

# Using the pressure injury aetiology-specific T.I.M.E. clinical decision support tool to promote consistent holistic wound management and eliminate variation in practice

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The T.I.M.E. clinical decision support tool (CDST; Moore et al, 2019; World Union of Wound Healing Societies, 2020) is based on the well-established T.I.M.E. wound bed preparation framework (Schultz et al, 2003). The tool has been further developed to help support clinicians to assess different wound types – namely venous leg ulcers, pressure ulcers/injuries (PUs/PIs), diabetic foot ulcers and dehisced surgical wounds. In this article, a team of non-wound care specialists (homecare nurses) in the USA used the PI aetiology-specific T.I.M.E. CDST to help guide wound bed preparation, dressing selection and ongoing management of three patients. The prevalence of PIs is of clinical concern with an estimated 2.5 million treated each year in the United States (Berlowitz, 2019). PI treatments include regularly changing position, using special mattresses to redistribute pressure, dressings to help heal the injury and, occasionally, surgery may be required (NHS, 2020).

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**D**eveloping an optimal and individualised treatment plan for wound care involves an accurate and thorough assessment of the patient and wound. However, suboptimal wound care is believed to be common and can contribute to delayed healing, increased risk of complications for the patient and inefficient use of resources (Guest et al, 2015; Johnson, 2015). Failure to recognise deterioration of the wound or patient, to take action, and/or to seek timely advice increases the likelihood of poor decision-making and treatment choices (Dowsett and Hall, 2019).

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

A World Union of Wound Healing Societies (WUWHS; 2020) consensus document identified that tools that incorporate evidence-based wound management and provide a structured approach to wound care can assist accurate and comprehensive wound assessment and could be beneficial to promote consistent holistic wound management and eliminate variation in practice.

The T.I.M.E. clinical decision support tool (CDST) was developed with input from an international group of experts to provide support to healthcare professionals using an 'ABCD and E' approach, with aim to reduce variation in practice and help to improve wound outcomes (Moore et al, 2019; *Box 1*):

- A** Assessment of the patient, wellbeing and wound
- B** Bringing in a multidisciplinary team and informal carers to promote holistic patient care
- 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.

A multi-centre clinical evaluation of the T.I.M.E. CDST was conducted at four different centres: two in Australia (Carville et al, 2019; Swanson et

### Box 1. Timeline of the T.I.M.E. clinical decision support tool.

- T.I.M.E. concept developed to provide a structured approach to wound bed preparation – Tissue (non-viable or deficient), Infection/Inflammation, Moisture balance and Edges of wound non-advancing (Schultz et al, 2003).
- A survey of delegates at the 2018 European Wound Management Association conference identified that although T.I.M.E. is universally the most widely used assessment tool, 40% of respondents reported that they did not use any formal framework to guide wound bed preparation in practice (Ousey et al, 2018).
- The T.I.M.E. clinical decision support tool (CDST) evolved from the T.I.M.E. wound bed preparation concept with the aim to help guide an holistic patient–wound approach. The tool addresses the elements of holistic assessment and management and the importance of patient involvement to help eliminate variation in practice (Moore et al, 2019; WUWHS, 2020). The tool was developed and endorsed by an international group of experts.
- The aetiology-specific T.I.M.E. CDSTs for venous leg ulcers, pressure ulcers/injuries, diabetic foot ulcers and dehisced surgical wounds were developed in conjunction with input from tissue viability nurses from the United Kingdom and wound, ostomy and continence nurses in the United States of America.

al, 2019), one in Canada (Woo, 2019), and one in Denmark (Jelnes et al, 2019). The leading wound care specialist at each centre supported non-specialists to use and evaluate the T.I.M.E. CDST on five different patients over a 4-week period. The non-specialists were surveyed during and after the evaluation and provided positive feedback on using the tool (Blackburn et al, 2019).

### Development of aetiology-specific T.I.M.E. CDSTs

The T.I.M.E. CDST has since been evolved into aetiology-specific tools, which retain the essence of the original T.I.M.E. CDST, but with specific management prompts for four wound aetiologies – venous leg ulcers (VLUs), pressure ulcers/injuries (PUs/PIs), diabetic foot ulcers (DFUs) and dehisced surgical wounds. All aetiology-specific tools follow the same principles of the original T.I.M.E. CDST tool by using an ‘ABCD and E’ approach to facilitate clinical decision-making (Moore et al, 2019).

