

Using the new T.I.M.E. Clinical Decision Support Tool to promote consistent holistic wound management and eliminate variation in practice: Part 2 at the Sygehus Sønderjylland Hospital, Sønderborg, Denmark

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This is the second 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 (Moore et al, 2019) in different countries. A team of non-wound care specialist staff in Denmark 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. With a population of 5.8mn in Denmark, it is predicted that there will be around 18,000 wounds treated annually in the local sector, that require over 3mn dressing changes in primary health care. Additionally, a survey carried out in a community care setting in Denmark showed that at least half of the patients involved had their wounds dressed three or more times a week, with daily dressing changes carried out for 23% of patients (Jørgensen et al, 2013).

The activity of healthcare professionals working in wound care in Denmark has subsequently increased by 40% since 2001, as shown in an analysis by the Danish Nurses Organization (Lindholm and Searle, 2016). This is due to an increase in the number of patients requiring wound management, combined with a decrease in the number of newly qualified nurses. Ultimately, 72 nurses are having to carry out the work of what would have been completed by 100 nurses (Lindholm and Searle, 2016). These findings reveal the challenges of providing care in Denmark, with over-stretched nursing resources and clinical time, creating the risk for inconsistencies in wound care practice to develop.

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

The recent Burden of Wounds study has displayed many inconsistencies in practice in the UK (Guest et al, 2015). Suboptimal assessment of wounds contributes to a delay in healing and misused resources, while exposing patients to unnecessary risk (Johnson, 2015).

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, 2016). The T.I.M.E. CDST has been developed with input from an international group of experts, to provide support to overloaded healthcare professionals making clinical decisions, while reducing variation in practice and helping to improve wound outcomes (Moore et al, 2019). A non-product-specific version of the tool [Figure 1], as well as a Smith & Nephew product-specific version [Figure 2] are available. Box 1 presents the stages which led to the development of the T.I.M.E. CDST (Swanson et al, 2019).

Holistic wound care and the involvement of a multidisciplinary team are 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 multidisciplinary team
- **C** - Controlling and treating the underlying causes and barriers to wound healing
- **D** - Deciding on the most appropriate wound treatment 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.

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Declaration

This case series has been supported by Smith & Nephew.

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

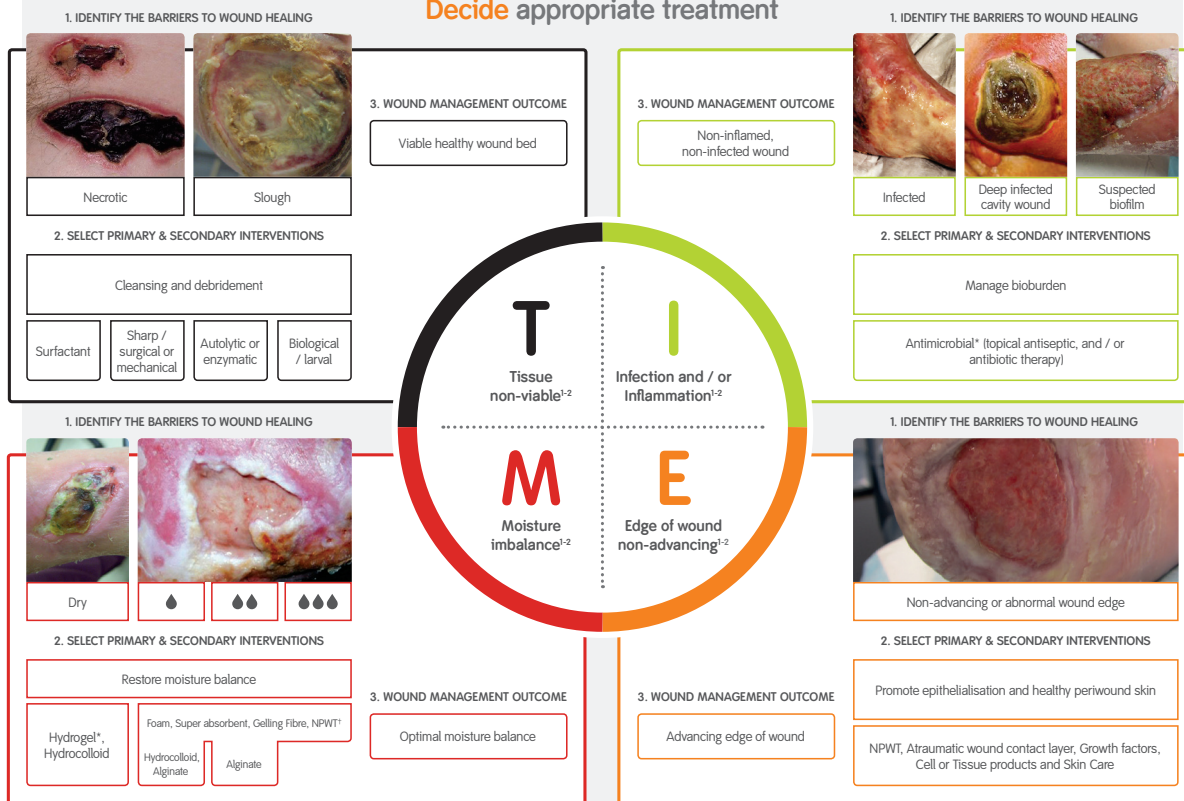
Bring in multi-disciplinary team and informal carers to promote holistic patient care

