Using the new T.I.M.E. Clinical Decision Support Tool to promote consistent holistic wound management and eliminate variation in practice: Part 3 at the West Park Healthcare Centre, Chronic Care and Rehabilitation Hospital, Canada

Author: Kevin Woo This is the third in a series of articles that explores the use of a newly developed wound assessment and decision-making tool, the T.I.M.E. Clinical Decision Support Tool (CDST) (Moore et al, 2019) based on the well-established T.I.M.E. wound bed preparation framework (Schultz et al, 2003) in different countries and settings. A team of non-wound care specialist staff in a rehabilitation centre used the new T.I.M.E. CDST to help guide wound bed preparation, dressing selection and ongoing management of chronic wounds. Five case studies are presented here.

uboptimal wound assessment contributes to a delay in healing and misused resources, while exposing patients to unnecessary risk (Johnson, 2015). 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). Additionally, inconsistencies in wound care practices have been highlighted in the literature (Guest et al, 2015).

Tools that incorporate evidence-based wound management and provide a structured approach to wound care can assist accurate and comprehensive wound assessment, and would be beneficial to promote consistent holistic wound management and eliminate variation in practice (World Union of Wound Healing Societies, 2016).

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

The T.I.M.E. CDST has been developed with input from an international group of experts [Box 1], to provide support to health care professionals making clinical decisions, while reducing variation in practice and helping to improve wound outcomes. A non-product-specific version of the tool [Figure 1], and a Smith & Nephew product-specific version [Figure 2] are available.

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 Assessment 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 Deciding on the most appropriate wound treatment to implement and the desired wound management outcome
- E Evaluation and reassessment of how the wound is progressing and if the wound management goals have been achieved.

Evaluating the T.I.M.E. CDST

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

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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, whilst eliminating variation in practice (Moore et al, 2019).

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 West Park Healthcare Centre, Chronic Care and Rehabilitation Hospital based in Toronto, Canada.

West Park Healthcare Centre, Chronic Care and Rehabilitation Hospital, Canada

In Canada, results show that compromised wounds are reported in almost 4% of inpatient acute hospitalisations and for more than 7% of home care patients, almost 10% of long-term care and almost 30% of hospital-based continuing care clients. While the exact cost of wound care in Canada is unquantified, annual costs of approximately US\$10bn for North America have been estimated (Ontario Association of Community Care Access Centers, the Ontario Hospital Association, and the Ontario Federation of Community Mental Health and Addiction Program, 2010).

Challenges to providing care in Canada include fragmented care, limited communication with patients and interprofessional teams, lack of a universal electronic health record affecting seamless care between sectors and transitions, and lack of a wound care registry to track healing. There are also issues with supplies, and a focus on finding low-cost options rather than patient-centered or evidence-based care (Woo et al, 2017).

Enabling non-wound care specialist staff to conduct wound assessment and management planning may promote consistent holistic wound management, as well as alleviate the burden on specialist staff in managing these patients.

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

West Park Healthcare Centre is a specialised, rehabilitation centre for patients with complex life-altering illness or injury. There are over 450 beds (130 rehab and community living, 200 long-term care centre beds and 146 complex continuing care beds).

The team involved in this series were an engaged group of non-wound care specialists who were selected to participate due to their keenness to make a difference in wound care and reinforce and validate their own experience in wound care. Past approaches to wound care had been somewhat unsystematic, so it was hoped that using the T.I.M.E. CDST would help demystify wound care by providing a comprehensive approach to guide decision-making and to encourage early treatment while highlighting the importance of, and addressing, underlying causes. From an administrative perspective, this was going to be a useful quality improvement project.

The T.I.M.E. CDST was reviewed with the group and a few cases were completed together to show how it worked. The 'ABCD and E' approach is similar to a nursing process, so the team were already familiar with this concept and therefore thought it would be intuitive and easy to follow.

The five cases are presented below. All the cases describe how the T.I.M.E. CDST was used in the real world, alongside local clinical pathways.

Case 1: Venous leg ulcer

Assess patient, wellbeing and wound
This was a 68-year-old female inpatient with
muscular dystrophy, a history of venous disease
and multiple comorbidities. A wound on the
medial aspect of the right ankle had been
present for 7 days, measuring 1cm (length) x
0.8cm (width) with no depth [Figure 3a]. The leg
was oedematous, and there were signs of poor
calf muscle pump function and skin changes
indicative of venous disease. The wound was
very painful (7 out of 10 on the VAS), and it was
affecting the patient's walking and mood. A
non-adherent dressing had been applied to the
wound previously.

