Reviewing the use of the aetiology-specific T.I.M.E. Clinical Decision Support Tools to promote consistent holistic wound management and eliminate variation in practice

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Aim: This study aimed to explore the experiences of non-wound care specialists using the T.I.M.E. (Tissue, Infection/inflammation, Moisture imbalance and Edge of wound) Clinical Decision Support Tool (CDST) to help guide the management of chronic wounds and to understand if they could use the tool to make informed decisions ensuring appropriate early intervention. 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. **Methods**: The four aetiology-specific T.I.M.E. CDSTs were evaluated by three clinical specialists in centres in Malaysia, the Netherlands and the USA. Each specialist asked non-specialists to use and evaluate the tool on three or four different patients over a 4-week period and report how the tool influenced practice. **Results**: Responses indicated that the aetiology-specific T.I.M.E. CDST was easy to use, enhancing confidence, encouraging evidence-based decisions and supported wound assessments, particularly aiding the assessment of tissue type. **Conclusions**: the aetiology-specific T.I.M.E. CDSTs facilitates decision-making and provides guidance for non-specialists on the most appropriate treatment intervention for the different wound types.

Declaration
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Reducing the impact of chronic wounds continues to be a major area of focus within healthcare. In the UK, lower-limb wounds are estimated to effect 4.5% of the population, rising 12% per year according to recent forecasts (Guest et al, 2020). In a retrospective cohort study examining the incidence of chronic wounds in Singapore between 2000 and 2017 using a nationwide claims database, Goh et al (2020) found that 124,023 wound-related claims among 86,631 patients were identified, with wounds being more common amongst those over 80 years. Gunningberg et al (2013) found prevalence rates for pressure ulcers in Sweden of 16.6% and 14.5% in hospitals and nursing homes, respectively.

There are substantial costs associated with the treatment and management of chronic wounds and it is estimated that £530 million per year is spent (Guest et al, 2015) on wound care in the UK, comprising of nursing time, treatments and inpatient care. The cost of wound care is also a problem internationally. In the USA, approximately 2.5 million patients suffer hospital-acquired PUs (HAPUs) at an annual cost of almost $26.8 billion (Padula et al, 2020) and in the Netherlands, wound care is estimated to cost £1.5 billion (Capgemini Consulting, 2014) demonstrating the importance of appropriate wound care management.

Diverse levels of nursing knowledge, often attributable to differences in the delivery and accessibility of training and education, can cause variances in practices across services and the implementation of inappropriate wound management strategies (Guest et al, 2015). Gaps in clinician knowledge and limited confidence in decision making (Blackburn et al,

2019) further these discrepancies, highlighting the importance of reducing variances in care. Delayed wound healing is a well-known consequence of incorrect wound care (Dowsett and Hall, 2019) and can exacerbate negative patient impacts and quality of life (International Consensus, 2012; Gould et al, 2015).

Creating parity across wound care services can support a holistic approach to wound management, and the strategic integration of evidence-based wound assessment tools into clinical care is one method reducing disparity (World Union of Wound Healing Societies [WUWHS], 2016) and promoting a holistic wound management approach (WUWHS, 2020). These instruments can assist with, and guide decision-making (Blackburn et al, 2019), but not all clinicians adopt them into their clinical practice (Ousey et al, 2018), perhaps due to some difficulties non-specialists have following guidance when they do not feel confident in making decisions without support from specialists (Blackburn et al, 2019).

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

To support the adoption of a wound assessment framework in clinical practice a clinical decision support tool (CDST) was developed; T.I.M.E CDST (Moore et al, 2019). Using an 'ABCD and E' approach, and with a core focus on holistic wound care within a multidisciplinary team, the tool has evolved from its initial introduction (Schultz et al, 2003) of Tissue, Infection and/or inflammation, Moisture balance and Edge of the wound. A multi-centre international clinical evaluation of the T.I.M.E. CDST by non-specialists who were asked to evaluate the tool on different patients over a 4-week period was performed at four different centres including Australia (Swanson et al, 2019; Carville et al, 2019), Canada (Woo, 2019) and Denmark (Jelnes et al, 2019) established that non-specialists felt the tool helped decision-making and reduced their reliance on specialists for support (Blackburn et al, 2019). More widely, the T.I.M.E framework has favourable outcomes on clinician knowledge of wound care when combined with structured education (Dowsett, 2009).