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



*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 Smith³

¹Use appropriate secondary dressing as per your local protocol. ²NPWT: Negative Pressure Wound Therapy. ³Level 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

Use MolecuLight iX™ 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

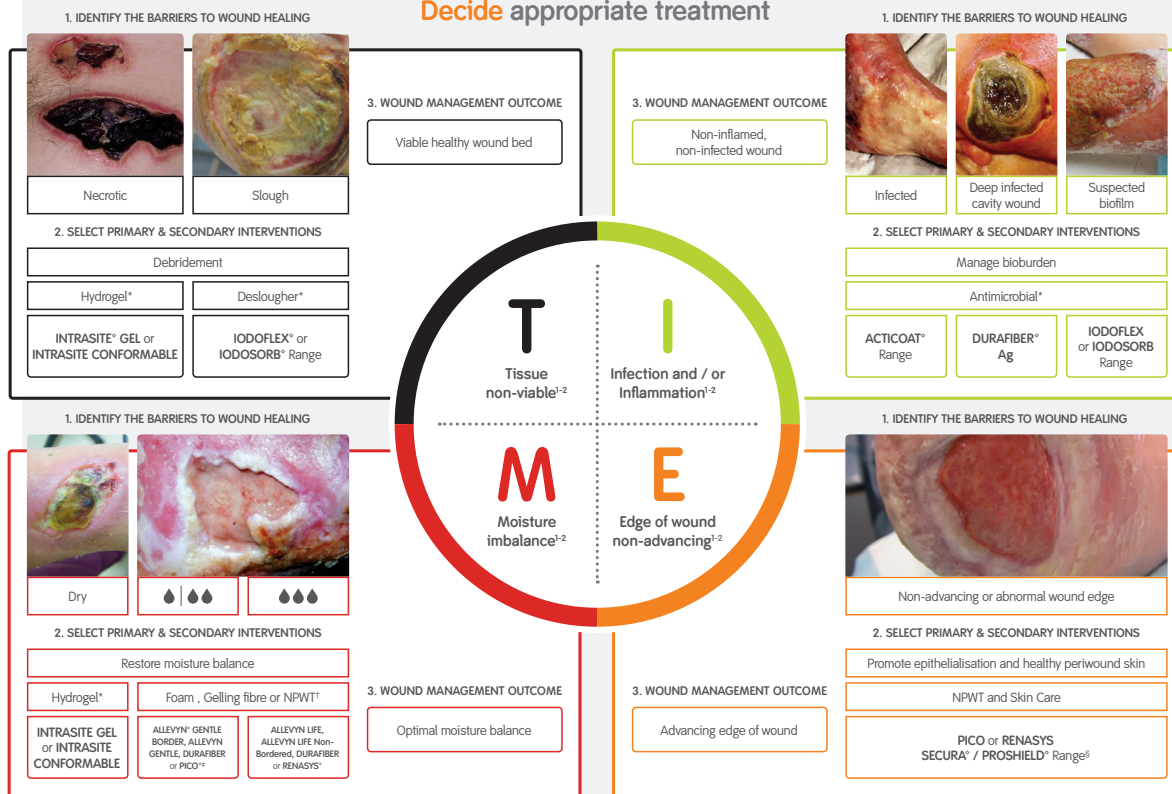
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Control or treat underlying causes and barriers to wound healing

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



*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[†] and Moore et al. 2019[‡]

†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 LIFE.

