In Focus: Uses and Limitations with using Digital Photography for Pressure Ulcer Staging in the Acute Care Setting

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Specific Aim

- Examine whether a digital photo could reliably convey the characteristics of a pressure ulcer

- Multi-rater agreement used to compare bedside assessment of pressure ulcer by certified WOCN to assessment of the same wound by a panel of experts.

Research Questions

Question 1:

What is the level of agreements between scores on the BWAT 13 characteristics and total score of the bedside assessment and the digital photo assessment?

Question 2:

What is the level of agreement between NPUAP stages of the bedside assessment and the digital photo assessment?

Question 3:

Is there a difference in how CWON's rate characteristics and stage the pressure ulcer based on their background?

Problem/Background

- Digital photography:
  - Used in home care & long-term care settings
  - Used for nursing education
  - Tool for legal and clinical documentation of wounds
  - Allow access to wound specialist via telemedicine

Problem/Background

- WOCN Society has neither recommended nor discouraged use of photography
- Emphasized need for clearly written guidelines & standards
- Need to build a foundation for digital photography use in acute care settings

Methods/Design

- Assessed inter-rater reliability of 13 characteristics and staging of pressure ulcers
- Compared direct CWON onsite observation of the wound with visual inspection of a digital color photograph
- Photograph sent via internet to expert panel of three CWONs for assessment
- Approved by MedStar Health and Georgetown Institutional Review Boards.

Methods/Design

Study Design

- A non-experimental, cross sectional, correlational study

Setting

- General & critical care med/surg nursing units at two of the MedStar Health System hospitals
  - **Georgetown University Hospital** (609 licensed beds)
  - **Franklin Square Hospital Center** (380 licensed beds)

Methods/Design

Sampling Plan & Size

- Non-probability sampling plan
- Convenience sample of **69** adult inpatients at the **2** hospitals
- **100** pressure ulcer photographs

Methods/Design

Wound Photographer Preparation

- Twelve RNs (6 from each site) received 6 hours of training in the techniques of wound photography by an experienced medical photographer

- Following training, each RN assessed for competency by the medical photographer through return demonstration

- Wound photography competency validation conducted using established guidelines
  - Developed by Buckley, Adelson, & Hess (2005)

Methods/Design

Instruments

- Bates-Jensen Wound Assessment Tool (BWAT)©
  - Measures 13 Wound Characteristics

• Tissue Edema	• Drainage Amount	• Drainage Type
• Necrotic Tissue Amount	• Granulation	• Epithelialization
• Necrotic Tissue Type	• Size	• Periwound
• Tissue Induration	• Wound Edge	• Undermining
• Depth		

Methods/Design

Instruments

- National Pressure Ulcer Advisory Panel
  - Definitions for staging were used (2007)

• Suspected deep tissue injury (SDTI)	• Stage III
• Stage I	• Stage IV
• Stage II	• Unstageable

Methods/Design

Data Analysis

- Descriptive techniques
  - Frequencies
  - Measures of central tendency
- Inter-rater reliability analysis
  - Percent agreement
  - Spearman rho correlation
  - Cohen's kappa
- Additional analyses
  - Chi square to assess for differences among the CWONs
  - Linear regression for potential confounding relationships of wound evaluators
  - Study sites on total BWAT scores

Results

Demographic Data

- 7 CWONs served as wound evaluators
  - **3** as panelists at off-site locations
  - **4** as direct observers at MedStar hospitals

Location

- Consistent with literature
- 74% of the wounds located on sacrum/coccyx and the heels

Results

Research Question #1

"Level of agreement between BWAT characteristics and bedside photo assessment"

- The kappa coefficients for the 13 characteristics ranged from *slight* to *moderate* agreement

- Wound characteristics that could be observed and quantified had the highest percent agreements and kappa coefficients

Table 2: Kappa Interpretation

Kappa	Agreement
< 0	Poor
0 - .2	Slight
.21 - .4	Fair
.4 - .59	Moderate
.6 - .79	Substantial
>= .8	Outstanding