Bring in the multidisciplinary team throughout care

At the end of week 1, the patient was referred to a pain specialist who prescribed morphine sulfate.

Control or treat underlying causes and barriers to wound healing

The patient was being prescribed thyroxine, ramipril, vitamin D supplements, alendronate, plus gabapentin for the pain. For the venous

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, a non-adherence / concordance with offloading and compression, lifestyle choices **Decide** appropriate treatment 1. IDENTIFY THE BARRIERS TO WOUND HEALING 1. IDENTIFY THE BARRIERS TO WOUND HEALING Non-inflamed. Viable healthy wound bed non-infected wound 2. SELECT PRIMARY & SECONDARY INTERVENTIONS 2. SELECT PRIMARY & SECONDARY INTERVENTIONS Cleansing and debridement Manage bioburden Sharp / surgical or Autolytic or enzymatic antibiotic therapy) Infection and / or 1. IDENTIFY THE BARRIERS TO WOUND HEALING 1. IDENTIFY THE BARRIERS TO WOUND HEALING Moisture Edge of wound non-advancing1 44 444 Non-advancing or abnormal wound edge 2. SELECT PRIMARY & SECONDARY INTERVENTIONS 2. SELECT PRIMARY & SECONDARY INTERVENTIONS Promote epithelialisation and healthy periwound skin 3. WOUND MANAGEMENT OUTCOME 3. WOUND MANAGEMENT OUTCOME Optimal moisture balance Advancing edge of wound NPWT, Atraumatic wound contact layer, Growth factors, Cell or Tissue products and Skin Care Alginate *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

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

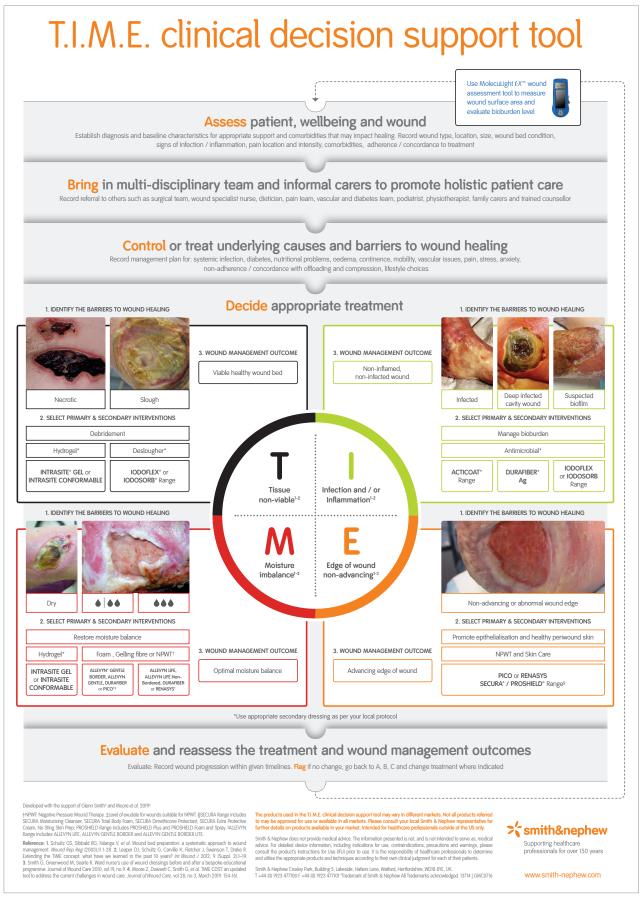


Figure 2. The T.I.M.E. clinical decision support tool — including Smith & Nephew products.

Case 1: Venous leg ulcer.



Figure 3a: Initial assessment.



Figure 3b: Review 2 (+14 days).



Figure 3c: Review 3 (+21 days).

Case 2: Trauma wound at risk of non-healing.



Figure 4a: Initial assessment.



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

disease, the patient was prescribed stockings to wear based on an appropriate ABPI of 0.8, but they were not always compliant with treatment.

Decide appropriate treatment
Wound assessments conducted using the
T.I.M.E. CDST tool are described below:
T – On initial assessment, viable tissue was
present on the wound bed (80% granulation
tissue, 20% fibrinous tissue). However, at day
14, the wound became sloughy and larger
(2.5cm [width] x 2.5cm [length] x 0.3cm [depth])
[Figure 3b].