The clinical evaluations of the T.I.M.E. CDST in Canada and Denmark included patients with PIs and illustrated that using the T.I.M.E. CDST provided a structured approach to managing the wound and guided dressing selection (Jelnes et al, 2019) and that the tool helped to direct dressing selection and referral to the wound specialist and multidisciplinary team to address the underlying complications (Woo, 2019). Based on this previous work, there was an opportunity for further evidence and support, which led to the development of the aetiology-specific T.I.M.E. CDSTs.

The aetiology-specific T.I.M.E. CDSTs were developed in conjunction with input from tissue viability nurses from the United Kingdom and

wound, ostomy and continence nurses in the United States of America. The purpose of the aetiology-specific T.I.M.E. CDSTs is to provide aetiology-specific content in sections A, B, C, to provide images of associated wound types and to include treatments that may be specific to wound aetiology in section D.

There are two versions of the PI aetiology-specific T.I.M.E. CDST available, one that is not product specific that can be adapted to local formularies [Figure 1] and a second that includes products from Smith + Nephew (e.g. IODOSORB cadexomer iodine range and ACTICOAT antimicrobial barrier dressings) [Figure 2]. The IODOSORB range is indicated as a deslougher to promote the development of viable tissue and as an antimicrobial to manage the wound bioburden. It has been recognised that use of IODOSORB’s cadexomer micro-beads promote autolytic debridement and provide a desloughing action and can dehydrate and directly disrupt the biofilm structure (Wounds International, 2018; Woo et al, 2021).

The DFU T.I.M.E. CDST and the VLU T.I.M.E. CDST have been evaluated previously (Nair and Kaur, 2021; Post et al, 2021).

### Evaluating the PI aetiology-specific T.I.M.E. CDST

#### Setting: Home setting, care provided by Sta-Home Health & Hospice, Mississippi, USA

This article focuses on the experiences of staff at Sta-Home Health & Hospice, a provider of home care services that serves approximately 6,200 patients per day throughout the state of Mississippi. Sta-Home Health & Hospice provide services which include nursing, physical and occupational therapy, and home health aide care.

PU

## T.I.M.E. clinical decision support tool Pressure injuries (treatment)

START HERE ↓

### ASSESS patient, wellbeing and wound<sup>9,10</sup>

Confirm diagnosis and establish 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

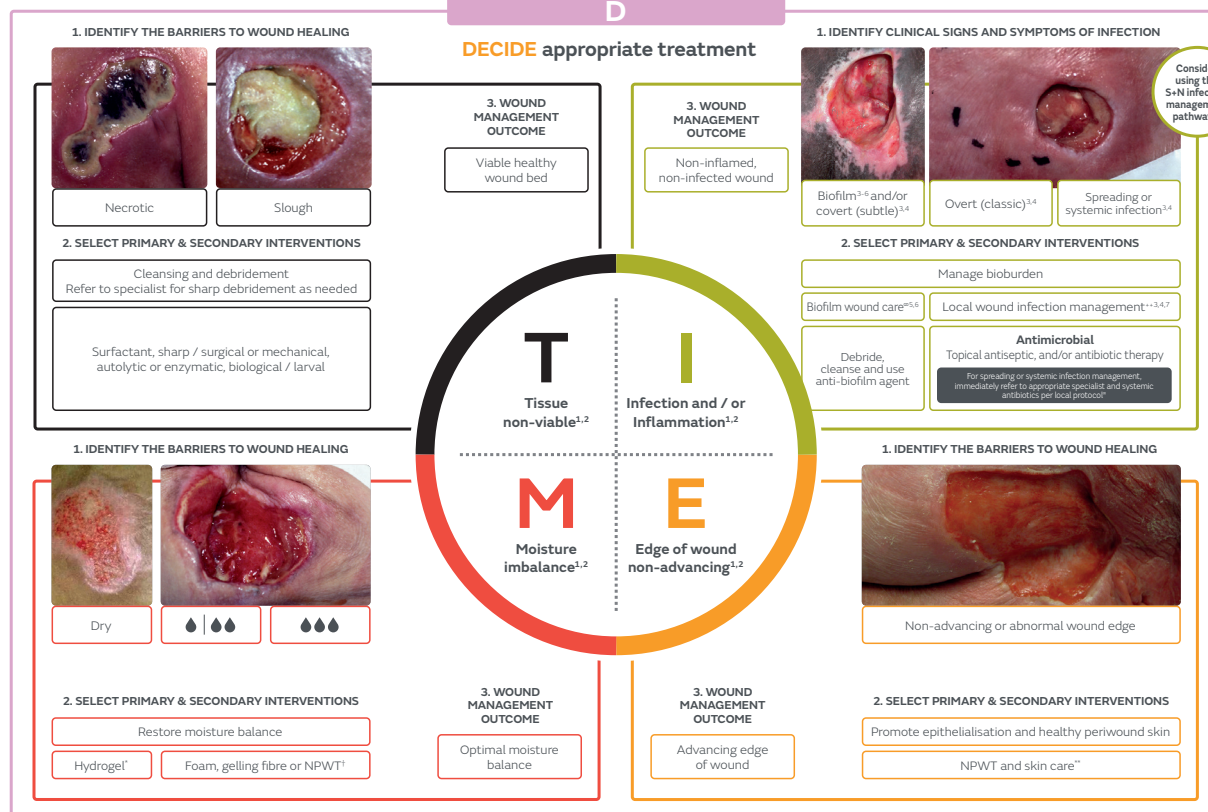
- Categorise and report pressure damage using international consensus guidelines guidance
- Clinical photography
- Assess surrounding skin for moisture associated skin damage (MASD)
- Continence assessment
- Undertake validated pressure injury risk assessment
- Visual skin inspection
- Assess support surfaces
- Vascular (ABPI) assessment required for heel ulceration
- Assess nutrition and hydration
- Develop individualised care plan for patients with pressure injuries

