



Role of Time in Bed Preparation for Patients with Complex Traumatic Wounds Treated at Viet Duc University Hospital

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Abstract

Purpose: Caring trauma wound, especially complex wound caused by traffic accident plays an important role, helps to prevent the complications and short length stays as well as reduce the cost. We have conducted the study aiming to evaluate the effectiveness of TIME for bed preparations of patients with complex traumatic wound have been treated at Viet Duc Hospital.

Materials and Methodology: A prospective study of patients with complex traumatic wounds have been treated at the Department of Septic Surgery and Wound care of Viet Duc University Hospital from 1/2020 to 5/2020. The subjects without distinction genders, over 18 years old, with trauma wounds sized from 5 cm in large, full medical record information are enrolled. The data was processed by software SPSS.20.0.

Results: Total 70 cases were diagnosed the complex traumatic wounds, of them, 57 males accounted for 81.4%; 13 female accounting for 18.6%; mean age was 37.1 ± 2.3 . The main cause is road traffic accidents, accounting for 78%, and occupational accidents accounting for 22%. The number of patients with soft tissue wound only was accounting for 21.4%, with complex lesions including tendon and bone accounting for 78.6%. The time from injury to care from 3 to 7 days was commonly in 87.1%, over 07 days was only in 12.9%. The exudative wounds accounted for 74.3%, the size 5 cm to 10 cm was 31.4%, from 10 cm to 15 cm was 58.6%, >15 cm was only 10%. Wounds with necrotic tissue was 24.3%. TIME has applied once the patients hospitalized. Healing time <1 week was 8.6%, from 1 to 3 weeks in 72.9%, and more than 3 weeks in 18.5%. Complications were 3 patients with serious necrosis requiring more debridements, accounted for 4.3%.

Conclusions and recommendations: Results from study shows that the complex traumatic and infected wound should be cared by TIME is effective. Careful and daily checks of wounds, evaluation of healing progress to make the appropriate changes are important issues which help to improve the healing progress.

Keywords: Wound care; Nursing care; Wound Bed Preparation

Introduction

Wound care is an important part of the whole patient care process. Although many measures have been recommended and implemented to reduce the risk of complication, to facilitate the healing process and to ensure patient safety, wound infections still occur frequently. With a predicted year on year increase in the prevalence of wounds of approximately 11%, the burden of wounds on the NHS in terms of cost and associated comorbidities is estimated to rise to around £8-£9 billion by 2018 [1-4].

Infectious wounds always has been, and remains a global challenge for wound care professionals, causing high expenditure in terms of medical care and resources, and adversely affecting quality of life for the patient, with Vietnam being no exception. Some recent cross-sectional surveys showed that this complication accounted for over 12% in some large hospitals. Wound care is very important to help facilitate the healing process, prepare for the next process such as wound repair, skin plastic surgeries... acute wounds are different from chronic wounds that can progress quickly. However, the healing process is also fast if the correct care procedures are followed, especially caring the wounds caused by trauma, or those related to traffic accidents are often dirty and have a high risk of infection [4-7].

First introduced in 2002 and revised in 2012, the TIME framework has been an important

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tool for clinicians in wound management helping to identify the barriers to healing enabling a plan of care to be developed. Since the concept of TIME in wound care has been introduced, in particular for wound preparation, many authors international and national have implemented it, but mostly for chronic wounds, however, not frequently applied for acute and trauma wounds [3,8,9].

Viet Duc University Hospital, one of the leading centers of surgery in Vietnam, performs annually about 70,000 operations [10]. Mostly related to the serious trauma wounds and its complication. Therefore, we carried out the study "Role of TIME for bed preparation for patients with complex traumatic wound at Viet Duc Hospital" aiming to propose a standard regimen in wound care that contributes to reducing the rate of complications of wound care and improving the quality of treatment.

Materials and Methods

Objects

Selection criteria: Prospective study of patients with complex traumatic wounds treated in the Department of Septic Surgery and Wound Care of Viet Duc University Hospital from January 01st, 2020 to May 05th, 2020. The study subjects did not discriminate between men and women, over 18 years old, with full medical records.

The complex traumatic wounds are: Sized from 5 cm × 5 cm damaged all the layers of soft tissues or until tendon and bone.

Exclusion criteria: The patient’s records are not completed

- Chronic wound.
- Cancer wound.