I – Wound infection was the largest concern and determined treatment and dressing selection. At initial assessment, signs suggesting local infection were present (increased pain, malodour and exudate production). As per the T.I.M.E. CDST, the wound was cleansed with saline, and a non-bordered broad-spectrum antibacterial foam was selected to promote healing, reduce bioburden and improve moisture balance. A secondary highly absorbent dressing and 2-layer short-stretch compression were applied. Seven days later, there was an increase in pain and wound size. As a result, the dressing regimen was changed to a silver-coated antimicrobial dressing, with the same absorbent secondary dressing. Another week later, the infection started to resolve, as there was less exudate production and the skin temperature was less elevated [Figure 3c]. Following cleansing and gentle mechanical debridement with a microfilament pad, a silvercoated antimicrobial barrier dressing (ACTICOAT FLEX 7) with a higher concentration of silver was used to reduce bioburden, optimise moisture balance and promote healing. After 28 days since treatment began, infection was believed to have resolved.

M – Wound moisture levels associated with the infection, oedema and venous disease were high and had led to periwound skin maceration and strikethrough on the dressing. Dressing change was increased from once weekly to twice weekly. By day 14, wound moisture began to resolve and dressing changes were returned to once weekly.

E – Although the wound initially increased in size, the wound edges slowly advanced and became less rolled. After 4 weeks, the wound measured 2cm (length) x 1.5cm (width) x 0.1cm (depth), and there was epithelial tissue at the edges.

Evaluate

Although infection worsened, and the size of

the wound and pain increased after the first week, by the end of the 4-week period, there was an improvement in bacterial burden, exudate volume and pain. The patient was in less pain (5 out of 10 on the VAS), which suggested that infection was resolving. The T.I.M.E. CDST helped to identify infection, to indicate when the treatment plan needed to be changed and when referral was required, and to select appropriate antimicrobial dressings. It was also helpful to explain the treatment rationale to the patient.

Case 2: Trauma wound at risk of non-healing

Assess patient, wellbeing and wound This was a 68-year-old female inpatient with spina bifida and multiple comorbidities. She developed a wound on the anterior surface of the ankle, thought to be as a result of pressure damage from poorly fitted compression stockings. The patient had no calf muscle pump function so was wearing stockings to address oedema related to spina bifida. The wound measured 2.5cm (length) x 1cm (width) and had been present for 3 days [Figure 4a]. Compression was changed from hosiery to a bandage, and the wound had been treated with a topical povidone-iodine spray and a povidone-iodine non-adherent dressing. The patient was worried about her wound and the prospect of amputation.

Bring in multidisciplinary team throughout care The patient was seen by occupational therapy for positioning of the foot.

Control or treat underlying causes and barriers to wound healing

Compression stockings had been used, but were believed to have caused pressure damage, leading to ulceration. As a result, compression bandaging was used instead. The patient was also advised to spend less time sitting in the chair and given advice on how to position the foot safely.

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

T – At initial assessment the wound bed comprised 80% necrotic and 20% granulation tissue. As per the T.I.M.E. CDST, cleansing and sharp debridement were performed prior to every dressing application. At each subsequent review the amount of necrotic tissue reduced. After 4 weeks, the wound bed comprised 70% epithelialisation tissue and 30% granulation tissue.

Case 3: Trauma wound at risk of non-healing.



Figure5a: Initial assessment.



Figure 5b: Review 4 (+28 days).

I – The wound was infected and biofilm was suspected due to increased exudate, malodour and swelling. An antimicrobial, in this case cadexomer iodine powder (IODOSORB), was selected to reduce bacterial burden and absorb excess fluid. A gentle multi-layer foam dressing (ALLEVYN LIFE) and compression bandaging was applied. The signs of infection decreased at each review, and the treatment regimen described above was continued. Infection resolved after 28 days, so antimicrobial treatment was discontinued.

M – Exudate levels were moderate. Onceweekly dressing changes were planned and compression bandaging was used. During the review period, the level of exudate reduced.

E – The edges were advancing, and the wound reduced in size from 2.5cm (length) x 1cm (width) to 1cm (length) x 0.4cm (width) [Figure 4b]. By day 28, as infection had resolved, the main aim was to close the wound edges, so a gentle foam dressing (ALLEVYN LIFE) was used as the sole dressing for protection and to help heal the wound.

Evaluate

For this patient, infection and moisture balance were the main areas of concern. An antimicrobial dressing was used for 4 weeks and, at the end of this period, the wound was very close to healing. The T.I.M.E. CDST helped to direct decision-making and care-planning.