Aetiology-specific T.I.M.E. CDSTs

Further developments of the T.I.M.E. CDST have produced aetiology-specific frameworks for venous leg ulcers (VLUs), pressure ulcers/injuries (PU/PIs), diabetic foot ulcers (DFUs) and dehisced surgical wounds (SWD), each benefiting from specific prompts for each condition while still maintaining the core features of the original tool. These recent advancements were produced with input from healthcare professionals in tissue viability from the UK, and wound, ostomy and continence nurses in the USA. Evidence from the implementation of the VLU T.I.M.E. CDST shows the tool supports decision making and communications between specialists and non-specialists (Post et al, 2021). Nair and Kaur (2021) used the DFU version of the T.I.M.E. CDST on four patients treated in wound care clinic at Kuala Lumpur Hospital in Malaysia and found that non-specialists felt the tool aided confidence, supported correct and consistent use of dressings for wound management, and enhanced specialist and non-specialist communications. Phelps et al (2021a) employed the dehisced surgical wounds aetiology-specific T.I.M.E. CDST with a team of non-wound care specialist staff (homecare nurses) in a homecare setting in the USA with staff reporting that it supported decision-making and guided appropriate treatment with a reduced need to seek assistance from specialists. Similar findings were reported by Phelps et al (2021b) with non-specialists using the PI aetiology-specific T.I.M.E. CDST to help guide wound bed preparation, dressing selection and ongoing management of three patients in the USA.

Aims and objectives

The aims of this study were:

- To examine the experiences of non-wound care specialists from four centres who used the four aetiology-specific T.I.M.E CDSTs to understand if the tool helped to guide practice to make informed decisions in the absence of a wound care specialist
- To understand if the T.I.M.E CDSTs help to guide decision-making in wound management.

Methods

A questionnaire assessing the use of the tool was designed and administered to wound care practitioners treating patients with chronic wounds at centres in the Netherlands (Post et al, 2021), Malaysia (Nair and Kaur, 2021), USA (Phelps et al, 2021a; 2021b) between June and October 2021.

Participating clinicians were asked what types of wounds they were involved in treating (options: VLU; PI; SWD; DFU), and the duration of their employment in health care. Information on patient gender, age and wound type was collected.

Assessment of the tool was facilitated via a series of 5-point Likert-style items asked

Access the aetiology-specific T.I.M.E. CDSTs.

- **Venous leg ulcers**
  https://bit.ly/3Bwu6T5
- **Pressure ulcers/injuries**
  https://bit.ly/369hEwX
- **Diabetic foot ulcers**
  https://bit.ly/3LK5DyC
- **Dehisced surgical wounds**
  https://bit.ly/3GQP7ZX

of clinicians regarding their use of the tool in wound treatment. These items elicited information relating to whether the use of the tool resulted in: enhanced confidence; reduced need for assistance; more consistent use of formulary; improved assessment of tissue type; prompt of identification of infection; prompt of identification of exudate; improved identification of epithelisation. Three additional items eliciting open-ended responses were also included in the questionnaire and respondents were asked to indicate how the aetiology-specific tool was used to select their chosen intervention, if the tool reduced the need for specialist support and the ease or difficulty of using the tool in practice. This data were collected weekly after commencement of treatment for four occasions.

Data were analysed descriptively; considering changes with time in overall patterns of responses to individual items and also in a summed score measure. This score was based on responses to all seven items and hence could range from seven points (representing extreme dissatisfaction with the tool) to 35 points (representing extreme satisfaction with the tool). A consistently neutral respondent would score 21 points on this measure.

Results

Data were collected over the 4-week period from clinicians treating 16 patients (10 males, 6 females); aged between 32 and 92 years (mean age 58.75 years; SD 16.31 years). Most clinicians treated one patient only; some clinicians treated more than one patient; and a small number of patients were treated by more than one clinician. Four patients with each type of wound (DFU, PI, SWD and VLU) were represented.

The most common type of wounds reported to be treated by participating clinicians was leg ulcers, with 15 out of 16 patients treated by clinicians with experience in treating this type of wound. A total of 14 out of 16 patients were treated by clinicians with experience in treating PIs; 13 out of 16 patients were treated by clinicians with experience in treating DFUs; 12 out of 16 patients were treated by clinicians with experience in treating SWD.