Table 1: Inter-rater Reliability for Bates-Jensen Wound Assessment Tool

	Panelist 1			Panelist 2			Panelist 3			
Item	% Agreement	Spearman Correlation	Kappa	% Agreement	Spearman Correlation	Kappa	% Agreement	Spearman Correlation	Kappa	
Size	60%	0.75	**	51%	0.77	**	55%	0.80	**	**
Depth	53%	0.73	**	61%	0.69	**	54%	0.67	**	**
Edges	42%	0.34	**	42%	0.32	**	36%	0.34	**	**
Undermining	78%	0.41	**	79%	0.53	**	77%	0.53	**	**
Necrotic Tissue Type	69%	0.84	0.60	60%	0.70	0.49	50%	0.67	0.37	0.37 - 0.6
Necrotic Tissue Amount	66%	0.83	0.54	66%	0.81	0.53	65%	0.70	0.49	0.49 - 0.54
Exudate Type	43%	0.55	0.24	58%	0.57	0.32	67%	0.48	0.41	0.24 - 0.41
Exudate Amount	41%	0.58	0.23	54%	0.73	0.37	57%	0.58	0.26	0.23 - 0.37
Skin Color Surrounding Wound	47%	0.24	0.17	37%	0.19	0.21	37%	0.05	0.12	0.12 - 0.21
Peripheral Tissue Edema	93% *	0.23	**	96%*	0.33	**	93% *	-0.04	**	**
Peripheral Tissue Induration	80%*	0.19	**	97%*	**	**	95%*	0.32	**	**
Granulation Tissue	49%	0.48	0.34	49%	0.40	0.28	58%	0.51	0.41	0.28 - 0.41
Epithelialization	74%	0.16	0.14	66%	0.31	0.21	72%	0.25	0.17	0.14 - 0.21
NPUAP Stages	62%	0.64	0.48	69%	0.68	0.58	55%	0.39	0.39	0.39 - 0.58

Results

Research Question #2

"Level of agreement between NPUAP stages and bedside photo assessment"

- Inter-rater reliability was deemed *fair* to *moderate*
- Kappa coefficients for NPUAP stages ranged from 0.39 to 0.58
- SDTIs had the *highest level of agreement*
- Percentage agreements on stage III and IV pressure ulcers were *higher* than stage I and II pressure ulcers
- Using digital photos as visual record to depict the staging proved to be highly problematic

Table 3: NPAUP Percent Agreement and Kappa Coefficients

	NPUAP-P1	NPUAP-P2	NPUAP –P3
Stage I	5 %	5 %	0%
StageII	1 %	2 %	1%
Stage III	8 %	9 %	13.1%
Stage IV	13 %	13 %	6.1%
Unstageable	4 %	6 %	5.1%
SDTI	31 %	34 %	30.3%
Kappa	.484	.581	.393
***p*-value**	.000	.000	.000
Interpretation	Moderate agreement	Moderate agreement	Fair agreement

Results

Research Question #3

"Difference in how CWON's rate characteristics and stage the pressure ulcers based on their backgrounds"

- No statistically significant differences between off-site panelists and MedStar wound evaluators

- Great amount of variability in years of work experience as RN & CWONs existed among hospital & panelist wound evaluators

Table 4: Comparison of Wound Experts: Independent Samples t-test

	t (df)	Sig (2-tailed)
Number of beds	1.1 (4)	.33
Years experience as RN	.68 (5)	.52
Years experience wound care RN	.75 (5)	.49
Years certified as WON	1.1 (5)	.33
Average # PU/week	1.7 (5)	.14
Years experience wound photo	.45 (1)	.73

Conclusions

- Results indicate that a photograph alone cannot accurately and reliably convey the characteristics of a pressure ulcer
- SDTIs and unstageable pressure ulcers had the highest level of agreement

Conclusions

Practice Implications

- Bedside assessment continues to be the “gold standard”
- Digital photo in combination with clinical assessment may increase the accuracy of the assessment and documentation

Conclusions

Research Implications

- Exploration and research on wound imaging systems is needed
- Recognizes the current limitations of digital photography use for pressure ulcer staging

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Questions or Comments?

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