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 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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Case 1: Pressure ulcer of the lateral malleolus.



Figure 3a: Initial assessment.



Figure 3b: Review 1 (+14 days).



Figure 3c: Review 2 (+19 days).



Figure 3d: Review 3 (+25 days).



Figure 3e: Final review (+32 days).

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; Wounds UK, 2018])
- 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).

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 and two in Australia (Swanson et al, 2019). 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 Sygehus Sønderjylland Hospital based in Sønderborg, Denmark.

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

Use of the T.I.M.E. CDST in the case studies presented below has shown that the tool has supported wound management by facilitating less experienced clinicians to feel confident in decision-making, especially in relation to dressing selection and knowing when to make referrals.

The lead nurse specialist invited five nurses at the Sygehus Sønderjylland Hospital, with no theoretical training in wound care, to use the T.I.M.E. CDST in practice, and to focus particularly on the 'D and E' concept in the approach mentioned previously. Three of the five nurses had less than 2 years of

clinical practice. Before the study began, the lead nurse specialist discussed with the practice nurses the basics of wound care. This included: how to select the most appropriate dressing according to the amount of exudate and how to identify the presence of clinical infection, as well as the benefits of debridement. Patient consent forms were also given out. The trial period began once the patients had been discharged from hospital and had returned back into the community. Once the study was complete, debriefing was undertaken. All five cases are presented below and describe how the T.I.M.E. CDST was used in the real world, alongside local clinical pathways.

Case 1: Pressure ulcer of the lateral malleolus

Assess patient, wellbeing and wound

A 74-year-old male presented with a pressure ulcer of 5 months' duration, on his lateral malleolus (outer ankle). Previous treatment included immobilisation in a pressure-relieving boot to avoid movement in the ulcer area, along with application of a foam and felt dressing.

Bring in the multidisciplinary team throughout care

The GP and practice nurse had been brought in previously to discuss appropriate treatment. During each wound assessment, the patient visited a nurse clinic every second day for dressing changes where a foam dressing and bandage were applied.

Control or treat underlying causes and barriers to wound healing

The main barrier to wound healing for this patient was the small amount of slough, which was addressed through regular cleansing and debridement at each review, as indicated by the T.I.M.E. CDST.

Decide appropriate treatment

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

T – Initial assessment presented a wound of 60% granulation tissue and 40% slough [Figure 3a], with a mainly healthy viable wound bed achieved at final review (+32 days). Levels of granulation tissue improved consistently throughout treatment, through regular cleansing with saline and mechanical debridement of the small amount of slough using forceps. This was indicated by the T.I.M.E. CDST in order to promote a viable healthy wound bed.

I – No obvious signs of infection were identified

Case 2: Vasculitic wound.



Figure 4a: Initial assessment.



Figure 4b: Review 1 (+2 days).



Figure 4c: Review 2 (+5 days).



Figure 4d: Review 3 (+8 days).



Figure 4e: Final review (+13 days).

apart from pain, which was so severe that it was affecting the patient's ability to conduct activities of daily living. Discussions were carried out between the practice nurse and the GP, and the decision was made to prescribe antibiotics and initiate compression therapy, with the aim of increasing blood flow (no arterial insufficiency was detected). By second review (+19 days) [Figure 3c], levels of pain had reduced and, by final review, pain medication was no longer required.

M – A low exudate level was noted at initial assessment with minimal secretion, therefore a hydrogel dressing and a secondary foam dressing were applied. At first review (+14 days), exudate levels had increased to moderate [Figure 3b]. The clinician believed this could be as a result of having selected a hydrogel dressing for use. A foam dressing was applied at each review thereafter, as per the T.I.M.E. CDST, to achieve optimal moisture levels. Extra padding was placed around the malleolus throughout care to provide further support to the ankle and reduce pressure. At final review, the clinician noted that optimum levels of moisture had been achieved.

