

## Role of Bates-Jenson Wound Assessment Tool (BJWAT) in Wound Management

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### Abstract

Wound management is an integral part of surgical specialties. The process of wound healing has been studied in detail and the management of wound and its myriad treatment options have been evolving since the advent of scientific advancements. Proper wound assessment is an important part of wound management. Here we share our experience with the use of Bates-Jenson Wound Assessment Tool in the assessment of wounds.

**Keywords:** Bates Jenson Wound Assessment Tool (BJWAT); Wound assessment; Management.

### Introduction

From the time of injury body initiates a process of tissue repair and wound healing. Wound healing is a dynamic process involving cellular, humoral and molecular mechanisms and consists of phases such as inflammation, proliferation and wound remodeling. Wound healing is a multifactorial process; hence both local and systemic factors should be included for effective assessment of wound. Appropriate assessment enables

interventions at the right time. An adequate assessment is essential for making treatment and recognizing and preventing wound possible complications. Various wound assessment tools are described in literature. Here we describe our experience regarding decisions and management of healing process which involves monitoring and recognizing and preventing wound possible complications. Various wound assessment tools are described in literature. Here we describe our experience regarding the use of Bates-Jenson wound assessment tool in assessment of wounds and thus further management.

### Materials and Methods

This study was conducted in the department of plastic surgery in a tertiary care center during the period January 2019-March 2019. Informed consent was taken from all participants included in the study. Here we studied the use of Bates-Jenson Wound Assessment Tool in the management of wounds. A total of 10 patients were included in the study who were admitted and treated in the plastic surgery ward. Three patients were cases of

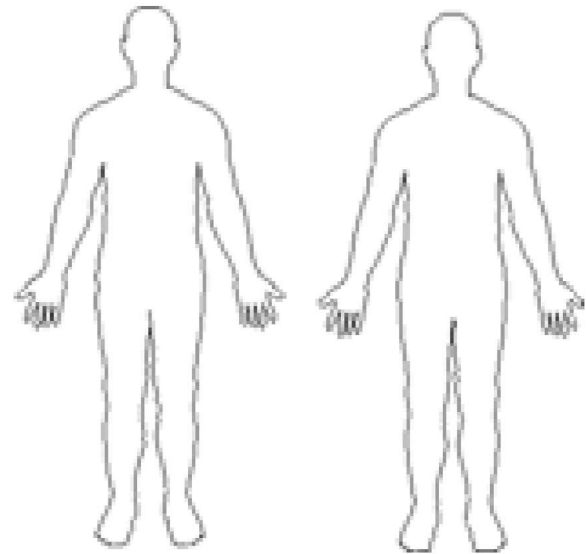
posttraumatic raw area, 4 cases were of diabetic ulcer, 2 were of postsurgical raw area following surgical site infection and one was a case of Fournier’s gangrene. Wound assessment was done using BJWAT Chart on admission and weekly after start of therapy for 4 weeks. Following are the details and guidelines followed while using BJWAT Chart:<sup>3</sup>

*Bates-Jensen Wound Assessment Tool*

*Name*

Complete the rating sheet to assess wound status. Evaluate each item by picking the response that best describes the wound and entering the score in the item score column for the appropriate date.

*Location:* Anatomic site. Circle, identify right (R) or left (L) and use “X” to mark site on body diagrams:



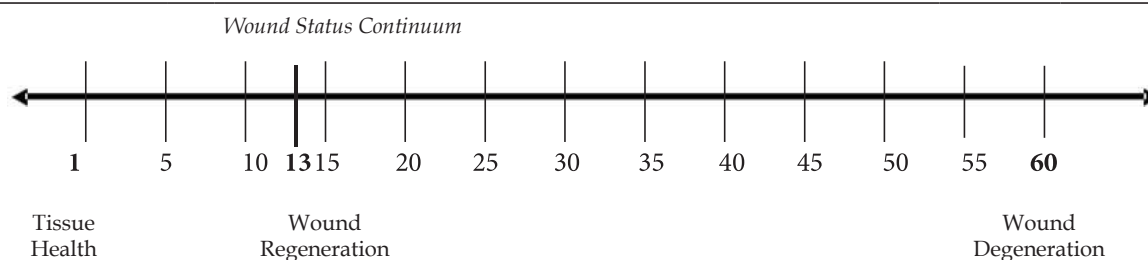
*Shape:* Overall wound pattern; assess by observing perimeter and depth.

