I — Infection and / or Inflammation[1-2]

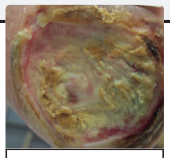
M — Moisture imbalance[1-2]

E — Edge of wound non-advancing[1-2]

T

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Necrotic



Slough

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Cleansing and debridement
- Surfactant
- Sharp / surgical or mechanical
- Autolytic or enzymatic
- Biological / larval

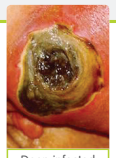
3. WOUND MANAGEMENT OUTCOME

- Viable healthy wound bed

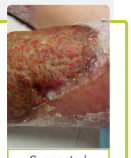
I

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Infected



Deep infected cavity wound



Suspected biofilm

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Manage bioburden
- Antimicrobial* (topical antiseptic, and / or antibiotic therapy)

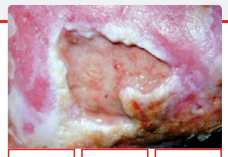
3. WOUND MANAGEMENT OUTCOME

- Non-inflamed, non-infected wound

M

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Dry



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2. SELECT PRIMARY & SECONDARY INTERVENTIONS

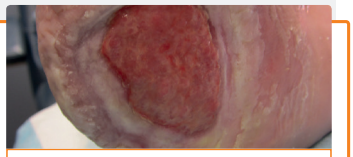
- Restore moisture balance
- Hydrogel*, Hydrocolloid
- Foam, Super absorbent, Gelling Fibre, NPWT†
  - Hydrocolloid, Alginate
  - Alginate

3. WOUND MANAGEMENT OUTCOME

- Optimal moisture balance

E

1. IDENTIFY THE BARRIERS TO WOUND HEALING



Non-advancing or abnormal wound edge

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Promote epithelialisation and healthy periwound skin
- NPWT, Atraumatic wound contact layer, Growth factors, Cell or Tissue products and Skin Care

3. WOUND MANAGEMENT OUTCOME

- Advancing edge of wound

*Use appropriate secondary dressing as per your local protocol.

Evaluate and reassess the treatment and wound management outcomes

Evaluate: Record wound progression within given timelines. **Flag** if no change, go back to A, B, C and change treatment where indicated

Developed with the support of Glenn Smith[3]

*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

Supported by an unrestricted grant from Smith and Nephew 13714 | GMC0577

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

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

Use MolecuLight *i:X*™ wound assessment tool to measure wound surface area and evaluate bioburden level

Assess patient, wellbeing and wound

Establish diagnosis and baseline characteristics for appropriate support and comorbidities that may impact healing. Record wound type, location, size, wound bed condition, signs of infection / inflammation, pain location and intensity, comorbidities, adherence / concordance to treatment

Bring in multi-disciplinary team and informal carers to promote holistic patient care

Record referral to others such as surgical team, wound specialist nurse, dietician, pain team, vascular and diabetes team, podiatrist, physiotherapist, family carers and trained counsellor

Control or treat underlying causes and barriers to wound healing

Record management plan for: systemic infection, diabetes, nutritional problems, oedema, continence, mobility, vascular issues, pain, stress, anxiety, non-adherence / concordance with offloading and compression, lifestyle choices

Decide appropriate treatment

T — Tissue non-viable[1-2]

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Necrotic | Slough

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Debridement
- Hydrogel* | Deslougher*
- INTRASITE® GEL or INTRASITE CONFORMABLE | IODOFLEX® or IODOSORB® Range

3. WOUND MANAGEMENT OUTCOME

Viable healthy wound bed

I — Infection and / or Inflammation[1-2]

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Infected | Deep infected cavity wound | Suspected biofilm

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Manage bioburden
- Antimicrobial*
- ACTICOAT® Range | DURAFIBER® Ag | IODOFLEX or IODOSORB Range

3. WOUND MANAGEMENT OUTCOME

Non-inflamed, non-infected wound

M — Moisture imbalance[1-2]