Methodologies

Clinical descriptive, prospective, cross-sectional study with convenient sample size.

Research tools: A wound monitoring sheet with wound/injury monitoring indicators built on the wound management document (wound condition; wound bed; wound exudate; wound pain; signs of infection; wound size; dressing changes; antibiotics...). Vacuum Assisted Closure (VAC) application: indication, time of application, and evaluation of wound.

TIME process: T - I - M - E: All information was monitored and recorded as protocol.

Collecting the data: the wound/injury care processes as well as the wound/injury progress were recorded in sample medical records by the trained team of researchers.

Data processing

Data were collected and analyzed using SPSS.20.0 software.

Results

Total 70 cases, of them, 57 males accounted for 81.4%; 13 female accounting for 18.6%; mean age was 37.1 ± 2.3 (Chart 1, 2) (Tables 1, 2). 82.9% were isolated the microorganism, the bacteriology features are in Table 3 (Table 4, 5).

Discussion

Infectious wounds always has been, and remains a global challenge for wound care professionals. Many efforts and application of policies in infection control, the rate of nosocomial infection in

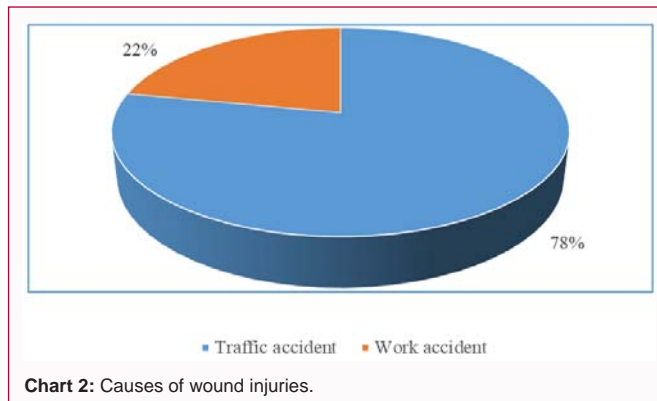
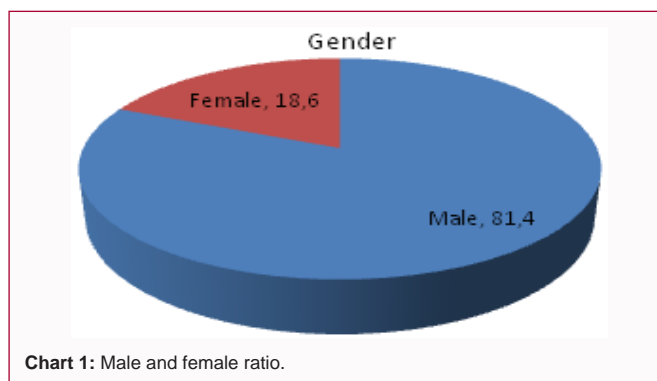


Figure 1: Pictures. Le Van C, one young male patient, 24 years old, had complex and infected wounds on his leg due to motorbike accident. One month and half after having treated with TIME, and further plastic surgery and rehabilitation, the patient returned to normal life with good function of his leg.

Table 1: Location of wounds.

| Description | n | % |
|-------------|----|------|
| Upper limb | 11 | 15.7 |
| Lower limb | 55 | 78.6 |
| Body part | 4 | 5.7 |

general and wound infection in particular in Vietnam has now decreased significantly. A surveillance conducted at the hospitals in cities showed a decrease in wound infection depending on the type of surgery and facility: 5.8% at Saint Paul Hospital (2010), 12.6% at Hanoi Heart Hospital (2010), 5.2% in Da Nang General Hospital (2011) while that at Binh Dinh General Hospital is 8.4% (2012). However, this rate is still related high and needs to be reduced in the

Table 2: Wound classifications and time to care.

| Descriptions | Time from injury to care | Size | Wound criteria |
|--|--------------------------|----------------|------------------------|
| Soft tissue only: 21.4% | 3-7 days: 87.1% | 5-10 cm: 31.4% | exudate wound: 74.3% |
| Associated with tendon and bone lesions: 78.6% | > 07 days: 12.9% | >10 cm: 58.6% | necrotic tissue: 24.3% |
| | | >15 cm: 10% | |

Table 3: Bacteriologies.