Participating clinicians had been employed in health care for periods of time stated to be from less than 5 years to over 20 years. The median length of employment in health care was between 5 and 10 years. Complete sets of data over the 4-week period were obtained from clinicians treating 14 patients. Data from Week 1 and Week 2 only were obtained from the treatment of one patient. Some items were omitted from the questionnaire filled in on behalf of another patient.

Week 1 response data

Responses were generally positive. Of those clinicians reporting a full set of data, scores ranged from 23 to 32 points, with a mean summed score of 27.1 points per respondent. No respondent gave the response Strongly Disagree to any item, and only two respondents gave the response Disagree to a single item only. The most common response was Agree to all items. 79% of all recorded responses were Agree or Strongly Agree.

The items eliciting the most positive responses were Aided identification of epithelialisation and Aided identification of tissue type; with responses to both items totalling 61 out of a possible 75 points. The item on which the tool yielded the lowest mean item score was Reduced need for assistance; with responses to this item totalling 54 out of a possible 75 points.

Clinicians treating patients with DFUs responded more positively than those treating other wound types; with a mean score of 4.21 for clinicians treating DFU patients, and mean scores of 3.75 to 3.76 for clinicians treating patients with other wounds.

Week 1 responses are summarised in *Figure 1*. The preponderance of responses of Agree can be clearly discerned.

Week 2 response data

Responses were generally positive and similar to those obtained at Week 1. Of those clinicians reporting a full set of data, scores ranged from 23 to 35 points, with a mean summed score of 28.1 points per respondent; an increase of 1.0 points on Week 1. No respondent gave the response Strongly Disagree to any item, and only 1 respondent gave the response Disagree to a single item only. The most common response was Agree to all items. 79% of all recorded responses were Agree or Strongly Agree; a similar proportion as at Week 1.

As at Week 1, the items eliciting the most positive responses were Aided identification of epithelialisation and Aided identification of tissue type; with responses to both items totalling 63 out of a possible 75 points. The items on which the tool yielded the lowest mean item score were Reduced need for assistance, Enabled more consistent use of formulary, Prompted infection identification and Prompted exudate identification; with responses to all these items totalling 58 out of a possible 75 points.

Figure 1: Clinician responses after 1 week of using the aetiology-specific T.I.M.E. CDSTs.

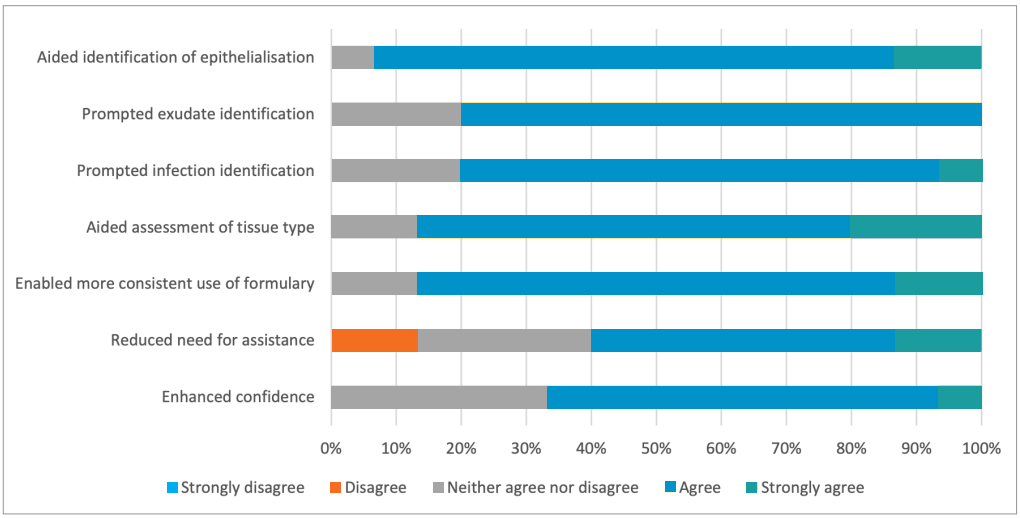
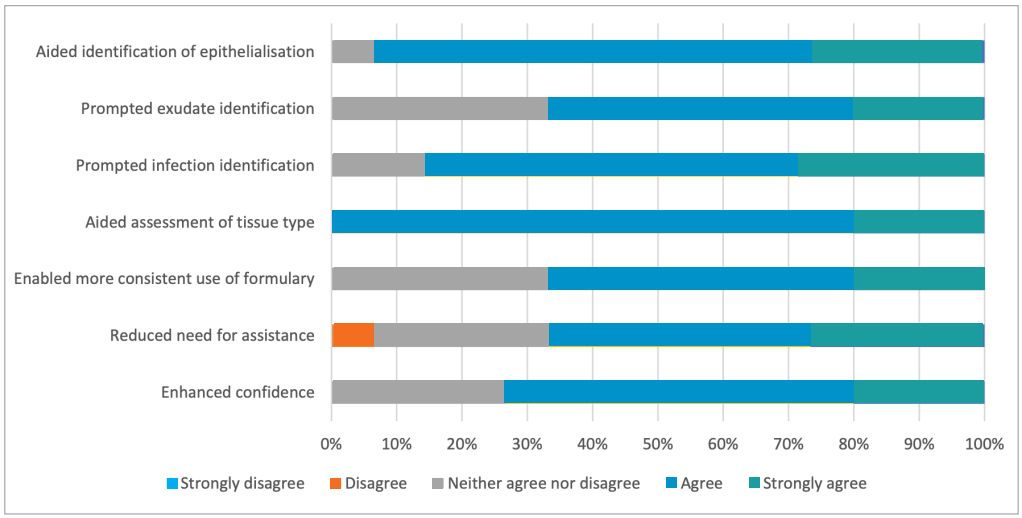