Sacrum & coccyx	Lateral ankle
Trochanter	Medial ankle
Ischial tuberosity	Heel                      Other Site

Circle and date appropriate description:		
Irregular	Linear or elongated	
Round/oval	Bowl/boat	
Square/rectangle	Butterfly	Other Shape

Item	Assessment	Date	Date	Date
		Score	Score	Score
1. Size	1 = Length x width <4 sq cm			
	2 = Length x width 4--<16 sq cm			
	3 = Length x width 16.1--<36 sq cm			
	4 = Length x width 36.1--<80 sq cm			
	5 = Length x width >80 sq cm			
2. Depth	1 = Non-blanchable erythema on intact skin			
	2 = Partial thickness skin loss involving epidermis &/or dermis			
	3 = Full thickness skin loss involving damage or necrosis of subcutaneous tissue; may extend down to but not through underlying fascia; &/or mixed partial & full thickness &/or tissue layers obscured by granulation tissue			
	4 = Obscured by necrosis			
	5 = Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone or supporting structures			
3. Edges	1 = Indistinct, diffuse, none clearly visible			
	2 = Distinct, outline clearly visible, attached, even with wound base			
	3 = Well-defined, not attached to wound base			
	4 = Well-defined, not attached to base, rolled under, thickened			
	5 = Well-defined, fibrotic, scarred or hyperkeratotic			
4. Under-mining	1 = None present			
	2 =Undermining < 2 cm in any area			
	3 = Undermining 2-4 cm involving < 50% wound margins			
	4 = Undermining 2-4 cm involving > 50% wound margins			
	5 = Undermining > 4 cm or Tunneling in any area			
5. Necrotic Tissue	1 = None visible			
	2 = White/grey non-viable tissue &/or non-adherent yellow slough			

Type	3 = Loosely adherent yellow slough
	4 = Adherent, soft, black eschar
	5 = Firmly adherent, hard, black eschar
6. Necrotic Tissue Amount	1 = None visible
	2 = < 25% of wound bed covered
	3 = 25% to 50% of wound covered
	4 = > 50% and < 75% of wound covered
	5 = 75% to 100% of wound covered
7. Exudate Type	1 = None
	2 = Bloody
	3 = Serosanguineous: thin, watery, pale red/pink
	4 = Serous: thin, watery, clear
	5 = Purulent: thin or thick, opaque, tan/yellow, with or without odor
8. Exudate Amount	1 = None, dry wound
	2 = Scant, wound moist but no observable exudate
	3 = Small
	4 = Moderate
	5 = Large
9. Skin Color	1 = Pink or normal for ethnic group
Sur-Rounding Wound	2 = Bright red &/or blanches to touch
	3 = White or grey pallor or hypopigmented
	4 = Dark red or purple &/or non-blanchable
	5 = Black or hyperpigmented
10. Peripheral Tissue Edema	1 = No swelling or edema
	2 = Non-pitting edema extends <4 cm around wound
	3 = Non-pitting edema extends >4 cm around wound
	4 = Pitting edema extends < 4 cm around wound
	5 = Crepitus and/or pitting edema extends >4 cm around wound
11. Peripheral Tissue Induration	1 = None present
	2 = Induration, < 2 cm around wound
	3 = Induration 2-4 cm extending < 50% around wound
	4 = Induration 2-4 cm extending > 50% around wound
	5 = Induration > 4 cm in any area around wound
12. Granulation Tissue	1 = Skin intact or partial thickness wound
	2 = Bright, beefy red; 75% to 100% of wound filled &/or tissue Overgrowth
	3 = Bright, beefy red; < 75% &> 25% of wound filled
	4 = Pink, &/or dull, dusky red &/or fills < 25% of wound
	5 = No granulation tissue present
13. Epithelialization	1 = 100% wound covered, surface intact
	2 = 75% to <100% wound covered &/or epithelial tissue extends >0.5 cm into wound bed
	3 = 50% to <75% wound covered &/or epithelial tissue extends to <0.5 cm into wound bed
	4 = 25% to < 50% wound covered
	5 = < 25% wound covered
	Total Score
	Signature



Plot the total score on the Wound Status Continuum by putting an "X" on the line and the date beneath the line. Plot multiple scores with their dates to see-at-a-glance regeneration or degeneration of the wound.

BJWAT was used and scores were calculated every week whenever the wound was debrided and wound bed preparation was done (Figs. 1-3). The assessment tool was used by 5 Plastic surgery trainees on their patients. Feedbacks were collected from them at the end of the study on the basis of which it was concluded whether BJWAT was helpful in their treatment protocol for their patients.