| Description | n | % |
|-------------|----|------|
| Aerobic | 47 | 67.1 |
| Anaerobic | 3 | 4.3 |
| Mixed | 52 | 74.3 |

Table 4: Antibiotic therapy.

| Description | n | % |
|---------------|----|------|
| Beta-lactam | 63 | 90 |
| Aminoglycosid | 7 | 10 |
| Macrolid | - | - |
| Lincosamid | 12 | 17.1 |
| Peptid | 23 | 32.9 |
| Quinolon | 31 | 44.3 |
| Oxazolidinon | 3 | 4.3 |
| Combination | 70 | 100 |

Table 5: TIME application.

| TIME application | n | % |
|---|----|------|
| T: Tissue debridements | | |
| Autolytic | 38 | 54.3 |
| Surgical | 32 | 45.7 |
| I: Infection control | | |
| Antibiotic | 70 | 100 |
| Dressing with Antimicrobials, Alginates ... | 38 | 54.3 |
| M: Moisture balance | | |
| VAC * | 12 | 17.1 |
| Dressing | 70 | 100 |
| For dry wound | 17 | 24.3 |
| For exudate wound | 36 | 51.4 |
| E: Epithelial Edge of wound ** | | |
| Daily debridement on bed | 24 | 34.3 |
| Surgical: | 17 | 24.3 |

near future. Data from the another surveys at 7 hospitals conducting by Hung [7], showed that the rate of nosocomial infection accounts for 10% of admitted patients and wound infection ranks second only after respiratory infections [4,6].

For improving the quality of wound care, there are numerous wound assessment tools which Greatex-White and Moxey found to be lacking in some aspects of wound assessment, whilst not providing practitioners with a framework to enable goals to be set. Whilst it is not possible to expand on these tools, there is a useful framework for practitioners which has expanded on the T.I.M.E (Tissue, Infection/ Inflammation, Moisture balance and wound Edge) model of wound bed preparation Schultz et al. [9], namely the Triangle of Wound Assessment (Dowsett, WUWHS, 2016). Wound Bed Preparation

Table 6: Healing.

| Healing time | N | % |
|-------------------|----|------|
| 1 week | 6 | 8.6 |
| From 1 to 3 weeks | 51 | 72.9 |
| More than 3 weeks | 13 | 18.5 |

(WBP) is recommended by experts as the most important step in the care of an infected wound. Many preventions are proposed to prepare the best wound base related to procedures, skills and experience of surgeons and nurses, care products. However, the TIME formula is mostly mentioned because of its effectiveness. Many studies have showed that the routine application of TIME in wound management and WBP. The research organization on cost-effectiveness of health care services in the US mentioned that if TIME is well implemented in wound care, it will bring significant effects [3,7,9-11].

In fact, Viet Duc Hospital in recent years has paid great attention to the quality of trauma care due to the large number of patients, especially the trauma departments of the orthopedic center. The hospital has conducted many applications also focusing deeply on specific care measures, choosing suitable products, in parallel with the new surgical techniques. In which the role of wound care is very important because is not only to help the patient keep his/her injured limb, but also to regain function and ensure aesthetic aspects. The report of Chinh et al. [12], in last the years have shown that most of the victims are injured in accidents, especially because most of the traffic accidents are young and male, so the consequences will be serious if the injuries are not controlled, leading to complications and the risk of disability, impact of their quality of life even death [10].

Additionally, the annual report of Viet Duc Hospital also showed that limb and soft tissue injuries account for nearly half of all traumatic injuries, therefore the role of surgery, the process of wound care is especially important. The application of standard procedures such as TIME and adherence to wound care technique, improving the wound care capacity of medical staff is very concerned. Many studies, trainings, conferences with the participation of international and domestic experts highly appreciate the effective wound care of medical staff in general, and nurses in particular in the treatment of wounds in implementing TIME [10,13].

In our series, males accounted for 81.4%; female accounting for 18.6%; the victim were young as the mean age was 37.1 ± 2.3, related road traffic injuries were mostly in 78% (Figure 1). The wounds were commonly located in legs (78.6%), and upper extremities (15.7%), however, only 5.7% was in the other part (Table 1).