E – At initial assessment, two very small wounds were identified at the edge of the main wound. The edges of these wounds and surrounding skin were healthy and by third review (+25 days), edges were documented as advancing and clean [Figure 3d]. By final review these two wounds had almost closed [Figure 3e].

Evaluate

Final review presented a wound that had consistently improved and was now on a healing trajectory. Use of the T.I.M.E. CDST had provided a structured approach to managing the wound and helped guide dressing selection.

Case 2: Vasculitic wound

Assess patient, wellbeing and wound

An 86-year-old female presented with a vasculitic wound and cellulitis on her right leg, that had been present for over 2 weeks.

Bring in multidisciplinary team throughout care

Previous referral had been made to a specialist wound healing centre to determine wound aetiology and to help promote patient involvement, as she had not always been compliant with treatment. The GP and practice nurse were brought in to discuss appropriate treatment throughout care.

Control or treat underlying causes and barriers to wound healing

Compression therapy was initiated with a compression stocking to address oedema and inflammation, as the patient had palpable pulses (as per local protocol, ABPI is not measured when there are palpable pulses). Antibiotics and paracetamol were prescribed to address the cellulitis, which was very painful.

Decide appropriate treatment

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

T – It was estimated at initial assessment that the wound consisted of 50% necrotic tissue, 40% slough and 10% granulation tissue [Figure 4a]. The wound was regularly cleansed at each review with saline, and a combination of mechanical and sharp debridement performed to remove necrotic, sloughy and fibrous tissue, as indicated by the T.I.M.E. CDST tool. By final review (+13 days), debridement was performed using a monofilament fibre pad and urea cream applied to the surrounding area. A mainly viable healthy wound bed was achieved at final review, with the wound comprising of 85% granulation tissue and 15% fibrous tissue.

I – Wound inflammation remained a concern throughout care. As per the T.I.M.E. CDST, antibiotics were prescribed for this wound at high risk of infection, up until the final week of assessment when the patient's quality of life and ability to conduct activities of daily living had improved.

M – A moderate exudate level was recorded at initial assessment, with exudate visible on the bandage already in place. A foam dressing was applied at this assessment, with a lightweight elasticated tubular bandage selected for compression. To promote moisture balance at first review (+2 days) [Figure 4b], as indicated by the T.I.M.E. CDST, PICO Single Use Negative Pressure Wound Therapy System was used to manage exudate and encourage healing. NPWT was discontinued at final review, as moisture levels were low. A hydrogel dressing and superabsorbent dressing were applied instead, along with a secondary gauze dressing.

E – Slightly undermined, non-advancing edges were recorded at initial assessment. By second review (+5 days) and third review (+8 days) undermining had almost resolved [Figures 4c & 4d]. By final review edges were noted as defined [Figure 4e].

Evaluate

By the end of treatment the wound was smaller

Case 3: Venous leg ulcer.



Figure 5a: Initial assessment.



Figure 5b: Review 1 (+7 days).



Figure 5c: Review 2 (+14 days).



Figure 5d: Review 3 (+21 days).



Figure 5e: Final review (+28 days).

in size, with mainly healthy granulation tissue visible and reduced levels of pain experienced by the patient.

Case 3: Venous leg ulcer

Assess patient, wellbeing and wound

A 74-year-old male presented with a venous leg ulcer, initiated by a knock to his medial malleolus, 18 months ago. Compression therapy had previously been in place. The patient was wearing compression stockings to help improve blood flow and healing; however, he found compression therapy hard to tolerate.

Bring in multidisciplinary team throughout care

During care, the patient visited a medical clinic for dressing changes 3 times a week, along with monthly visits to the wound clinic at a nearby hospital. Referral was made at final review to the wound clinic because of a suspected *Pseudomonas* infection.

Control or treat underlying causes and barriers to wound healing

Moisture imbalance and non-advancing wound edges were the main barriers to wound healing for this patient. Class 1 compression stockings were applied to address venous disease, with daily dressing changes organised after 28 days of treatment, when infection was suspected.