Figure 2: Clinician responses after 2 weeks of using the aetiology-specific T.I.M.E. CDSTs.



Clinicians treating patients with DFUs continued to respond more positively than those treating other wound types; with a mean score of 4.54 for clinicians treating DFU patients. This was followed by clinicians treating surgical wounds (mean score 4.09), clinicians treating venous leg ulcers (mean score 3.74), and clinicians treating PIs (mean score 3.68). These last two categories represented very slight reductions from the Week 1 mean scores.

Week 2 responses are summarised in *Figure 2*. As for Week 1, the preponderance of responses of Agree can be clearly discerned.

Week 3 response data

Responses remained very positive, with a further slight improvement was observed in responses collected at Week 3, although these were broadly very similar to those obtained at Week 2.

Of those clinicians reporting a full set of data, scores ranged from 23 to 35 points, with a mean summed score of 29.1 points; an increase of 1.0 points on Week 2. No respondent gave the response Strongly Disagree to any item, and only one respondent gave the response Disagree to a single item only. The most common response was Agree to all items except Reduced need for assistance; for this item equal numbers of respondents gave the responses Strongly Agree, Agree and Neither agree nor disagree. 81% of all recorded responses were Agree or Strongly Agree; an increase of 2 percentage points on the corresponding Week 2 proportion.

The item eliciting the most positive responses was Aided identification of tissue type; with responses to this item totalling 69 out of a possible 80 points. The item on which the tool yielded the lowest mean item score was Reduced need for assistance; with responses to this item totalling 62 out of a possible 80 points.

Clinicians treating patients with DFUs continued to respond more positively than those treating other wound types; with a mean score of 4.96 for clinicians treating DFU patients. This was followed by clinicians treating surgical wounds (mean score 4.04), clinicians treating VLUs (mean score 3.89),

and clinicians treating PIs (mean score 3.68). Hence, the largest contribution to the positive responses yielded by the tool was from clinicians treating patients with DFUs.

Week 3 responses are summarised in *Figure 3*. While the dominant response is still Agree, the proportion of Strongly Agree responses is similar in most items.

Week 4 response data

A further slight improvement from Week 3 was observed in Week 4, with the responses of Strongly Agree now outnumbering the responses of Agree. The pattern of change between weeks 3 and 4 continued the earlier trend, with a small number of respondents transferring responses from Disagree to Neither Agree Nor Disagree; and a small number of respondents transferring responses from Agree to Strongly Agree. Some 87% of all recorded responses were Agree or Strongly Agree; an increase of 6 percentage points on the corresponding Week 2 proportion.

