

Introduction

Chronic wounds that have failed to heal after 3 months of appropriate wound care affect approximately 6.5 million people in the US with a prevalence of 1% and costs estimated at \$25 billion per year.

Medical students currently receive limited wound care training, yet to effectively manage chronic wounds, providers must both understand the biology of healing as well as remain up-to-date with wound care guidelines published by the Agency for Healthcare Research and Quality (AHRQ). A recent study reported that only 7 US medical schools offer formal wound healing electives. The purpose of this student-led project was to investigate medical students' knowledge and comfort with wound care guidelines.

Methods

This study was approved by the George Washington University IRB (011639). Students consented to participate in this research. A multiple choice questionnaire of 11 questions (Table 1) testing the fundamentals of chronic wound management, developed based on AHRQ guidelines, was administered using the REDCap survey tool to students via the GWU SMHS year group list serves.

In addition to wound care knowledge, participants answered questions on didactic exposure related to wound care, participation in electives, and comfort level of managing chronic wounds was assessed using a self-reported subjective grading scale (0-10).

For the purposes of analysis, students were grouped into two groups: pre-clinical (years 1 and 2), and clinical (years 3 and 4). Data was analyzed using T-test, Fisher's Exact and Chi Square performed using GraphPad Prism 5.0.

Table 1: Questionnaire assessing student competency in wound care guidelines, based on AHRQ.³

Question

1. At what time point is a wound/ulcer considered chronic?
2. The determination of the Ankle Brachial Index (ABI) is crucial in the assessment of a chronic non-healing leg ulcer. To initially assess arterial circulation for a chronic non-healing leg or foot ulcer, a patient should have:
3. What percentage of healing per week represents normal healing?
4. How frequently should patients with diabetes undergo diabetic foot exams?
5. Clinicians should consider re-evaluation of the ulcer and initiating the use of advanced treatment options if the DFU or VLU has not healed by what percentage in 4 weeks?
6. What is considered the gold standard for offloading plantar diabetic foot ulcers?
7. The standard of care for ulcer management using dressing is:
8. After wrongful death, what is the 2nd highest reason for medicolegal lawsuits in the US?
9. At what time point should a clinician consider biopsy of a chronic ulcer that has progressed towards healing despite standard of care?
10. What is considered medical grade compression for the treatment of venous ulcers?
11. Debridement is the removal of necrotic or non-viable tissue from an ulcer bed. Which are considered forms of debridement?

Results

Overall, 48 GWU SMHS student participated in this study and had an average score of 32.20%. Students reported a mean of 1.77 ± 0.88 hours of didactics on wound healing, tissue injury, or wound management. Students reported a mean of 1.48 ± 1.18 of exposure to electives in vascular, plastic, and general surgery, podiatry, ER, dermatology, wound care, endocrinology, or internal medicine.

Table 2: Table of results of all medical students.

	Mean Survey Score (Mean±SD)	Sex (% Female)	Didactic Exposure (Mean±SD)	Elective Exposure (Mean±SD)	Comfort Level (Mean±SD)
Medical Students	3.54 ± 1.43 (32.20 %)	66.67%	1.77 ± 0.88	1.48 ± 1.18	2.14 ± 2.31

Data was available from 21 pre-clinical and 27 post-clinical students. Knowledge of wound care guidelines was suboptimal in both groups, with post-clinical students correctly answering 34.68% of questions and pre-clinical 29.0% (p=0.1888). Students reported no significant differences between pre-clinical and post-clinical groups in didactic exposure, elective exposure, and comfort level.

Table 3: Table of results of pre-clinical and clinical medical students.

	Pre-Clinical Students (n=21)	Clinical Students (n=27)	p-value
Mean Survey Score (Mean±SD)	3.19 ± 1.21 (29.00%)	3.81 ± 1.55 (34.68%)	0.1346
Sex (% Female)	76.19%	59.26%	0.3549
Didactic Exposure (Mean ±SD)	1.90 ± 0.89	1.67 ± 0.89	0.3761
Elective Exposure (Mean ±SD)	1.19 ± 1.17	1.70 ± 1.17	0.1409
Comfort Level (Mean ±SD)	1.94 ± 2.13	2.27 ± 2.46	0.6276

For most questions there were no significant differences in correct response rate between clinical and pre-clinical groups.