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Dry | ♦|♦♦ | ♦♦♦

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Restore moisture balance
- Hydrogel* | Foam , Gelling fibre or NPWT†
- INTRASITE GEL or INTRASITE CONFORMABLE | ALLEVYN® GENTLE BORDER, ALLEVYN GENTLE, DURAFIBER or PICO®‡ | ALLEVYN LIFE, ALLEVYN LIFE Non-Bordered, DURAFIBER or RENASYS®

3. WOUND MANAGEMENT OUTCOME

Optimal moisture balance

E — Edge of wound non-advancing[1-2]

1. IDENTIFY THE BARRIERS TO WOUND HEALING

Non-advancing or abnormal wound edge

2. SELECT PRIMARY & SECONDARY INTERVENTIONS

- Promote epithelialisation and healthy periwound skin
- NPWT and Skin Care
- PICO or RENASYS SECURA® / PROSHIELD® Range§

3. WOUND MANAGEMENT OUTCOME

Advancing edge of wound

*Use appropriate secondary dressing as per your local protocol

Evaluate and reassess the treatment and wound management outcomes

Evaluate: Record wound progression within given timelines. Flag if no change, go back to A, B, C and change treatment where indicated

Developed with the support of Glenn Smith[3] and Moore *et al.* 2019[4]

†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):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. **4.** Moore Z, Dowsett C, Smith G, *et al.* TIME CDST: an updated tool to address the current challenges in wound care. *Journal of Wound Care*, vol 28, no 3, March 2019: 154-161.

The products used in the T.I.M.E. clinical decision support tool may vary in different markets. Not all products referred to may be approved for use or available in all markets. Please consult your local Smith & Nephew representative for further details on products available in your market. Intended for healthcare professionals outside of the US only.

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

Box 1. Buruli ulcer (Yotsu et al, 2018).

Chronic, debilitating and necrotising disease of both the skin and soft tissue, caused by *Mycobacterium ulcerans*. It is recognised as the third most common mycobacterial infection in the world.

The ulcer begins with a papule, nodule, plaque or oedematous lesion, which then progresses into an extensive ulceration of the skin. If detected early, the ulcer will heal using a combination of antibiotics (daily rifampicin is recommended). If diagnosed too late, permanent disfiguration and disability is expected.

A smaller number of countries, such as Australia, are reporting more cases of this disease at a rapid rate. Reasons for this epidemiology remain unknown (O'Brien et al, 2019).

of his right knee, following an abscess thought to be caused by an ingrowing hair. The patient had a history of a pulmonary embolism and deep vein thrombosis. He was able to conduct daily activities, and no pain medication was required. The wound had been previously treated by the patient's GP using povidone-iodine and a film dressing.

B*ring in the multidisciplinary team throughout care*

The wound was diagnosed as a buruli ulcer at review 2, and the patient was referred *[Box 1]* to a specialist dermatologist. Throughout treatment, the pathology lab and wound infection specialist were consulted.

C*ontrol or treat underlying causes and barriers to wound healing*

At review 1, rifampicin 600 mg was prescribed by the GP, once daily for 8 weeks, to address the infection caused by *Mycobacterium ulcerans*.

D*ecide appropriate treatment*

Wound assessments conducted using the T.I.M.E. CDST tool are described below:

Initial assessment

The wound measured 0.5 cm (length) x 0.5 cm (width), with the wound bed consisting of non-viable **T**issue *[Figure 3a]* and non-advancing, rolled wound **E**dges. At this stage, the wound showed no visual signs of **I**nfection or offensive discharge. There was a low level of **M**oisture imbalance.

Tissue non-viable

1. Identify barriers to healing

The wound comprised 90% sloughy tissue.

2. Select primary & secondary interventions

As non-viable tissue was present and in order to promote a viable healthy wound bed, the wound was cleansed and debrided as indicated by the T.I.M.E. CDST. The wound was cleansed with saline and soaked for 10 minutes with a surfactant wound irrigation solution containing Betaine and polyhexamethylene biguanide (PHMB). Conservative sharp wound debridement (CSWD) was also attempted to remove the large quantity of slough.

Moisture imbalance

1. Identify barriers to healing

A low exudate level was present.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST in order to restore optimum moisture balance, a hydrogel was selected and covered with a light bordered foam dressing. The edges of this secondary dressing were fixed with a wide-area adhesive tape, suitable for use on highly contoured areas of the body.