Of those clinicians reporting a full set of data, scores ranged from 25 to 35 points, with a mean summed score of 30.3 points; an increase of 1.2 points on Week 3.

The item eliciting the most positive responses was Aided identification of tissue type; with responses to this item totalling 71 out of a possible 80 points. The items on which the tool yielded the lowest mean item score was Reduced need for assistance and Prompted infection identification with responses to both these items totalling 66 out of a possible 80 points.

Clinicians treating patients with DFUs continued to respond more positively than those treating other wound types; with all items reported by these clinicians yielding a response of Strongly Agree; hence, a mean score of 5.00 for clinicians treating DFU patients was recorded. This was followed by clinicians treating surgical wounds (mean score 4.21), clinicians treating venous leg ulcers (mean score 4.11) and clinicians treating pressure injuries (mean score 3.93). Hence, all wound types were associated with a substantial increase in mean score between Week 3 and Week 4.

Week 4 responses are summarised in *Figure 4*.

Figure 3: Clinician responses after 3 weeks of using the aetiology-specific T.I.M.E. CDSTs.

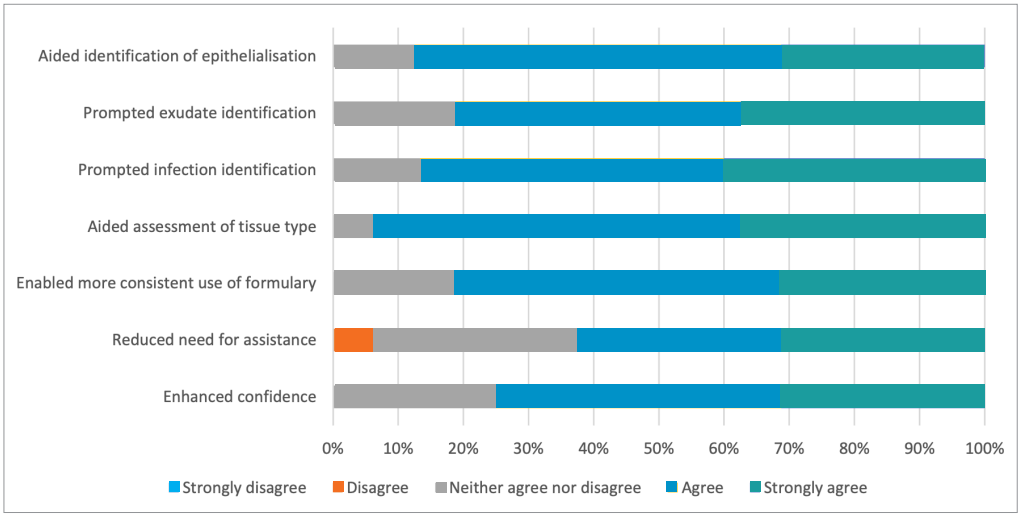


Figure 4: Clinician responses after 4 weeks of using the aetiology-specific T.I.M.E. CDSTs.