However, for Question 4 pertaining to recommended frequency of diabetic foot examination, 9.52% of preclinical students responded correctly compared to 55.56% of clinical students (p=0.0019).

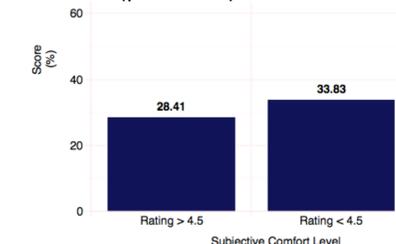


Figure 2. Subjective comfort level rating versus score performance.

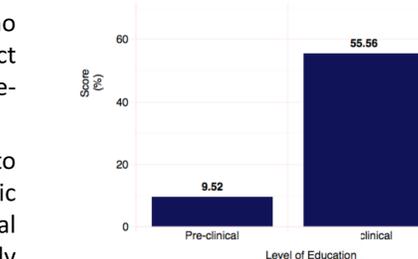


Figure 1. Level of education versus score performance in correctly answering Question 4.

Comfort level of medical students in managing chronic wounds was not correlated with correct answers on this survey.

However, we did note that individuals reporting higher subjective comfort scores had received more wound related didactic hours (2.38 ± 0.74 compared to 1.61 ± 0.84, p=0.02).

Discussion

This study shows that medical students become more comfortable with chronic wound management when they have more didactic exposure. Additionally, medical students with more training have a higher comfort level when managing chronic wounds.

Evidence supports that a wound care curriculum which provides team-based, multi-disciplinary training is the best approach for educating students on the management of chronic wounds. Both medical and surgical components of wound care should be emphasized.

This survey had several limitations that merit discussion. The student response rate was low (6%), most likely due to low access to the survey email, time constraints, and survey fatigue. In addition, our survey did not find that a higher comfort level resulted in more correct survey answers. Since we only surveyed students at one point in time we could not assess interval change in knowledge and comfort level as students progress through medical school. There is an unmet need for guideline-driven wound care education in the medical school curriculum.

Conclusion

This survey shows that despite the prevalence of chronic wounds and their associated healthcare costs, medical students are currently not receiving adequate training on guideline based management of chronic wounds. Didactics improve student self reported comfort with managing chronic wounds and there is an unmet need to incorporate wound care training into the SMHS curriculum.

References

1. Sen CK, Gordillo GM, Roy S, Kirsner R, Lambert L, Hunt TK, Gottrup F, Gurtner GC, Longaker MT. Human skin wounds: a major and snowballing threat to public health and the economy. *Wound Repair Regeneration*. 2009; 17(6):763-71.
2. Werdin F, Tennenhaus M, Schaller H-E, Rennekampff H-O. Evidence-based Management Strategies for Treatment of Chronic Wounds. *Eplasty*.
3. Negative Pressure Wound Therapy Technologies For Chronic Wound Care in the Home Setting. Agency for Healthcare Research and Quality 2014. Available at: <http://www.ahrq.gov/research/findings/ta/comments/npwt-comments.html>. Accessed February 27, 2016.
4. Ruiz ES, Ingram A, Landriscina A, Tian J, Krisner RS, Friedman A. Identifying an Education Gap in Wound Care Training in the United States *Dermatology*. *J Drugs Dermatol* 2015 Jul;14(7):716-20.
5. Yim E, Sinha V, Diaz SI, Kirsner RS, Salgado CJ. Wound healing in US medical school curricula. *Wound Repair Regen* 2014 Jul-Aug;22(4): 467-72.

Acknowledgements

This work was supported by award R01NR013888 from the National Institute of Nursing Research and by award number UL1 TR000075 from the National Center for Advancing Translational Sciences (NCATS), National Institutes of Health, through the Clinical and Translational Science Awards Program (CTSA). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Center for Advancing Translational Sciences or the National Institutes of Health