Edge of wound non-advancing

1. Identify barriers to healing

Non-advancing of the wound edges.

2. Select primary & secondary interventions

At each review, the wound edge was cleansed to promote healthy periwound skin.

Review 1 (+7 days after initial assessment)

The wound had improved, with surrounding skin erythema reduced. It had increased slightly in size, now measuring 0.7cm (length) x 0.6 cm (width) *[Figure 3b]*. At review, all factors of the T.I.M.E. paradigm — non-viable **T**issue, **I**nfection and/or inflammation, **M**oisture imbalance and non-advancing of the wound **E**dge — were barriers to healing.

Tissue non-viable

1. Identify barriers to healing

The wound comprised 90% sloughy tissue and 10% granulation tissue.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST, in order to promote a viable healthy wound bed, the wound required cleansing and debridement. The wound was soaked for 10 minutes with a surfactant wound irrigation solution and cleansed with saline. The patient could not tolerate the pain associated with CSWD, so an enzymatic debriding ointment was selected with the purpose of reducing excess exudate and slough.

Infection and/or inflammation

1. Identify barriers to healing

Clinical signs of infection were present — erythema, pain and swelling.

2. Manage bioburden

The aim was to manage the bioburden. A member of the multidisciplinary team consulted the pathology lab to gain further understanding of the bacteria identified in the positive swab result. Antibiotic therapy was indicated, and rifampicin 600 mg commenced.

Moisture imbalance

1. Identify barriers to healing

Even though infection was present, wound exudate level was low.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST in order to restore optimum moisture balance a hydrogel

Case 1: Buruli ulcer.

Figure 3a: Initial assessment.

Figure 3b: Review 1.

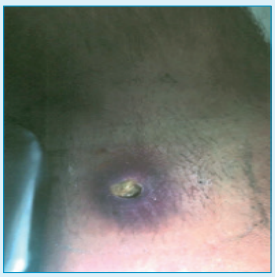

Figure 3c: Review 2.

Figure 3d: Review 3.

Figure 3e: Final review.

was selected with a secondary absorbent perforated dressing applied to maintain moisture levels.

Edge of wound non-advancing

1. Identify barriers to healing

Edges of the wound were rolled, with slight undermining and tissue edges pink and perfused.

2. Select primary & secondary interventions

To promote epithelialisation and healthy periwound skin, the skin was cleansed with a wound gel containing hydrogel and octenidine.

Review 2 (+14 days) and Review 3 (+21 days)

At reviews 2 and 3, wound healing had stalled. The wound had increased in size slightly (0.1 cm [length] and 0.3 cm [width]) and there was a moderate level of yellow, fibrous slough [*Figures 3c & 3d*]. The diagnosis of a buruli ulcer was confirmed through a positive swab result and consultation with a dermatologist was arranged.

Based on the results of the wound assessment using the T.I.M.E. CDST, non-viable **T**issue, **I**nfection and/or inflammation, **M**oisture imbalance and non-advancing of the wound **E**dge were all significant areas of concern.

Tissue non-viable

1. Identify barriers to healing

The wound comprised 90/80% sloughy tissue and 10/20% granulation tissue.

2. Select primary & secondary interventions

As specified by the T.I.M.E. CDST in order to promote a viable healthy wound bed, the wound was cleansed with saline and soaked for 10 minutes with a surfactant wound irrigation solution at both reviews.

Infection and/or inflammation

1. Identify barriers to healing

Confirmed buruli ulcer.

2. Manage bioburden

The patient was assessed/reviewed by the specialist dermatologist. An alginate gel dressing for moderate-to-heavily exuding wounds was proposed as a more suitable dressing for use. Antibiotics were continued. At this stage, surgical intervention was a possibility.

Moisture imbalance

1. Identify barriers to healing

Exudate level was now moderate.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST, in order to restore optimum moisture balance an alginate dressing was selected with an absorbent perforated secondary dressing.

Edge of wound non-advancing

1. Identify barriers to healing

There was undermining of the wound edges. A large cavity was present with an estimated depth of less than 2 cm.