Decide appropriate treatment

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

T – A mainly viable healthy tissue bed was identified throughout care until final review (+28 days), when the wound comprised 70% slough and 30% healthy granulation tissue. The wound was regularly cleansed at each review with saline and debrided using a monofilament fibre pad to remove sloughy tissue, while causing minimal damage to viable tissue.

I – No signs of infection were identified until final review, when *Pseudomonas* was suspected, as indicated by the green colouration of the bandage.

M – An optimal moisture balance was maintained during care (with three dressing changes carried out every week) until final review when exudate levels had increased due to suspected infection. There was no maceration of surrounding skin. A superabsorbent dressing was applied throughout care to absorb excess moisture, along with a secondary foam dressing for protection. At final review, a superabsorbent dressing, gauze dressing

and elasticated tubular bandage were applied as per the T.I.M.E. CDST and in line with local policy, when high exudate levels were recorded.

E – Advancing edges were identified at initial assessment [Figure 5a]; however, progress was noted as slow at first review (+7 days) [Figure 5b]. By second review (+14 days) and third review (+21 days) edges were non-advancing as a consequence of oedema [Figures 5c & 5d], and by final review a large quantity of slough was causing further delay in wound progression.

Evaluate

After 28 days of treatment, the wound was suspected to be infected [Figure 5e]. Wound healing may have progressed quicker if the patient had tolerated the use of compression therapy better. The T.I.M.E. CDST was helpful in aiding communication between clinicians for this patient when making referrals.

Case 4: Diabetic foot ulcer and postoperative wound

Assess patient, wellbeing and wound

A 73-year-old female presented with a postoperative wound after transmetatarsal forefoot amputation, following a diabetic foot ulcer [Figure 6a].

Bring in multidisciplinary team throughout care

Previous referral to a specialist wound clinic. Visits to the specialist wound clinic now in place every 2 weeks.

Control or treat underlying causes and barriers to wound healing

Foam bandaging, antibiotic therapy, specialist footwear and optimisation of blood glucose were all implemented during care.

Decide appropriate treatment

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

T – At first review (+7 days) and throughout care a mainly healthy viable tissue bed was identified with a small amount of slough [Figure 6b]. By final review (+36 days), healthy granulation tissue had increased slightly. As indicated by the T.I.M.E. CDST in order to promote a viable healthy wound bed, the wound was regularly cleansed with saline, and hard skin and slough was removed. At second review (+14 days) [Figure 6c], tweezers and scissors were used for debridement, and at subsequent review (+29 days) [Figure 6d] debridement was

Case 4: Diabetic foot ulcer and postoperative wound.



Figure 6a: Initial assessment.



Figure 6b: Review 1 (+7 days).



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

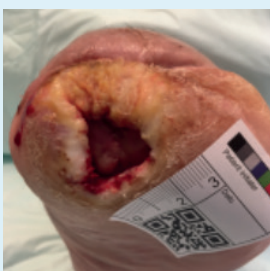


Figure 6d: Review 3 (+29 days).

performed using a ring curette. Extensive levels of callous contributed to the complexity of this wound and were managed by a specialist clinician when required.

I – No clinical signs of infection were identified for this patient.

M – Moisture imbalance was a constant concern during care, with exudate levels fluctuating between moderate and low. To assist in creating an optimal moisture balance as indicated by the T.I.M.E. CDST, a superabsorbent dressing was selected for use at initial assessment, along with an elasticated tubular bandage, as there were concerns about safe levels of compression. At every review thereafter, superabsorbent dressings were selected for use and fixed into place with a gauze roll, a padded bandage and a lightweight elasticated tubular bandage. NPWT was not considered at this stage as it had been used previously with little effect.

E – Non-advancing of the wound edges was another concern throughout care. An abnormal and slightly macerated wound edge, with callus formation, was identified up until final review. Skin care was maintained through regular cleansing, recommended by the T.I.M.E. CDST to promote epithelialisation and healthy periwound skin. Advancing wound edges were noted at final review.

