

TIME-H in clinical practice — a pilot study

Conduit C, Free B & Sinha S

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INTRODUCTION

The concept of wound bed preparation (WBP) has evolved considerably since its formal inception¹⁻⁵. Several tools have been developed which encourage the process of WBP and wound healing, including TIME which was first introduced in 2003^{4,9}. The acronym TIME (tissue, infection, moisture, edge) remains at the forefront of chronic wound management 10 years on^{1,2,10-13}. The tool identifies elements for optimal WBP in order to provide coordinated management of a chronic wound to achieve effective healing⁵.

However, TIME does not offer any prognostic indication — an important aspect of wound management to enable development of management goals and strategies for individual patients. In order to address this issue, Ligresti and Bo³ proposed the concept of TIME-H, which embraces both the local conditions of the wound and the general condition of the patient. The authors assigned a numerical value to each parameter to develop a 'healing score' (Tables 1–3) for the purpose of predicting wound healing time and planning an individualised treatment protocol.

Chronic wounds affect around 1% of individuals in developed countries¹⁴ and are estimated to cost the Australian health care system A\$3 billion annually¹⁵. In addition, a myriad of social and physical issues arise from chronic wounds which cause significant morbidity

to those affected^{3,16,17}. Hence, any tool which claims to be able to guide wound healing is worthy of further research to validate this for routine clinical application.

The present study was undertaken as a pilot project to evaluate TIME-H in clinical practice with a case-based approach.

CASE DISCUSSION

The TIME-H protocol was implemented as a pilot project for all patients attending the chronic wound clinic at the Royal Hobart Hospital in late 2012. The clinic, which was established in 1994 in Hobart (Tasmania, Australia), is publicly funded and available on referral from a medical practitioner for patients requiring specialist wound management^{18,19}.

However, after closely following 10 patients over a period between 10 and 12 weeks (between September and December 2012), it soon became apparent that there were several difficulties in the application of TIME-H, which will be discussed here with three of the selected patients to illustrate the pros and cons TIME-H and our suggestions to modify this tool.

Case one: Wound remained unhealed, where healing was expected

The first case involved an 84-year-old female who presented to the clinic with an ulcer on her left lateral ankle secondary to trauma. Her initial and final scoring is provided in Table 4. Despite the scoring at her initial assessment, which indicated that wound healing was 'certain', after two months of standard treatment in our clinic the patient's wound remained unhealed. Given this patient's apparent inaccurate prognosis, despite implementation of TIME-H principles of WBP, this raises the possibility of inter-assessor variability when using TIME-H.

Case two: Accurate prognostication of an uncertain healing wound

This is the case of an 82-year-old female who presented to the clinic with a right lower limb venous ulcer. After two months of treatment, the patient achieved significant improvement in her wound, with a 53% reduction in total scores over this period (with improvements in all wound bed characteristics) (Table 4). During this time, she underwent regular manual debridement followed by hydrofibre® dressings and graduated compression bandage. Despite the significant improvement, the patient's wound never resolved and she was therefore appropriately labelled as 'uncertain healing' during the initial assessment.

Ciara Conduit

Medical student, University of Tasmania

Belinda Free

RN, GradCertWoundCare, Royal Hobart Hospital

Sankar Sinha*

OAM, M Ed, B.Sc, MBBS, MS, MNAMS, FRACS, FACS
Professor of Wound Care (Discipline of Surgery),
University of Tasmania; Staff Specialist, Royal Hobart
Hospital; Professor & Head of Anatomy, University of
Notre Dame Australia, School of Medicine, Sydney,
Australia

Tel +61 3 6226 4874

Mobile 0438 254 623

Email sankar.sinha@utas.edu.au

* Corresponding author

Table 1: TIME-H scoring³

WOUND SCORE	0	1	2	3
T – presence of necrotic tissue	0%	30%	60%	90%
I – presence of inflammation/infection	Absent	Contamination	Colonisation	Infection
M – presence of maceration	Absent	Little exudate	Much exudate	Smelly exudate
E – presence of epidermis reconstruction	0%	30%	60%	90%