2. Select primary & secondary interventions

To promote epithelialisation and healthy periwound skin, skin prep continued using a wound gel containing hydrogel and octenidine, as suggested by the T.I.M.E. CDST.

Evaluate the treatment

By the end of the review period (+28 days), the patient was under the care of the dermatology specialist [*Figure 3e*]. For this atypical and complex wound, the T.I.M.E. CDST tool provided a helpful framework to support and direct wound management.

Case 2: Skin tear

A*ssess patient, wellbeing and wound*

A 79-year-old female sustained a skin tear on her left forearm after knocking it on a piece of furniture. The wound had been present for 4 weeks and measured 3.5 cm (length) x 2.2 cm (width) [*Figure 4a*]. Wound closure strips were initially applied to the skin tear to re-align the skin; however, this failed to take. CSWD was performed by the practice nurse to remove the non-viable tissue [*Figure 4b*] and a soft silicone foam dressing and elasticated tubular bandage applied. The patient had previous history of angiodysplasia and angioedema, and was prescribed amlodipine and a low dose of aspirin to treat high blood pressure and prevent blood clotting. At this stage, neither quality of life nor ability to conduct daily activities were affected; however, the patient found the wound very painful, particularly at dressing removal.

B*ring in multidisciplinary team throughout care*

By review 3, signs of infection were positively identified, i.e. an increase in purulent discharge and pain. Pain was so severe that the patient's ability to conduct activities of daily living were affected, particularly when showering and washing her hair. At this stage, discussions were carried out between the practice nurse and the GP to prescribe antibiotics and initiate compression therapy.

C*ontrol or treat underlying causes and barriers to wound healing*

When infection was suspected at review 3, the patient was prescribed cephalexin 500mg (four times/day) by the GP and advice was given by the practice nurse on how the patient should protect

Case 2: Skin tear.

Figure 4a & 4b: Initial assessment (Pre-debridement and post debridement).

Figure 4c: Review 1.

Figure 4d: Review 3.

Figure 4e: Final review.

their skin, e.g. clothing, moisturising, good nutrition and hydration. Additional instructions were to keep the wound dry, to rest, to elevate the limb and to report any increased levels of pain.

D*ecide appropriate treatment*

Wound assessments conducted using the T.I.M.E. CDST tool are described below:

Initial assessment

The T.I.M.E. CDST was used to assess the wound and decide appropriate treatment; there were concerns with **M**oisture imbalance and non-advancing of the wound **E**dge. The wound bed was viable and healthy, and no **I**nfection was identified; however, the clinician noted hypergranulation tissue on the wound bed, which may be a potential sign of infection.

Moisture imbalance

1. Identify barriers to healing

The wound exudate level was high and had been leaking through the dressing.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST, in order to restore optimum moisture balance, a bordered foam dressing was selected for use and held in place by two elasticated tubular bandages for added pressure.

Edge of wound non-advancing

1. Identify barriers to healing

Non-advancing of the wound edges, due to hypergranulation.

2. Select primary & secondary interventions

Healthy periwound skin was promoted through regular cleansing of the wound edge at each review to stimulate wound closure.

Review 1 (+8 days from initial assessment)

Evaluating progress over the past 8 days, the wound was beginning to improve. **E**dges of the wound were drawing in with no rolling, dryness or maceration and there had been no strikethrough on the dressing suggesting **M**oisture imbalance was improving. The wound measured 4.6 cm (length) x 1.7 cm (width) [*Figure 4c*]. There was some non-viable **T**issue, but islands of epithelisation had developed. There were no signs of **I**nfection. The key barriers to healing were non-viable **T**issue and a slight **M**oisture imbalance.

Tissue non-viable

1. Identify barriers to healing

The wound comprised 90% granulation tissue (with some hypergranulation) and 10% slough.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST in order to promote a viable healthy wound bed, the wound required cleansing and debridement. At this stage the patient was in too much pain for CSWD to be performed, so the wound was cleansed with a saline rinse and soaked with a wound irrigation solution containing Betaine and PHMB.