Evaluate

After 36 days of treatment, the wound had made good healing progress, and was now smaller in size. The practice nurse referred to each step of the T.I.M.E. CDST and to the pictures provided at every wound assessment, which had facilitated consistent wound treatment.

Case 5: Venous leg ulcer

Assess patient, wellbeing and wound

A 73-year-old female presented with a complex, previously infected, venous leg ulcer of 6 months' duration, caused by bilateral oedema and venous insufficiency. This patient had an extensive medical history, which included diagnosis of lymphoma.

Bring in multidisciplinary team throughout care

Previous specialist referral was made to an outpatient wound-specialist department. Admittance as an inpatient was made based on the initial assessment, with plans for the patient to be seen by a doctor and nurse specialist in wound care. At first review (+4 days), a blood test was taken and at second review (+7 days) a biopsy, as vasculitis was suspected. Results showed that there were no signs of vasculitis, and blood samples and ankle pressure were recorded as normal. The patient was discharged at final review and referred to an outpatient wound department.

Control or treat underlying causes and barriers to wound healing

In the past, the patient had not been able to tolerate compression therapy due to high levels of pain. Compression therapy was re-introduced at initial assessment and antibiotics were also prescribed as infection was suspected, due to visible redness and general malaise. This was affecting quality of life for the patient, who was having difficulty sleeping.

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 of 80% slough and 20% granulation tissue [Figure 7a].

At first review, a wound bed of 50% fibrous tissue and 50% granulation tissue had been achieved [Figure 7b]. As indicated by the T.I.M.E. CDST to promote a viable healthy wound bed, cleansing and debridement were regularly performed.

Throughout care, debridement was performed using a curette and the wound was cleansed with saline. Levels of healthy granulation tissue increased at each wound assessment and by final review (+15 days) a wound bed of 80% granulation tissue and 20% fibrous slough was achieved.

I – Visible redness and general malaise were noted at initial assessment. Antibiotics were prescribed throughout treatment, and by final review, the patient's quality of life had improved and she was able to sleep through the night.

M – A moderate exudate level was recorded throughout care, with minimal signs of odour only evident at second review [Figure 7c]. As suggested by the T.I.M.E. CDST, an absorbent gelling dressing and a secondary foam dressing were selected and applied to maintain moisture levels at initial assessment. PICO NPWT was introduced at first review and continued for the duration of treatment for 4 weeks, with good results.

E – Non-advancing wound edges were identified at initial assessment. At each subsequent wound assessment until third review (+11 days) [Figure 7d] edges were recorded as advancing, with regular edges achieved by final review. Skin care was regularly undertaken to promote healthy periwound skin, as recommended by the T.I.M.E. CDST.

Evaluate

By the end of treatment (+15 days) the wound was progressing to healing [Figure 7e]; however, moisture imbalance remained a concern, with oedema still present. Overall, use of the T.I.M.E.

Case 5: Venous leg ulcer.



Figure 7a: Initial assessment. Figure 7b: Review 1 (+4 days). Figure 7c: Review 2 (+7 days). Figure 7d: Review 3 (+11 days). Figure 7e: Final review (+15 days).

CDST had promoted consistent wound treatment and eliminated variation in practice.

Discussion

The case studies outline experiences using the T.I.M.E. CDST in practice and how an 'ABCD and E' approach to wound care management offers many benefits, such as reducing the burden of chronic wounds and addressing deficits in care. The non-wound care specialist clinicians who used the tool reported that it helped them to remember the importance of consistent holistic assessment, regular documentation of wound progression/deterioration and the involvement of a multidisciplinary team.

The clinicians occasionally struggled with the terms used in the T.I.M.E. CDST as English was not their first language, and it was agreed that it would be very useful to make the CDST available in multiple languages. As the weeks progressed, the clinicians became more confident in using the tool to choose appropriate dressings. They also gained confidence when improvement in wound healing was observed.

Conclusion

Overall, the cases described show that the clinicians were able to use the T.I.M.E. CDST to promote consistent holistic wound management and eliminate variation in practice. They stated that the tool had also enhanced their confidence in identifying the barriers to wound healing and selecting primary and secondary interventions, reducing the need to seek assistance from specialist staff and increasing the potential to improve wound healing outcomes.

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