Case 3: Trauma wound at risk of non-healing

Assess patient, wellbeing and wound
This was a 72-year-old male inpatient who
sustained a trauma wound to the calf. The
wound was at high-risk of non-healing due
to the patient's history of venous disease,
VLUs and complex comorbidities including
obesity and lymphoedema, chronic pulmonary
disease, hypertension and diabetes, managed
with medication.

The wound measured 6cm (length) x 4cm (width) [Figure 5a] and had been dressed with a non-adherent dressing. The wound was painful (5 out of 10 on the VAS), so hydromorphone was prescribed. The patient was also concerned with the odour of the wound.

Bring in multidisciplinary team throughout care For this patient, the diabetes team regularly reviewed the diabetes management plan and the occupational therapy team gave advice on positioning.

Control or treat underlying causes and barriers to wound healing

The patient had used compression in the past, but not consistently. As such, high compression therapy was initiated following vascular assessment. The patient was given advice to manage diabetes and instructed to perform ankle exercises.

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

T – At initial assessment, the wound bed comprised 100% granulation tissue. The wound did not become sloughy or necrotic during the review period, and by day 28, the wound had become 100% epithelialised and healed [Figure 5b].

I – The wound was thought to be infected based on the signs and symptoms exhibited. These included: increased pain, increased exudate level and malodour. Biofilm was also suspected. The wound was cleansed with saline, and cadexomer iodine (IODOSORB powder) selected to absorb moisture and to kill bacteria. A secondary foam dressing (ALLEVYN Gentle Border) and compression were applied. After 7 days, infection had resolved but biofilm was still suspected as there was some exudate and slight malodour. This dressing regimen continued following the positive observations, and by day 14, infection was resolved, so antimicrobial treatment was no longer required.

M – A high level of clear thin exudate was present at initial review. After 7 days of the regimen described above, moisture had reduced. By day 28, moisture was low and the wound was close to healing.

E – After 7 days of treatment using the T.I.M.E. CDST, the wound had reduced considerably in size, measuring 2cm (length) x 1.5cm (width), reducing further to 0.5cm (length) x 0.1cm (width) after 21 days. A week later, the wound healed completely.

Evaluate

This wound was at risk of becoming chronic and non-healing. Following the T.I.M.E. CDST had helped to direct decision-making and selecting the appropriate dressing and treatment regimen. As a result, infection resolved within 2 weeks, and after 1 week, there was a substantial reduction in wound size and pain (2 out of 10 on the VAS).

Case 4: Pressure ulcer/pressure injury

Assess patient, wellbeing and wound This patient, in his late 70s, had a category IV sacral pressure ulcer/pressure injury, which developed

Case reports

Case 4: Pressure ulcer.



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



Figure 6b: Review 4 (+28 days).

after a period of acute care. He had been in the rehab centre for a year with a spinal cord injury and autonomic dysfunction. Increased bed rest time led to the patient feeling isolated, withdrawn and less stimulated.

The wound had been present for 3 months and at presentation measured 3cm (length) x 2cm (width) x 1cm (depth) [Figure 6a]. It had previously been managed with a silver foam dressing.

Bring in multidisciplinary team throughout care
At week 1, the patient was referred to radiology
and osteomyelitis was confirmed. The clinician also
consulted members of the MDT (i.e., occupational
therapist, physiotherapist and nutritionist), while
caring for this patient.

Control or treat underlying causes and barriers to wound healing

Regular repositioning and an air mattress were part of the care plan. The patient was advised to have more bed rest, with only 1–2 hours a day spent sitting in a chair.

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

T – The wound was a large cavity, but the opening was rather small. After cleaning and debridement, the wound bed composed of a thin layer of granulation tissue over the bony tissue. This remained the case over the 4-week period. At day 14, however, some bone was exposed and osteomyelitis was suspected, later confirmed by X-ray.

I – Signs of local infection were increased exudate, malodour and stalled healing. As per the T.I.M.E. CDST, an antimicrobial dressing was selected after wound cleansing. For this patient, an absorbent silver dressing was selected to manage bacterial burden, and a secondary absorbent cellulose dressing was used. Daily dressing changes were arranged. The wound deteriorated and osteomyelitis was suspected. The wound became bigger, with more severe signs of infection, such as increased temperature and malodour. Antibiotics and antimicrobial dressings were prescribed: povidone-iodine ribbon gauze was used to pack the wound for 7 days and then a silver-coated antimicrobial barrier dressing (ACTICOAT FLEX 7) was used for 14 days to better pack the wound. After 4 weeks, draining and odour were reduced.

M – Previous dressings had been saturated with exudate. Moisture levels remained high throughout the review period, requiring daily changes and the use of an absorbent cellulose dressing.