### BRING in multi-disciplinary team (MDT) and informal carers to promote holistic patient care

- Consider wound care specialist / GP referral / MDT involvement
- Patient / carer education – repositioning / use of pressure redistribution equipment (offloading) / concordance with therapy

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

- Implement appropriate support surfaces / repositioning schedule / offloading
- Skin barrier products to protect affected skin
- Appropriate use of continence aids following assessment



\*Use appropriate secondary dressing as per your local protocol. \*\*Consider whether wound edge debridement is also required.

**E**

### 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. Repeat pressure injury risk assessment as per your protocol.

**RECOMMENDATION:** Non-wound care specialists need to be trained on T.I.M.E. Wound Bed Preparation and how to conduct comprehensive wound assessment. Developed with the support of Glenn Smith<sup>9</sup> and Moore et al. 2019<sup>9</sup>  
<sup>†</sup>NPWT: Negative Pressure Wound Therapy. <sup>‡</sup>Level of exudate for wounds suitable for NPWT. <sup>§</sup>Biofilm wound care: Debridement, cleanse and use anti-biofilm agent. <sup>||</sup> Debride and cleanse and use effective topical antimicrobial as per local protocol. <sup>¶</sup> Signs/symptoms of infection among people with diabetes may be subtle or absent, especially for those with ischemia and sensory neuropathy. Refer to specialist, according to local protocol, for comprehensive evaluation.  
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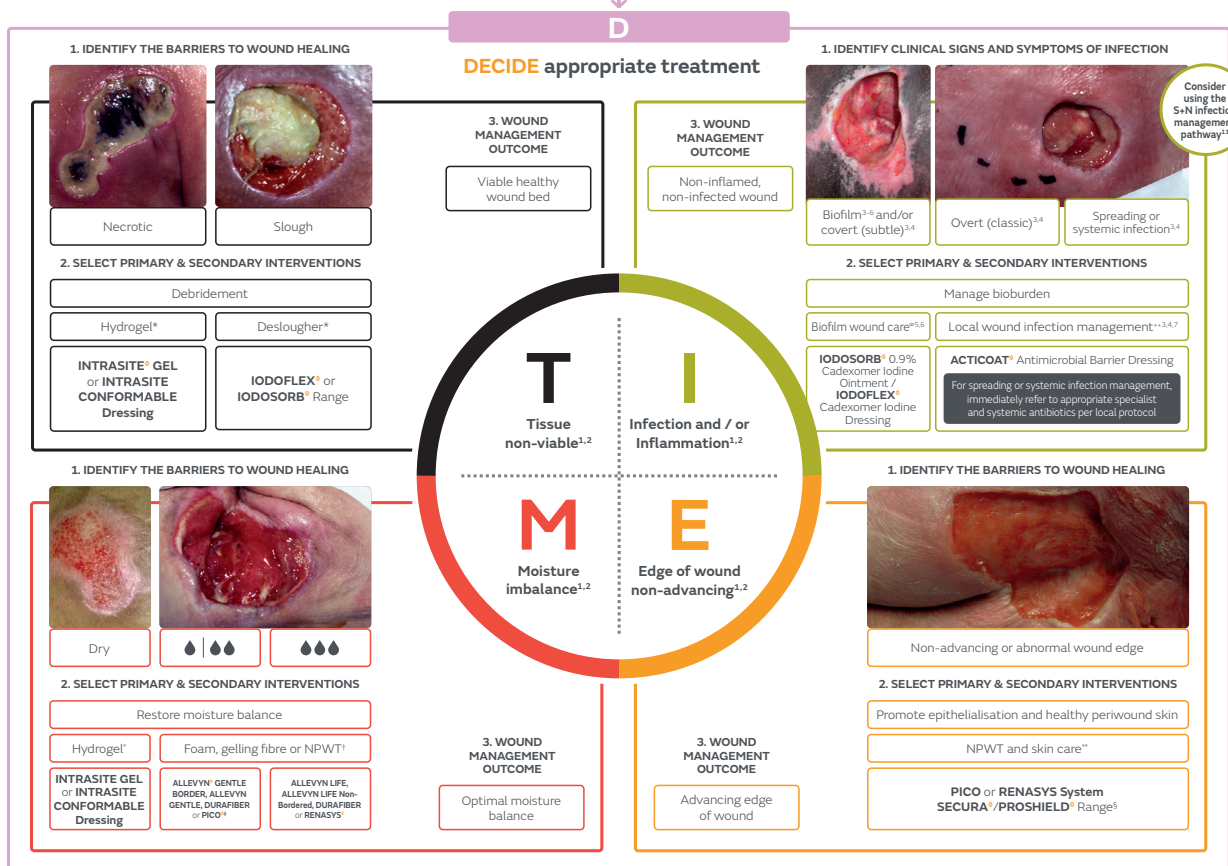
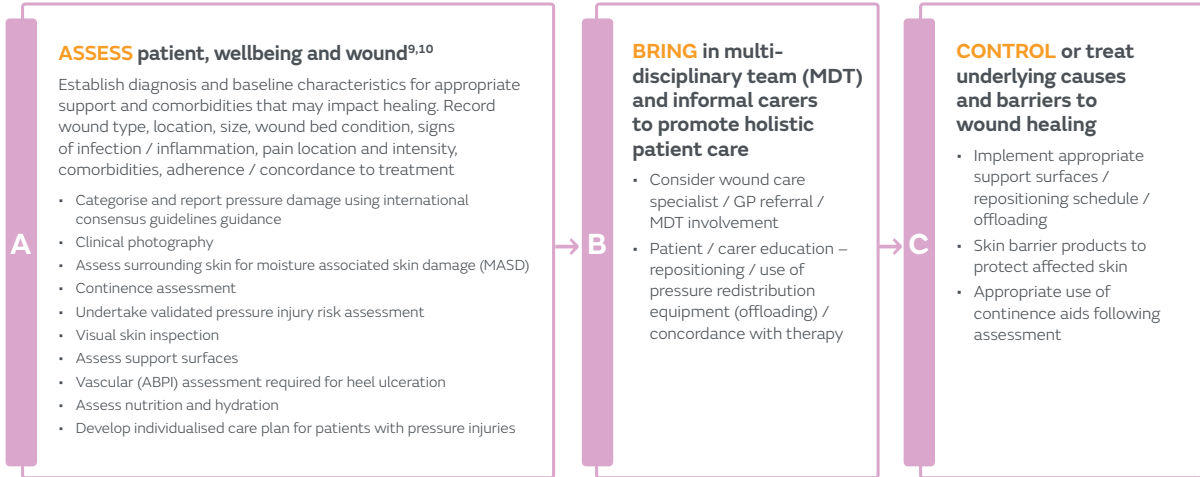
Figure 1: Pressure injury aetiology-specific T.I.M.E. clinical decision support tool (generic version).