Moisture imbalance

1. Identify barriers to healing

The wound exudate level was low.

2. Select primary & secondary interventions

The T.I.M.E. CDST indicated that a soft silicone foam dressing should be applied to the wound, allowing comfort and ease of use for the patient during wear time, while restoring moisture balance. Two layers of tubular foam bandage were again applied as a secondary dressing.

Review 2 (+16 days from initial assessment)

Eight days later, the wound had successfully improved, with the wound **E**dges continuing to draw together. The main wound had reduced slightly in size from the previous recording to 4.5 cm (length) x 1.6 cm (width), and the wound bed comprised 95% granulation tissue with some hypergranulation and 5% slough. Epithelised tissue was also developing. There

were no clinical signs of **I**nfection. Non-viable **T**issue and **M**oisture imbalance continued to be the two main barriers to healing.

Tissue non-viable

1. Identify barriers to healing

The wound comprised 95% granulation tissue (with some hypergranulation).

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST in order to promote a viable healthy wound bed, the wound required cleansing and debridement. The patient was still in too much pain for CSWD to be performed, so the wound was cleansed with a saline rinse and soaked with a wound irrigation solution containing Betaine and PHMB.

Moisture imbalance

1. Identify barriers to healing

The wound exudate level was low.

2. Select primary & secondary interventions

A soft foam dressing was applied as indicated by the T.I.M.E. CDST, and two layers of tubular foam bandage, to restore moisture balance and promote wound healing, while providing comfort to the patient during wear time.

Review 3 (+25 days from initial assessment)

At review 3, the wound had reduced in size with advancing wound **E**dges, the wound bridged and the medial wound now fully epithelialised. The main wound now measured 2.2 cm (length) x 1.7 cm (width), and the wound bed consisted of granulation and some evidence of hypergranulation **T**issue. Signs of **I**nfection had now developed e.g. increase in purulent exudate and pain, plus increased moderate **M**oisture imbalance [*Figure 4d*]. Although the cause of infection was unknown, risk factors were present as identified by the practice nurse.

Tissue non-viable

1. Identify barriers to healing

The wound comprised of 95% granulation and 5% hypergranulation tissue.

2. Select primary & secondary interventions

As indicated by the T.I.M.E. CDST in order to promote a viable healthy wound bed, the wound was cleansed: soaked for 10 minutes with a surfactant wound irrigation solution and cleansed with saline. CSWD could not be performed due to increased pain.

Infection and/or inflammation

1. Identify barriers to healing

The clinical signs of infection were present, i.e. increased levels of purulent exudate and pain.

2. Manage bioburden

No referral was necessary. Antibiotics were commenced as indicated by the T.I.M.E. CDST in order to manage bioburden.

Moisture imbalance

1. Identify barriers to healing

The wound exudate level was moderate.

2. Select primary & secondary interventions

As recommended by the T.I.M.E. CDST, an absorbent perforated dressing was selected for use instead of a foam dressing to absorb the increase in purulent exudate. Local policy indicates antibiotics shoud be prescribed by a GP, rather than an antimicrobial. Planned dressing changes were increased from twice a week to three times a week to manage increased exudate and to restore moisture balance. Two elasticated tubular bandages were used to secure the dressing in place.

Review 4: +31 days

By the end of the review period, the wound had improved, with the wound **E**dges now advancing. The wound measured 1.9 cm (length) x 1.6 cm (width), with the wound bed **T**issue consisting of healthy granulation tissue and some hypergranulation [*Figure 4e*]. **I**nfection had resolved, and **M**oisture imbalance was improved.

Moisture imbalance

1. Identify barriers to healing

The wound exudate level was low.

2. Select primary & secondary interventions

The fragile wound was cleansed and soaked with a wound irrigation solution. In line with the T.I.M.E. CDST, an absorbent perforated dressing was selected for use and secured with two elasticated tubular bandages to restore moisture imbalance.

Evaluate the treatment

At the end of the review period, the wound had improved and was on a healing trajectory. Hypergranulation tissue had been a concern, and the wound had been at risk of infection; however, the T.I.M.E. CDST and the wound management regimen had supported the clinician to optimise wound care delivery.