Table 2 showed the wounds features, including: soft tissue wound only was 21.4%, complex lesions: Tendon and bone accounting for 78.6%. Also we found the time from injury to care were from 3 to 7 days commonly in 87.1%, more than 7 days was only in 12.9%. The above mentioned factors impact to the healing wound progress. The exudative wounds accounted for 74.3%, and wounds with size 5 cm to 10 cm was mostly in 31.4%, from 10 cm to 15 cm was 58.6%, >15 cm

was only 10%. Wounds with necrotic tissue was 24.3%.

During the implementation of TIME, it's necessary to control all steps through the wound evaluation and make changes accordingly. Schultz et al. [9], Dowsett and Newton [11] mentioned that WBP is now a well established concept and the TIME framework has been developed as a practical tool to assist practitioners when assessing and managing patients with wounds. It is important, however, to remember to assess the whole patient; the wound bed preparation 'care cycle' promotes the treatment of the 'whole' patient and not just the 'hole' in the patient. That means the wound care should be very comprehensive and all multiple disciplinary team involved.

For control of I and keep M balance, it's important to understanding about the bacteriology examination, especially biofilm and antibiotic therapy. On the other hand, the role of debridement through I to E. According to Tran Doan Dao and Nguyen Hong Ri, debridement should be applied daily on bed or in operating room to assure that the devitalized tissue are removed and facilitate the granulation tissue well developed [8,14-17]. Also the antibiotic therapy is playing one important role in TIME. Besides using the wound care dressing with antimicrobials agent (Alginate) required appropriate antibiotic treatment accordingly to the results of bacteriology examinations needed [3,14,22,23].

For control of I, we have combined both antimicrobial dressing and antibiotic according to the results of bacteriology examinations (Table 3, 4). The caregivers are not only surgeons such as nurses involved should assess the wound healing progress carefully.

Vacuum-Assisted Closure (VAC) is a wound management therapy that creates local negative pressure over a wound bed to promote healing, one important part of TIME. Benefits of VAC therapy include removal of fluid from the extravascular space, improved circulation, enhanced granulation tissue formation, increased bacterial clearance, and hastening of wound closure. In the reports with big sampling of Lambert et al. [18], Hyldig et al. [21], the effectiveness of VAC has proved similarly to other studies of Rezk et al. [19] and Virani et al. [20]. Few complications were recorded in our series such mild skin irritation from contact with the foam, but easy to manage. This complication is also common in the reports of other authors.

In our series, VAC has applied for 17.1% (Table 5). All other exudate wounds were controlled by special dressing and monitored for any further changes. The number of the patients who only need to be changed the dressing without further intervention accounted for 54.3%. The granulation in wound is well developed and healing process is favorable.

Reports of Leaper et al. [8], Schultz et al. [9] and Ousey et al. [15] all clearly show that the application of TIME in wound care for infected wounds brings remarkable results, and the wound bed is clean and granulation was well developed. It helps the plastic surgery process to be effective. TIME has applied once the patients hospitalized. Healing time <1 week was 8.6%, from 1 to 3 weeks in 72.9%, and more than 3 weeks in 18.5% (Table 6). Only 03 patients (4.3%) with serious necrosis required more surgical debridements in wounds (Table 5).

Most important thing for wound care is wound assessment in general. It involves observation, data collection and an ongoing evaluation process. A systematic and evidence-based assessment

provides objective data to confirm wound healing whilst also alerting practitioners about any deterioration in the wound. It enables patients and their family/carers to become involved whilst also giving them confidence in the care they are receiving. It must be seen by practitioners (and managers) as an important first step in wound management with education, time and resources being allocated for this process. Without an accurate assessment that includes determining the underlying etiology of a wound, it stands to reason that appropriate, effective and timely management is potentially absent. In our study, the health staffs who give wound care should be trained on the concept of TIME, WBP and complied it in their daily practice. The wounds were well monitored and appropriate treatment could be changed accordingly [4,6,11,22,23].

Conclusion

Wound care, especially those caused by trauma, is an important part of the treatment process to facilitate healing and reduce the risk of complications and consequences. From the research results, we recommend that a standard wound care process be developed, including appropriate care for infected wounds or exudate wound, etc., which helps to improve the quality of treatment and reduce the risk of infection and slow healing. TIME, one part of WBP is a formula that has been applied for a long time and is effective, so it continues to be widely applied in complex and infectious wound care.