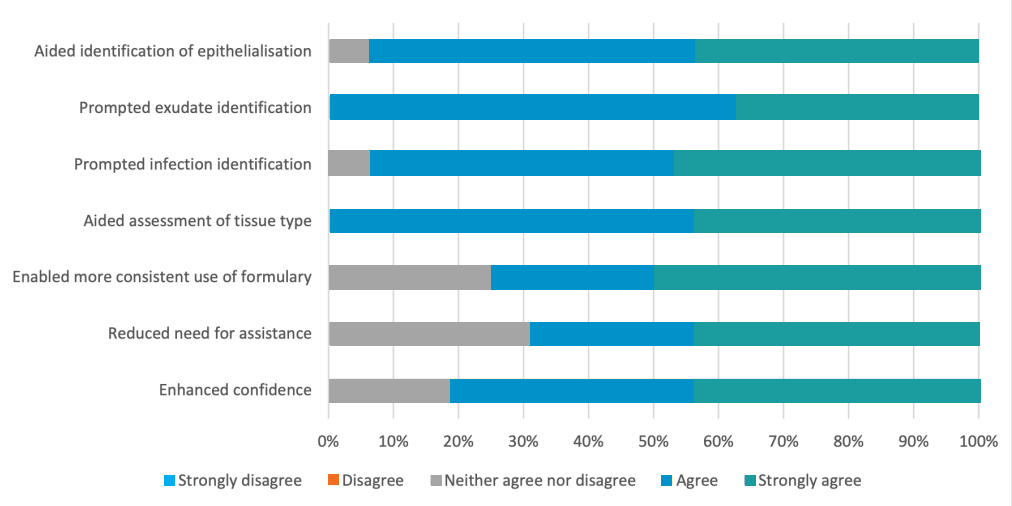
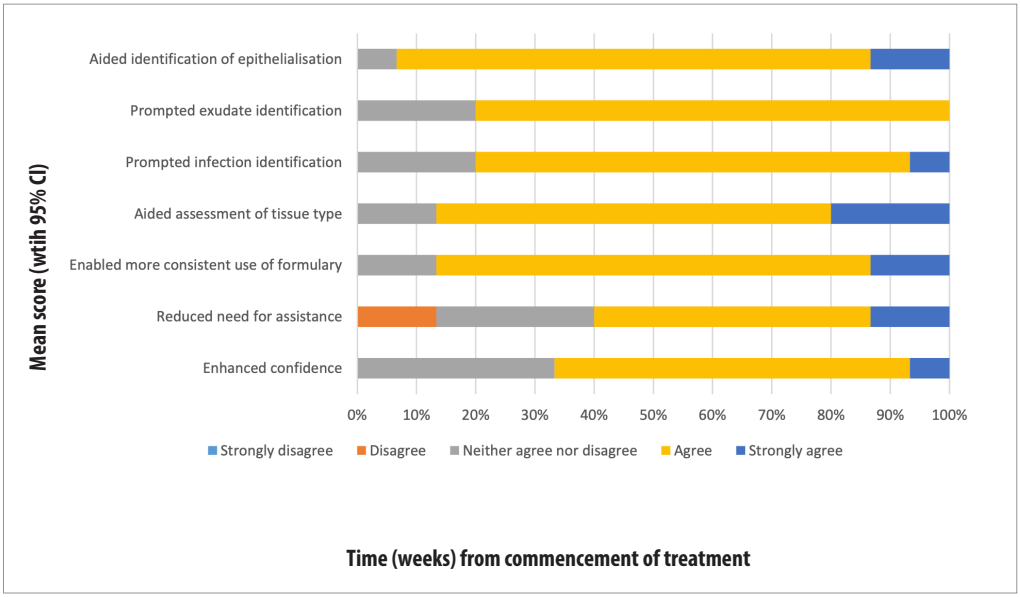


Figure 5: Mean summed scores at 1, 2, 3 and 4 weeks after treatment.



It may be seen that Strongly Agree is now the dominant response in most items.

The change in mean assessment scores over time indicates a consistently positive response to the tool, with time-dependent changes small and non-significant *[Figure 5]*. This reflects the consistency of responses to individual items as noted above. However, the confidence intervals suggest non-significant differences. This is likely to be a consequence of the small sample size. The overall increase form Week 1 to Week 4 is an increase of about 10%.

Qualitative findings and discussion

The overall aim of this study was to explore the experiences of non-wound care specialists using the four aetiology-specific T.I.M.E CDSTs to understand if the tool supported decision-making in clinical practice, enabling clinicians to make informed decisions in the absence of a wound care specialist. Responding clinicians had varied levels of experience in health care ranging from 5–10 years on average, and were primarily involved in the treatment of VLUs, PI/PUs and DFUs. The tool was consistently rated well by the respondents, with the most highly rated item being Aided identification of epithelialisation. This is in contrast to the findings of Blackburn et al (2019) where aiding the identification of epithelialising wounds was the least highly rated item and aiding the assessment of tissue type was most highly rated.

The proportion of clinicians who agreed or strongly agreed with statements was over 79% at Week 1, rising to 87% by Week 4. There were also small, but consistent improvements in wound assessments over time with the largest improvement occurring between Week 3 and week 4 and it could be possible that familiarity with using the tool in clinical practice has a longer term positive impact on decision making. Consistent positive ratings suggest that the T.I.M.E. CDST is a useful method of providing a structured approach to wound management, encouraging reliable holistic wound assessments that can reduce variations in practice and promoting consistency of care. The least highly rated item was reducing the need for assistance, suggesting that although the tool supported clinical decision making, specialist input was still required for a number of respondents. Clinicians treating DFUs consistently rate the tool higher than clinicians treating other types of wounds, although very high ratings were also given by those treating surgical wounds than those treating other types of wounds.