Discussion

In the cases described here, the T.I.M.E. CDST was a useful, supportive and helpful guide during wound assessment. The non-wound specialist nurses who used the tool reported that it had

Table 1. Case 3: Venous leg ulcer.

Assess patient, wellbeing and wound: 80-year-old female with a venous leg ulcer as a result of sideroderma, which caused the patient to scratch her itchy legs and develop an infection.

Bring in the multidisciplinary team: GP and practice nurse brought in to discuss appropriate treatment.

Control or treat underlying causes and barriers to wound healing: Compression therapy was commenced at review 3. The patient had previously declined compression therapy until they could see that the wound was progressing. Once the patient agreed to compression therapy, education appropriate to their understanding was provided. The initial barrier to wound healing was the patients intolerance to compression therapy.

Figure 5: Initial assessment.

Decide appropriate treatment:

Wound assessments conducted using the T.I.M.E. CDST tool are described below:

T - Initial assessment presented a wound of 70% slough and 30% granulation tissue *[Figure 5]*, with levels of sloughy tissue and pain increasing slightly by day 7; therefore, infection was suspected. By the end of the review period (+25 days), the wound presented with 60% healthy granulation tissue and 40% slough. Although the wound had improved, the recent hot weather had caused irritation to the surrounding skin, resulting in increased scratching.

Throughout treatment, as indicated by the T.I.M.E. CDST, cleansing and debridement were required in order to promote a viable healthy wound bed. This was achieved by soaking the wound with a wound irrigation solution and cleansing with a saline rinse at each review.

I - By day 7, infection was suspected due to increased pain and redness. As supported by the T.I.M.E. CDST and in line with local policy, antibiotic therapy was initiated to treat the bacterial infection. By the final review, infection was resolved.

M - A low exudate level was recorded at initial assessment, however, at second review this had increased to moderate, with an offensive odour and yellow colour, suggesting infection was present. An alginate gel dressing and absorbent perforated dressing were applied with the aim of promoting a viable healthy wound bed, while achieving optimal moisture balance. Levels of exudate decreased from week 2 onwards, and the patient began to use compression therapy at week 3 — the patient had gained confidence in the progression of treatment and felt able to tolerate compression. A foam dressing was used as part of the management regimen to restore moisture balance as per the T.I.M.E. CDST.

E - Throughout this review period, the wound edges were described as advancing.

EVALUATE — After 25 days of treatment, this wound was on a healing trajectory and was now a superficial wound with granulation tissue visible.

Table 2. Case 4: Skin tear.

Assess patient, wellbeing and wound: A 76-year-old male developed a skin tear to his right lower leg, which was caused from repeated scratching. There were also signs of cellulitis present.

Bring in the multidisciplinary team: GP and practice nurse brought in to discuss appropriate treatment.

Control or treat underlying causes and barriers to wound healing: Antibiotics had been previously prescribed to address cellulitis and advice was shared with the patient on skin tear prevention (i.e. appropriate clothing, moisturiser, awareness of surroundings and good nutrition and hydration).

Figure 6: Initial assessment.

Decide appropriate treatment:

Wound assessments conducted using the T.I.M.E. CDST tool are described below:

T - At initial assessment, the aim was to remove the small amount of slough visible *[Figure 6]*. As a result of the considerably low levels of dead/damaged tissue, no debridement was required. As indicated by the T.I.M.E. CDST throughout treatment to promote a healthy wound bed, the wound was regularly cleansed using saline and soaked with a wound irrigation solution containing Betaine and PHMB. By week 2, a healthy viable wound bed had been achieved.

I - By week 2, cellulitis had resolved due to antibiotics prescribed.

M - A moderate exudate level was identified at initial assessment. A light bordered foam dressing was selected for use, along with a secondary absorbent foam dressing, suitable for moderately exuding wounds. The level of exudate had decreased by week 1. An advanced layered foam dressing was applied as recommended by the T.I.M.E. CDST to restore moisture balance, secured into place with one layer of light weight tubular bandage and an elasticated multi-purpose bandage to offer further support.