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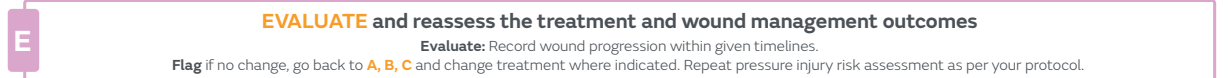
# T.I.M.E. clinical decision support tool

## Pressure injuries (treatment)

START HERE ↓



\*Use appropriate secondary dressing as per your local protocol. \*\*Consider whether wound edge debridement is also required.



**RECOMMENDATION:** Non-wound care specialists need to be trained on T.I.M.E. Wound Bed Preparation and how to conduct comprehensive wound assessment. Developed with the support of Glenn Smith<sup>9</sup> and Moore et al. 2019<sup>10</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. ¶Biofilm wound care: Debridement, cleanse and use anti-biofilm agent. \*\*Debride and cleanse and use effective topical antimicrobial as per local protocol.

**Reference:** 1. Schultz GS, et al. Wound Rep Reg (2003) 11:1–28. 2. Leaper DJ, et al. Int Wound J 2012; 9 (Suppl. 2): 1–19. 3. International Wound Infection Institute (IWII) Wound infection in clinical practice. Wounds International (2016). 4. Weir D, Schultz G. Assessment and Management of Wound-Related Infections. In: Doughty D & McMichael L (Eds). Wound, Ostomy and Continence Nurses Society Core Curriculum: Wound Management. (p. 156–180). 2016. Philadelphia: Wolters-Kluwer. 5. Wolcott RD, et al. J Wound Care 2010;19(2):45–53. 6. Schultz G, et al. Wound Repair Regen 2017;25(5):744–757. 7. Ayello EA, et al. Wounds Int 2012;1–24. 8. Smith G, et al. Journal of Wound Care 2010;19(9):396–402. 9. Moore Z, et al. Journal of Wound Care, 2019;28(3):154–161. 10. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. Emily Haesler (Ed) EPUAP/NPIAP/PPPIA: 2019. 11. Dowsett C, et al. Wounds Int. 2020;11(3):20–27.

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Figure 2: Pressure injury aetiology-specific T.I.M.E. clinical decision support tool (Smith + Nephew products included).



## Case 1: PI to left hip.



Figure 3: Initial assessment.



Figure 4: Week 3.

Prior to evaluation of the tool, executive directors/supervisors were contacted to identify eligible patients. After patient selection, nurses were contacted and briefed on components of the project. Nurses then discussed this further with the patients and consent for participation was obtained. Thereafter, meetings were held to explain use of the T.I.M.E. CDST and how to complete the data collection forms.

Overall, nurses were happy to be involved in the project and felt that use of the clinical decision-making tool would help to guide appropriate treatment and instil confidence, leading to better patient outcomes.

### Case 1: PI to left hip

#### Assess patient, wellbeing and wound

A 41-year-old male had a Stage 4 PI on his left trochanter measuring 3.1 cm (length) x 3.1 cm (width) x 0.5 cm (depth) for several years [Figure 3]. The patient had quadriplegia and used a suprapubic catheter. The patient had complex additional conditions including COPD, anxiety, neuromuscular dysfunction of the bladder, chronic pain, anaemia and a congenital heart defect.

The patient had a Braden score [Box 2] of 13, indicating he had a moderate risk of developing a PI. The presence of the wound had reduced his mobility and his independence as he was only able to sit in a wheelchair for a few hours a day.

#### Bring in multidisciplinary team and informal carers to promote holistic patient care

No new referrals were required during the evaluation period. However, the patient continued to have ongoing physical therapy at home.

#### Box 2. Braden scale (Bergstrom et al, 1987; Bergstrom and Braden, 2002).

The Braden Scale is a measure of the risk of an individual acquiring a pressure injury; the lower the number, the higher the risk is for developing an acquired ulcer or injury. The scale uses a score from less than or equal to 9 to as high as 23. There are six categories within the Braden Scale that are assessed and impact on the risk of pressure injury development: sensory perception, moisture, activity, mobility, nutrition, and friction or shear.

15+ = low risk

13-14 = moderate risk

12 or less = high risk

Below or equal to 9 = severe risk

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

The patient was placed on an alternating pressure mattress and was repositioned every 2 hours and as needed while in bed to offload pressure. The amount of time spent in a chair with a pressure relief wheelchair cushion was limited. The patient was on a weekly bowel program where stool softeners/laxatives were used to promote scheduled bowel movements.