Fig. 1: Wound with BJWAT Score 45 at admission



Fig. 2: Wound with BJWAT score 25 after Wound Bed Preparation (WBP)



Fig. 3: BJWAT Score 13 after treatment (skin grafting)

## Results

BJWAT was used in 10 patients by 5 Plastic Surgery trainees and scores were calculated over a period of 4 weeks. The scores decreased from high to low during the period of 4 weeks, signifying wound regeneration. The assessment scores helped in decision making and planning further management in addition to evaluating efficacy of the ongoing therapy. Based on the scores surgeons were able to plan their appropriate interventions for the desired results. It was found that BJWAT was useful in wound assessment but 2 surgeons felt that it required modifications since it did not consider systemic factors affecting wound healing such as diabetes mellitus, anemia, hypoalbuminemia, smoking etc.

Table 1: BJWAT Scores

S.N.	Week 1	Week 2	Week 3	Week 4
1.	55	35	20	13
2.	50	25	15	15
3.	55	43	20	14
4.	45	22	16	15
5.	40	20	18	13
6.	35	23	15	13
7.	30	21	18	13
8.	50	33	20	15
9.	45	25	17	14
10.	35	23	18	13

Table 2: Questionnaire

Questions	Participants				
	1	2	3	4	5
Is the assessment tool easy to use and comprehend?	Yes	Yes	Yes	Yes	Yes
Were you able to assess the wound condition and able to plan the management?	Yes	Yes	Yes	Yes	Yes
Were you able to correlate the wound condition with the changing score?	Yes	Yes	Yes	Yes	Yes
Were you able to make changes in your management approach based on the score?	Yes	Yes	Yes	Yes	Yes
Do you think modifications are needed in the score?	No	No	Yes	Yes	No

## Discussion

Wound assessment is an important aspect in efficient and effective management of wounds. Choosing a proper wound assessment tool becomes imperative in this set up. It is essential in deciding topical treatment based on wound



status and for recognition of healing and deterioration requiring other interventions.<sup>1</sup> The process of wound assessment should be simple according to Doughty.<sup>2</sup> According to Harris C, wound assessment is a complex process requiring substantial visual and physical assessment skills, combined with clinical judgement and experience.<sup>3</sup> Kobza and Scheurich attribute a significant portion of increased costs associated with wound care to inadequate or variable assessment and inconsistent documentation.<sup>4</sup> One method of improving this process is the use of standardised instrument designed to guide clinicians through a systematic and consistent assessment and documentation.<sup>5</sup> Various wound assessment tools are used in medical practice including PUSH (Pressure ulcer scale for healing), BJWAT (Bates Jensen Wound Assessment Tool), DESIGN (Depth, Exudate, Size, Infection/Inflammation, Granulation tissue, Necrotic Tissue), DESIGN-R (Depth, Exudate, Size, Infection/Inflammation, Granulation tissue, Necrotic Tissue, Rating), PUHP (Pressure ulcer healing process), Wound bed Sore (WBS), Diabetic foot ulcer assessment scale (DFUAS). Most of the assessment tools are based on wound parameters like size, area, volume, depth, exudate, tissue type, signs of infection and inflammation.

Bates-Jenson wound assessment tool is one of the most prevalent wound assessment tools. Originally developed in 1990 as the Pressure Sore Status Tool (PSST), it was redesigned in 2001 and renamed by Barbara Bates-Jenson.<sup>4,6</sup>

Although developed initially for assessment of pressure sores, BJWAT has been used to assess healing of chronic wounds of different etiologies and acute wounds as well. BJWAT assesses 13 wound characteristics with a numerical rating scale and rates from best (1) to worst (5). Total score ranges from 13 (skin closed) to 65 (profound tissue degeneration) (Table 3). Lower scores indicate a better healing index. It is imperative to watch the total score to note whether wound is healing or not. BJWAT has evolved to include measuring and predicting wound healing. Average content validity is 0.62.<sup>6</sup> Validation studies indicate that in addition to having good content validity, BJWAT has excellent intra-and interrater reliability when used by experienced wound care clinicians.<sup>7</sup> There are very detailed instructions for using the BJWAT and Harris and colleagues gave a pictorial guide to help novice clinicians.<sup>3</sup> BJWAT

assesses 13 parameters including size, depth, edges, undermining, necrotic tissue type, necrotic tissue amount, exudate type, exudate amount, skin colour surrounding wound, peripheral tissue oedema, peripheral tissue induration, granulation tissue, epithelisation. Higher scores indicate tissue degeneration and lower scores indicate tissue regeneration. A descriptive tool like BJWAT is not set out to be an outcome measure but rather used for initial assessment.

## Conclusion

This is a preliminary study to assess the use of BJWAT in wound management in a limited setting with limited number of cases. The assessment tool doesn't consider systemic factors of the patient which also plays an important role in wound healing. A positive effect was found but a large multicentric, double blinded control study with statistical analysis is required to substantiate the results.

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