E – The wound had raised edges, which were macerated due to high moisture levels. The wound was at its largest at day 14 (5cm [length] x 4cm [width] x 2cm [depth]). Once infection and osteomyelitis were under control, the wound began to heal. By day 28, it measured 4cm (length) x 3cm (width) x 2cm (depth) [Figure 6b].

Evaluate

This was a complex wound complicated by untreated osteomyelitis in a difficult-to-treat area, which was impacting heavily on the patient's quality of life. At first the wound deteriorated, but by week 4, the wound had improved and reduced in size. The T.I.M.E. CDST was helpful to direct dressing selection and to facilitate conversation with the wound specialist about course of action.

Case 5: Pressure ulcer/pressure injury

Assess patient, wellbeing and wound
This was an 87-year-old female patient with
a category IV sacral pressure ulcer, which had
been present for 3 months while in a different
acute care hospital. She had a spinal cord injury,
depression, and a history of breast cancer and
arthritis. The pressure ulcer measured 6cm
(length) x 5cm (width) x 3cm (depth), and the area
was insensate [Figure 7a].

The patient was not eating well and had been resistant to turning and care at times. The pressure ulcer had been previously packed with povidone-iodine ribbon gauze.

Bring in multidisciplinary team throughout care
The occupational therapist was consulted for advice on repositioning, offloading and the use of an air mattress.

Control or treat underlying causes and barriers to wound healing

Repositioning, offloading and the use of an air mattress were in place. The patient was advised bed rest and repositioned twice a day. The use of diapers and incontinence sheets was avoided. The patient was given protein supplements to improve dietary intake.

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

- **T** At initial assessment, it was clear that the wound was in a sustained inflammatory response, with a layer of granulation tissue and slough present on the wound bed.
- I The wound was thought to be deeply infected, this assessment was made using a locally produced infection assessment tool for superficial



Case 5: Pressure ulcer.

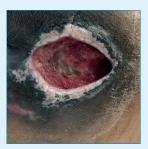


Figure 7a: Initial assessment.



Figure 7b: Review 2 (+14 days).

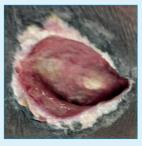


Figure 7c: Review 4 (+28 days).

and deep infection. The wound had not healed in 3 months and was sloughy, with a high level of exudate and malodour. At initial review, wound treatment with an antimicrobial alginate dressing incorporating nanocrystalline silver (ACTICOAT FLEX 7) was initiated, after wound cleansing with saline. The aim was to improve healing, reduce bioburden and optimise moisture balance. A secondary absorbent cellulose dressing was applied. Daily dressing changes were required. After 1 week, the wound looked cleaner and less inflamed. The treatment regimen continued for 4 weeks while the underlying complications were addressed.

M – Exudate levels were high and the dressing was soaked with wound fluid. Moisture continued to remain high over the 4-week period.

E – The wound edges were non-advancing, rolled up and macerated.

Evaluate

The wound did not progress during the review period [Figure 7c], but there were underlying challenges related to the patient's nutrition and engagement with care. As no wound progression was apparent, the T.I.M.E. CDST helped to direct referral to the wound specialist and multidisciplinary team to address the underlying complications.

Discussion

For this engaged group of clinicians who had a varied level of experience in wound care, the T.I.M.E. CDST helped to cement and validate their previous knowledge of wound care. The T.I.M.E. CDST also proved a useful communication tool to help non-wound care specialists discuss management with patients and specialist staff.

Identifying the cause of the wound is the first and most important step, but tools for making a correct diagnosis for the non-specialist are scarce. For example, a pressure ulcer can be confused with moisture-associated skin damage, dermatitis, inflammatory conditions or even cancer. While there is a desire to simplify and optimise wound care, wound care is complex and support that goes beyond the T.I.M.E. CDST is required, i.e. the approach to malignant and ischaemic wounds is very different to other wounds, such as pressure ulcers and venous leg ulcers.

To ensure complete adoption and continuation of practice using the T.I.M.E. CDST, time is required; there are no quick fixes to improving care. It is also essential that all staff members, including administration, 'buy-in' to a new approach, and that enthusiasm can be sustained.

Conclusion

The T.I.M.E. CDST is designed to promote consistent holistic wound management and eliminate variation in practice. For the clinicians who used the T.I.M.E. CDST in this case series, it provided a systematic approach to wound management. Its use enhanced the confidence of the non-wound specialist staff to assess tissue type, and to identify the presence of infection and abnormal exudate.

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Declaration

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