Case three: Persistence of high scores despite wound resolution

This final case is that of a 94-year-old female who presented with high TIME-H scores for her right leg ulcer (Table 4), which developed on the background of peripheral arterial disease and known diabetes mellitus. Upon her first presentation, the patient underwent manual debridement and was then commenced on second daily hydrofibre silver dressings with a retention bandage. Within six weeks of commencing this treatment, there was complete resolution of her wound. Interestingly, this ‘difficult healing’ wound paradoxically healed after a short period of treatment, which further highlights the potential subjectivity of TIME-H scoring and variability between assessors as highlighted in case one. At the time of wound resolution, the patient had persistently high general condition scores (general conditions=5), which raises the possibility that the general condition of the patient may play too large a role in TIME-H scoring.

STRENGTHS AND WEAKNESSES OF TIME-H

The WBP principles of TIME are well described in the literature and are generally reported to provide excellent guidance for health professionals managing chronic wounds^{1,4,5,10-13,20}. The authors of this paper agree that the *principles* of TIME’s WBP are sound and have significant merit in guiding clinical practice, as exemplified by case two. Specific assessment of tissue, infection, moisture and wound edge encourages in-depth assessment of wounds and assists in the identification of possible barriers to healing. In addition, the

Table 2: TIME-H scoring³

GENERAL CONDITION	0	1
Mental state	Good	Poor
Self-sufficiency	Good	Very poor
Nutrition	Good	Poor
Age in years	<70	>70
Predisposing disease	Absent	Present


Table 3: TIME-H scoring³

HEALING SCORE	
Certain healing	0–6
Uncertain healing	7–12
Difficult healing	13–17

recognition that the general condition of the patient may contribute to poor healing through TIME-H, is key to holistic assessment of chronic wounds.

However, in the course of clinical practice, we have observed several instances where application of TIME-H is not necessarily objective in its assessment and therefore may add confusion. The cases described above highlight the issues, which will be discussed further in the following paragraphs.

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Table 4: TIME-H scoring for case discussion

Case details	Date	TIME-H scoring					Total
		T	I	M	E	H	
Case one: CERTAIN HEALING							
84-year-old female;	27/9/12	0	1	1	1	2	5
unhealed	22/11/12	1	1	1	1	2	6
Case two: UNCERTAIN HEALING							
82-year-old female;	5/10/12	2	2	2	2	3	11
unhealed	12/11/12	1	3	3	2	3	12
	17/12/12	0	1	1	1	3	6
Case three: DIFFICULT HEALING							
90-year-old female; healed	4/10/12	3	2	3	2	5	15
	22/11/12	0	0	0	0	5	5

The main issues identified by the authors are as follows:

- inter-observer variability/subjectivity, and
- the impact of the general condition scoring upon total score.

Inter-observer variability

With regard to the first issue, we have observed that health professionals frequently struggle to differentiate between two characteristics for a given TIME-H parameter and may subsequently apply a score in a subjective manner. This potentially contributed to the inaccurate wound prognostication in both cases one and three. In each of the TIME characteristics, the authors believe there is potential for this subjectivity.

- **Tissue.** Scoring the presence of necrotic tissue as discrete numbers potentially exposes assessors to error as they may arbitrarily assign a value to the wound if it falls in between two parameters. For example, where a wound has approximately 50% necrotic tissue; should this score 1 or 2 points? Through the development of reference ranges to describe the necrotic tissue, this subjectivity can be avoided.
- **Infection.** Given that all chronic wounds are contaminated (unless otherwise proven by culture)^{12,21}, the ability to score wounds as being ‘absent’ (or not contaminated) is perplexing and clinically inappropriate. Differentiating between ‘absent’ and ‘contaminated’ wound in clinical practice was deemed to be highly subjective. In contrast, the criteria for differentiating between colonised and infected wounds were generally satisfactory and are well described in the literature²¹. For this reason, it may be worthwhile removing the ‘absent’ criterion and instead simply assessing wounds as ‘contaminated’, ‘colonised’ or ‘infected’.