Qualitative responses from the respondents found the aetiology specific T.I.M.E. CDSTs were straightforward and easy to use and utilised similarly across the four different aetiologies.

'This tool is a good structured assessment of wounds. It makes me feel confident managing wounds.'

One respondent using the VLU T.I.M.E. CDST said following the framework step by step guided their assessments.

'I followed the routine of the specific tool. The wound consistency was the same, but the size differs. (T.I.M.E) Thanks to the steps I do become aware of how to look at the wound and how to assess it. This will affect the rating of the wound.'

Higher ratings were given by clinicians treating DFUs and surgical wounds than those treating other types of wounds. One clinician using the SWD tool described how it helped them in their wound assessment and dressing selection.

'This tool allowed me to assess the wound and pick out the appropriate dressing to help with healing of the wound. I have trouble when it comes down to picking out a dressing choice.'

By providing guidance in wound assessment, the respondent felt able to select the most appropriate wound intervention to optimise wound healing.

'I assessed the moisture barrier to see how much moisture the wound contained. I assessed the viability of the wound tissue. I monitored for infections, inflammation and monitored for epithelization around the edges.'

Several clinicians felt the T.I.M.E. CDST helped them to select the most appropriate wound management intervention and enabled them to trust their clinical judgement without the need to rely on specialist clinicians.

'T.I.M.E helped me to choose the proper dressing and other interventions, like ABPI [ankle brachial pressure index] and compression'

One respondent using the PI tool described how they used it for guidance on dressing utilisation.

'[The tool] specifies the dressing needed for each type of wound'

'By using the tool I was able to choose the appropriate treatment to promote healthy healing of the wound'

Responses to the structure and layout of the tool was mixed; some respondents felt it was clear, well-structured and easy to use to guide their assessments, providing a 'step by step assessment'. Many respondents described the tool as being easy to use and they also tended to rely less on specialists for support and guidance.

'The tool is user-friendly and clear to use. The assistance was not necessary because it was clear what the best solution was.'

One respondent using the VLU tool stated that the pictures supported decision-making.

'I compared what I see with the pictures on the tool and in that way I came to my decision.'

There were others who felt the tool was complex and described it as being 'confusing' and 'difficult to read".

'The chart is very confusing. It is too busy. At first, I had to seek help on how to read the chart'

These respondents tended to rely more on specialists for support and reassurance in decision making and did not feel confident in their own ability to provide optimum wound care.

'I didn't feel confident about wound care. I see the wound getting bigger. Little change in the wound bed. The help or assistance of a specialist nurse remains necessary, in addition to using the tool.'

The tool appeared most useful for clinicians who were more confident, implying that building a knowledge base of wound care assessments, terminologies and treatment plans, makes it more likely that non-specialists can successfully implement the tool to help provide consistent patient care. For example, one respondent using the VLU tool stated the importance of existing knowledge when using the tool to support with treatment decisions.

'The tool has led me to rely on my own knowledge and experience. if I did not have knowledge and experience in wound care, it would have been very difficult to make a correct wound policy.'

Other clinicians felt the tool provided them with the confidence they need to make decisions in the absence of a specialist.

'The tool was very clear and it has given me the confidence to seek less assistance from a specialist nurse.'

Conclusion

This study found that overall, the aetiology-specific T.I.M.E. CDSTs facilitated decision-making and provided guidance for non-specialists on the most appropriate treatment intervention for the different wound types in the absence of a wound care specialist; thus fostering a holistic approach to wound management and consistency of care. Consistent with the findings from Blackburn et al (2019), who focussed on the T.I.M.E. CDSTs, this study identified the importance of ongoing

education for non-specialists to empower them to continue to make informed decisions about wound management in their clinical practice (Selman et al, 2016; Zieber and Sedgewick, 2018), reducing the dependence on senior colleagues (Thompson et al, 2004). These findings support research by Dowsett (2009) who found that wound care knowledge was increased when the T.I.M. E CDST was incorporated with structured education. Despite this, adopting the aetiology-specific T.I.M.E. CDSTs into clinical care can provide a more organised, evidence-based approach to wound care. WINT

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