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References

1. Frykberg RG, Banks J. Challenges in the treatment of chronic wounds. *Adv Wound Care (New Rochelle)*. 2015;4(9):560-82.
2. Dung NT, Dung BT. Epidemiology of chronic and acute wound at the department of wound healing. *J Disaster Burns*. 2015;5:35-42.
3. Jones J, Oates D. TIME to assess wounds - a clinical evaluation of Flaminal. *Wounds*. 2018;14:3.
4. Nguyen Dc, Tran TA, Nguyen TQ, Pham GA, Trinh H, Ninh V, et al. Risk factors for surgical site infections at VietDuc Hospital during a 4-month. *THAI J Surg*. 2013;34:115-8.
5. Sugawara G, Nagino M, Nishio H, Ebata T, Takagi K, Asahara T, et al. Perioperative synbiotic treatment to prevent postoperative infectious complications in biliary cancer surgery. A randomized controlled trial. *Ann Surg*. 2006;244(5):706-14.
6. Ohara H, Nguyen VH, Truong AT, Tran Q. Report on Japan-Vietnam collaboration in nosocomial infection control at Bach Mai Hospital, Hanoi from 2000 to 2006. *Trop Med Health*. 2007;35(3):253-9.
7. Nguyen VH, Truong AT, Victor DR, Thanh DT, Nguyen QA, Nguyen LB, et al. Surgical site infection rates in Seven Cities in Vietnam: Findings of the International Nosocomial Infection Control Consortium. *Surg Infect*. 2016;17(2):243-9.
8. Leaper DJ, Schultz G, Carville K, Fletcher J, Swanson T, Drake R. Extending the TIME concept: What have we learned in the past 10 years? *Int Wound J*. 2012;9(Suppl 2):1-19.
9. Schultz GS, Sibbald RG, Falanga V, Ayello EA, Dowsett C, Harding K, et al. Wound bed preparation: A systematic approach to wound management. *Wound Repair Regen*. 2003;11(Suppl 1):S1-28.
10. Annual Report of Viet Duc University Hospital activities. 2018-2019.

11. Dowsett C, Newton H. Wound Bed preparation - TIME in practice. UK: Clinical practice development; 2005.
12. Chinh NG, Anh TT, Pham GA, Hieu D. Remarks on injured patients have been treated at Viet Duc University Hospital from 2016 to 2018. *Preventive Medicine J.* 2019;12-8.
13. Phan TD, Nguyen DC, Pham PK, Notter J, Hanh BM. Effectiveness of training programme on nurses' wound care competencies after one year of implementation. *THAI J Surg.* 2017;38(4):140-6.
14. Wolcott RD, Rhoads DD, Dowd SE. A study of biofilm- based wound management in subjects with critical limb ischaemia. *J Wound Care.* 2008;17(4):145-55.
15. Ousey K, McIntosh C. Understanding wound bed preparation and wound debridement. *Br J Community Nurs.* 2010;15(3):S22-6.
16. Tran Doan Dao. Soft tissue management. Vietnam: National Publisher; 2019.
17. Nguyen HR. Care and management of wounds. *Clinical Practice. J Med.* 2007;88-99.
18. Lambert KV, Hayes P, McCarthy M. Vacuum assisted closure: A review of development and current applications. *Eur J Vasc Endovasc Surg.* 2005;29(3):219-26.
19. Rezk F, Åstrand H, Acosta S. Incisional negative pressure wound therapy for the prevention of surgical site infection after open lower limb revascularization – rationale and design of a multi-center randomized controlled trial. *Contem Clin Trials Commun.* 2019;16:100469.
20. Virani SR, Dahapute AA, Bava SS, Muni SR. Impact of negative pressure wound therapy on open diaphyseal tibial fractures: A prospective randomized trial. *J Clin Orthop Trauma.* 2016;7(4):256-9.
21. Hyldig N, Birke-Sorensen H, Kruse M, Vinter C, Joergensen JS, Sorensen JA, et al. Meta-analysis of negative-pressure wound therapy for closed surgical incisions. *Br J Surg.* 2016;103(5):477-86.
22. Hawn MT, Itani KM, Gray SH, Vick CC, Henderson W, Houston TK. Association of timely administration of prophylactic antibiotics for major surgical procedures and surgical site infection. *J Am Coll Surg.* 2008;206(5):814-22.
23. Arnold MA, Barbul A. Surgical site infections. In: Cameron JL, editors. *Current Surgical Therapy.* 9th Ed. USA: Mosby Co; 2008. p. 1152-60.