E - At initial assessment, the clinician noted that the wound edges were advancing. By week 2, it was noted that the edges had drawn in further and as a result the wound had decreased in size.

EVALUATE - After week 2, the wound had fully healed, suggesting that the care plan had been successful in treating the underlying causes and barriers to wound healing in a timely manner.

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Table 3. Case 5: Venous leg ulcer.

Assess patient, wellbeing and wound: An 83-year-old female with a venous leg ulcer to her right lower leg after sustaining a trauma over a year ago *[Figure 7]*, which caused the leg to fracture.

Bring in the multidisciplinary team: District nurse referral to help with dressings and compression. The patient has a monthly follow-up appointment at the wound healing clinic. GP advised on infection.

Control or treat underlying causes and barriers to wound healing: Compression therapy was initiated to address underlying venous disease.

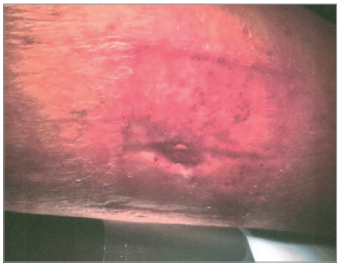

Figure 7: Review 1.

Decide appropriate treatment:

Wound assessments conducted using the T.I.M.E. CDST tool are described below:

T - Throughout the review period of 28 days, the wound consisted of approximately 10–20% slough and 80–90% granulation tissue, until a healthy viable wound bed was achieved at the final review. As indicated by the T.I.M.E. CDST, gentle debridement was required at initial assessment and at review 3 (+21 days) to remove the small amount of fibrous slough present. At each review, the wound was cleansed with saline and soaked with a wound irrigation solution containing Betaine and PHMB, which was changed at final review to a wound gel containing hydrogel and octenidine, followed by application of a hydrogel dressing.

I - No clinical signs of infection were identified until the final week of assessment, where the clinician suspected the presence of biofilm. The surrounding periwound skin was red and warm to touch. The T.I.M.E. CDST indicated that antibiotic therapy should be considered to target the bacterial infection. Therefore, antibiotics were prescribed by the GP as directed by local policy.

M - At initial assessment, a low exudate level was noted, with a small amount of slough, removed from the wound edge with CSWD by the practice nurse. At final review, the amount of exudate had increased, with breakthrough on the dressing, as a result of an infection now present. An absorbent perforated dressing was selected for use as indicated by the T.I.M.E. CDST in order to maintain optimal moisture levels. This was held into place by an elasticated tubular bandage.

E - No issues with non-advancing of the wound edges were highlighted at initial assessment. Throughout care, the edges of the wound were repeatedly noted as drawing in and advancing, with no rolling or undermining present.

EVALUATE - By the end of the review period (+28 days), a healthy viable wound bed was achieved, and the wound edges were pink and perfused.

been "hugely" effective in enhancing their confidence in wound management decision-making, especially for atypical wound aetiologies. The two practice nurses found that the tool had enhanced their ability to determine infection in a wound and in carrying out more appropriate management of exudate.

The lead nurse specialist felt that the cases highlighted the need for more education in some aspects of wound management, such as further teaching on what constitutes as good granulation tissue and how to manage hypergranulation tissue. Overall, they felt using the T.I.M.E. CDST reduced the need to seek specialist assistance by supporting accurate assessment of the underlying causes and barriers to wound healing, whilst encouraging regular documentation of wound progression/deterioration.

Many factors need to be taken into consideration by clinicians when using the T.I.M.E. CDST, such as when and where it is most appropriate for use. It was noted that the management options offered by the tool were restricted by local policy and availability of recommended dressings. During this study, both practice nurses felt that more direction on named dressings would be helpful in the future. It was felt that it would be useful for future management to broaden the range of dressings available for selection, to enable more cost-effective options.

Conclusion

The T.I.M.E. CDST has been shown to provide a structured approach to wound management, and to help prompt consistent holistic assessment. It also prompted a critical review of local policies. Chronic wounds continue to be a global epidemic and a structured, evidence-based approach, which guides clinicians through methodical wound bed preparation and wound assessment, as well as appropriate dressing selection, will result in better wound healing. WINT