- **Moisture.** The quantification of exudate also provides subjectivity as assessors in our clinic found considerable difficulty when differentiating between ‘little’ and ‘much’ exudate. Removal of this exact quantification, in our opinion, should lead to ease of assessment.
- **Edge.** The term ‘degree of epidermal undermining’ was anecdotally found to be confusing for health professionals when scoring wounds with TIME-H. Instead, we suggest changing the title to the ‘presence of epidermal reconstruction’. In addition, the use of discrete numbers (as for tissue) may also tender room for error and the development of reference ranges should be considered.

The impact of the general condition scoring upon total score

The negative effect of comorbidities upon wound development and healing has been well described in the literature^{3,14}. The addition of general condition scoring in the development of the TIME-H protocol should allow for holistic assessment of patients and their wounds³. As seen in the third case, however, the general condition score often contributes a large numerical value to a patient’s TIME-H score and may, as a result, contribute to inaccurate prognostication of wounds by raising the total score and pushing patients into difficult healing categories with poorer prognosis. After all, the ‘general condition’ score is likely to remain relatively static when compared with wound characteristics in spite of wound healing or resolution. For these reasons, we propose a change to the way the general condition of the patient is considered.

A possible avenue of change could be through the implementation of an assessment tool similar to the Ann-Arbor staging system for lymphoma. In a tool like this, instead of assigning a numerical value

Table 5: A revised TIME-H protocol?

WOUND SCORE	0	1	2
T – presence of necrotic tissue	0%	<50%	≥50%
I – presence of inflammation/infection	Contamination	Colonisation	Infection
M – moisture balance	No exudate	Exudate	Smelly exudate
E – presence of epidermis reconstruction	>90%	30–90%	<30%

Table 6: A revised TIME-H protocol?

GENERAL CONDITION	A	B
Mental state	Good	Poor
Self-sufficiency	Good	Very poor
Nutrition	Good	Poor
Age in years	≤70	>70
Predisposing disease	Absent	Present

Table 7: A revised TIME-H protocol?

HEALING SCORE	Score
Certain healing	0–3A
	0–1B
Uncertain healing	4–6A
	2–4B
Difficult healing	7–8A
	5–8B

to the presence of comorbidities and/or advanced age; we could recognise their presence in a similar fashion as the Ann-Arbor system does for constitutional symptoms in lymphoma²². That is, the absence of any comorbidity likely to impact wound healing could be labelled 'A', whereas the presence of at least one comorbidity likely to impact healing could be labelled as 'B' (Table 6).

After completing the assessment, a patient would then subsequently receive a numerical score based upon the characteristics of their wound according to TIME and subsequently 'A' or 'B' to denote the presence of comorbidities or advanced age. To recognise the importance that comorbidities play on wound healing, a TIME-H score of 2B would confer a more difficult healing wound than one assessed as 3A (in a similar way to Ann-Arbor).

IMPLICATIONS FOR PRACTICE

Our present pilot study with three illustrative cases provided a critical analysis highlighting some of the strengths and deficiencies in the TIME-H tool as reported by Ligresti and Bo³. The issues of inter-assessor variability and the impact of general condition scoring discussed in this article may be significant and should therefore interest health professionals caring for patients with chronic wounds. We expect that the suggestions described above will receive due consideration with the aim of developing an improved assessment tool. A formal study investigating the ability of TIME-H to accurately prognosticate wounds is needed. The revised protocol, which could be the new face of TIME-H in the future, is demonstrated in Tables 5–7 and requires further investigation.

CONCLUSION

TIME-H has enormous potential to rationalise the delivery of chronic wound management. This study has highlighted some potential weaknesses of the published TIME-H tool and has made suggestions for changes which require further investigation and research. In the future it is hoped that chronic wounds could be assessed and managed seamlessly and holistically with precise information communicated effectively between health care teams as easily and uniformly as the Glasgow Coma Scale²³ based on sound evidence.

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