#### Decide appropriate treatment

Using the PI aetiology-specific T.I.M.E. CDST, the main barriers to healing that needed to be addressed were identified as non-viable tissue in the form of slough and non-advancing wound edges.

T= The wound bed comprised 25% granulation tissue and 75% slough

I= The wound was not overtly infected

M= There were high level of serosanguinous exudate

E= The wound edges were firm and indurated (i.e. a deep thickening of the skin) 2–4 cm from the wound bed. The surrounding skin was pink and inflamed.

According to the PI aetiology-specific T.I.M.E. CDST, the appropriate treatment was to remove the slough from the wound bed and manage the wound bioburden to promote the development of viable tissue and wound edge advancement. The wound was cleansed with saline using a 4x4 inch gauze pad and patted dry.

As per the PI aetiology-specific T.I.M.E. CDST, IODOSORB 0.9% Cadexomer Iodine Gel was applied to the wound bed as a deslougher and to manage the wound bioburden. A calcium alginate foam dressing was applied as a secondary dressing as per local protocol. SKIN PREP Skin Protectant (liquid film forming protective barrier wipe) was used on the periwound skin to help reduce friction and skin trauma during removal of tapes and films. This dressing regimen continued for 4 weeks.

#### Evaluate

The condition of the wound bed improved [Figure 4] and, at the end of the 4-week period, the wound remained infection free and reduced in size to 2.3 cm (length) x 2.6 cm (width) x 0.1 cm (depth). The wound was not painful, but was still impacting on the patient's quality of life in terms of reduced mobility and independence.

For this patient with complex needs and a long-standing PI, the PI T.I.M.E. CDST eased

## Case 2: Sacral PI.



Figure 5: Week 1.



Figure 6: Week 4.

decision-making to select the right wound dressing and plan of care.

### Case 2: Sacral PI

#### Assess patient, wellbeing and wound

This case describes a 60-year-old female with an extensive medical history of diabetes, a left below-the-knee amputation, hypertension, depression, rheumatoid arthritis, urinary incontinence and end-stage renal failure.

She presented with an unstageable PI on her sacrum measuring 7cm (length) x 7cm (width) x 4.6cm (depth). The wound had been present for over 2 months and developed due to unrelieved pressure.

The patient had a Braden score of 11 (high risk) and the wound was mildly painful (3 out of 10 on the VAS; 0=no pain; 10=extreme pain). The patient had difficulty participating in activities of daily living because of the wound and she was not able to be involved in shared care because of the location of the wound.

The wound was previously debrided weekly at the wound care centre and cleansed and dressed with a non-adhering silicone wound contact layer and a foam dressing.

#### Bring in multidisciplinary team and informal carers to promote holistic patient care

No new referrals were required during the evaluation period. However, the patient continued to have physical therapy appointments at home.

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

The patient was repositioned every 1–2 hours using a foam wedge to redistribute pressure and was instructed to use a foam positioning wedge in bed and a seat wedge in a chair. A foam toilet cushion was used by the patient while they were toileting. She used incontinence products (e.g. incontinence pads), which were regularly wet and soiled. The patient was encouraged to follow a timed schedule for urination to help reduce the complications associated with incontinence.

#### Decide appropriate treatment

Using the PI aetiology-specific T.I.M.E. CDST, the main barriers to healing that were identified and needed to be addressed were the removal of non-viable tissue, infection, moisture imbalance and non-advancing wound edges [Figure 5].

T= The wound bed comprised 50% granulation tissue and 50% slough. The sloughy tissue

was mildly odorous

I= The wound area was odorous and inflamed, indicating the presence of infection

M= There was a moderate level of exudate

E= The wound edges were not attached to the wound bed. The surrounding skin was red and inflamed and blanched to the touch.

According to the PI aetiology-specific T.I.M.E. CDST, the appropriate treatment was to remove slough and promote granulation tissue formation and progress wound healing. The wound was cleansed with a wound cleanser and patted dry with a 4x4 inch gauze.

As per the T.I.M.E. CDST, IODOSORB Gel was used to deslough the wound and manage infection. The cavity was filled with calcium alginate and covered with a bordered foam dressing. A protective skin barrier product was applied to the periwound skin. Dressing change was planned for 3 times a week.

#### Evaluate

After 4 weeks, the wound showed improvement [Figure 6] and measured 6.5cm (length) x 6.5cm (width) x 3cm (depth). There were moderate amounts of exudate. Dressing change was required daily due to exudate and movement. As the clinician became more familiar with use of the aetiology-specific tool, this helped to guide appropriate treatment decisions.

### Case 3: Stage 4 sacral PI

#### Assess patient, wellbeing and wound

A 72-year-old male had a spinal cord injury, paraplegia, urinary incontinence and type 2 diabetes. He had an ileostomy in 2011 for a ruptured colon due to a chronic clostridium difficile infection.

The patient presented with a Stage 4 PI on his sacrum that had been present for over a year following use of an inappropriate seat cushion. The wound was not painful due to paraplegia and measured 4cm (length) x 2cm (width) x 3cm (depth) [Figure 7]. Excess drainage from the wound had affected the patient's hygiene; the patient had difficulty assisting with his own care. He received care at home, and the wound had been previously cleansed, patted dry and dressed with calcium alginate with silver and a foam bordered dressing.

#### Bring in multidisciplinary team and informal carers to promote holistic patient care

The patient received education for diabetes management at home during the evaluation

## Case 3: Stage 4 sacral PI.



Figure 7: Initial assessment.



Figure 8: Week 4.

period. At week 2, the nurse practitioner at the outpatient wound center advised treatment should commence with an antimicrobial dressing.

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

The patient used a low air-loss mattress for the bed and an air cushion for the wheelchair. He was able to sit in his wheelchair for only an hour three times a day. When the patient was in bed, the carer repositioned the patient every 2 hours to offload the pressure.

The patient used the following continence aids: underpads, condom catheter and a colostomy. A moisture barrier cream was also applied to protect the affected skin.

### Decide appropriate treatment

Using the PI aetiology-specific T.I.M.E. CDST, the main barrier to healing that needed to be addressed was management of moisture imbalance associated with infection.

**T=** The wound bed was unhealthy

**I=** Initially, the wound did not exhibit signs of overt infection, but at week 2, there was purulent exudate

**M=** High levels of exudate were observed, purulent at week 2

**E=** The wound edges were well defined but not attached, and the surrounding skin was macerated.

According to the PI aetiology-specific T.I.M.E. CDST, wound treatment needed to focus on optimising moisture balance at week 1 as the wound was heavily exuding and leaking onto the bed linen. No signs of infection were recorded initially.

The wound was cleansed with a wound cleanser spray and patted dry, and a calcium alginate dressing was used in combination with the gelling fibre to absorb exudate. Daily dressing changes were planned. An antimicrobial dressing was introduced at week 2 by the nurse practitioner as exudate had become purulent.

### Evaluate

Although the wound began to show signs of overt infection at week 2, by the end of the 4-week period, the wound had improved [Figure 8] and measured 4.5cm (length) x 1.5cm (width) x 1cm (depth).

The tool helped to ease decision-making and encouraged the clinician to bring in members of the multidisciplinary team to promote holistic patient care (e.g. the need for antimicrobial management).

## Discussion

Treatment decisions should be made on the assessment of the PI, skin inspection, level of risk, treatment objective and patient preference (Box 3; Fletcher, 2012) alongside use of tools, such as the PI aetiology-specific T.I.M.E. CDST.

The clinicians in this case series noted that use of the PI aetiology-specific T.I.M.E. CDST guided appropriate treatment for the presenting wound, and that it would be beneficial for recommended products to be on local formularies to ensure successful adoption.

In this evaluation, the clinicians experienced challenges in communicating with each other due to working schedules and irregular face-to-face multidisciplinary meetings and reviews.

### Box 3. Main aims of PI management (Fletcher, 2012).

- Reduce pressure, shear and friction using a suitable support surface
- Manage the skin microclimate
- Minimise the risk of infection
- Create an optimal wound healing environment
- Improve patient comfort.

## Conclusion

The PI aetiology-specific T.I.M.E. CDST aims to enhance the confidence of non-specialist staff members in decision-making, appropriate consultation with specialists and enable more consistent use of the formulary.

Tools, such as the T.I.M.E. CDST, can be used as part of a systematic and structured approach to promote consistent holistic wound management and eliminate variation in practice (WUWHS, 2020). The case studies presented by this group of clinicians indicate that use of this tool has the potential to promote consistent holistic wound management and eliminate variation in practice. WINT

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## Declaration

This case series has been supported by Smith & Nephew.

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