Influence Of Adequate Debridement & Placental-Derived Allografts On Diabetic Foot Ulcers

William H Tettelbach[1,2,7,8,9,10]; Shawn M Cazzell[3]; Brandon Hubbs[1]; Julie L De Jong[1]; R Allyn Forsyth[1,4]; Alexander M Reyzelman[5,6]

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INTRODUCTION

Debridement plays an essential role in the TIMERS framework for hard-to-heal wounds.[1] Debridement when performed with frequency and adequacy has been shown to rebalance the healing cascade converting the unfavorable molecular environment of a chronic wound into a pseudoacute wound.[2] TIMERS also recognizes the need to "step up" to Advanced Treatments when the trajectory towards wound closure stalls.[3] In addition to a retrospective analysis of Medicare data related to chronic lower extremity diabetic ulcers (LEDUs), this study also evaluated two advanced treatments, dehydrated human amnion/chorion membrane and dehydrated human umbilical cord (MIMEDX Group Inc., US) as adjunctive therapies to surgical debridement for closure in hard-to heal diabetic foot ulcers (DFUs).

METHODS

Debridement adequacy in the prospective RCTs was adjudicated by three blinded wound care specialists (Figure 1). Treatments included two placental-derived allografts (PDAs), dehydrated human amnion/chorion membrane (DHACM, n=54) or dehydrated human umbilical cord (DHUC, n=101), compared with standard of care (SOC, n=110). The key outcome was the influence of adequate debridement on rates of complete closure within 12 weeks. Additionally, a retrospective analysis of 2015–2019 Medicare claims for DFUs that received routine debridement at intervals ranging from every 1–7 days (18,900 total episodes), 8–14 days (35,728 total episodes), and every 15 days or greater (34,330 total episodes) was performed.

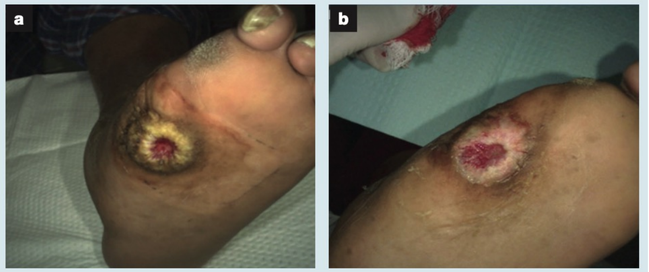
RESULTS

Within the RCTs, adequate debridement occurred in 202/265 (76%) of patients, 90/110 (82%) SOC ulcers, 45/54 (83%) of DHACM-treated ulcers, and in 67/101 (66%) of DHUC-treated ulcers. Complete closure occurred in 150/202 (74%) of adequately debrided ulcers, and in only 13/63 (21%) of ulcers without adequate debridement, p<0.0001. Debridement was the most significant factor for closure even when controlling for other clinical characteristics (Table 1).

References

1. Atkin L, Bućko Z, Conde Montero E, et al. Implementing TIMERS: the race against hard-to-heal wounds. *J Wound Care*. 2019;23(Sup3a):S1-S50. doi:10.12968/jowc.2019.28.Sup3a.S1. 2. Schultz GS, Chin GA, Moldawer L, Diegelmann RF. Principles of wound healing. Diabetic Foot Problems 2011: 395–402. https://doi. org/10.1142/9789812791535_0028. 3. Schultz G, Bjarnsholt T, James GA, et al. Consensus guidelines for the identification and treatment of biofilms in chronic nonhealing wounds. *Wound Repair Regen*. 2017;25(5):744-757. doi:10.1111/wrr.12590.

Figure 1. Examples of inadequate debridement: significant callous and epibole present (a) and adequate debridement: evidence of pairing of callous and removal of epibole, moist wound bed, no debris (b).



RESULTS

Within the Medicare claims data 21% (18,900/88,958) of episodes treated with SOC only had debridement intervals of ≤7 days (Figure 2). Short debridement intervals in combination with the use of DHACM demonstrated statistically significant better outcomes than SOC including (Figure 3): 65% fewer major amputations (p<0.0001), higher DFU resolution rates (p=0.0125), 42% fewer emergency room visits (p<0.0001) and reduced usage of other hospital resources (admissions and readmissions).

Table 1: Cox Regression Model Results

Variables	Parameter estimate	SE	Chi-squared	p-value	HR	95% CI for HR	
						Lower	Upper
Debridement: adequate versus inadequate	1.793	0.297	36.345	<.0001	6.006	3.353	10.756
Treatment: PDA versus SOC	0.715	0.172	17.283	<.0001	2.045	1.459	2.865
BMI, <30kg/m^2	0.398	0.166	5.722	0.017	1.489	1.075	2.064
Baseline wound size, <2.8cm^2	0.731	0.197	13.705	0.000	2.076	1.410	3.057
DFU position: non-plantar	0.528	0.176	8.999	0.003	1.695	1.201	2.393
History of amputations, no versus yes	0.419	0.218	3.684	0.054	1.521	0.991	2.333
DFU location: toe versus hindfoot	0.775	0.329	5.548	0.019	2.170	1.139	4.134
DFU location: forefoot versus hindfoot	0.674	0.279	5.830	0.016	1.963	1.135	3.393
DFU location: midfoot versus hindfoot	0.444	0.317	1.969	0.161	1.559	0.838	2.900

SE—standard error; HR—hazard ratio; CI—confidence interval; PDA—placental-derived allograft; SOC—standard of care; BMI—body mass index; DFU—diabetic foot ulcer

Author Affiliations

1. MIMEDX Group, Inc., Marietta, GA; 2. Duke University School of Medicine, Department of Anesthesiology, Durham, NC; 3. Limb Preservation Platform Inc, Fresno, CA, 4. Department of Biology, San Diego State University, San Diego, CA; 5. Department of Medicine California School of Podiatric Medicine at Samuel Merritt University, CA; 6. Co-Director, UCSF Center for Limb Preservation and Diabetic Foot Center for Clinical Research, San Francisco, CA; 7. College of Podiatric Medicine, Western University of Health Sciences, Pomona, CA; 8. American Professional Wound Care Association, LA; 9. Association for the Advancement of Wound Care, PA; 10. Western Peaks Specialty Hospital, UT.

Figure 2: Percent of 82,067 Medicare episodes receiving standard of care at the listed debridement intervals (bold). Included are the average number of debridements, and percent of diabetic foot ulcer resolution at one year for each interval

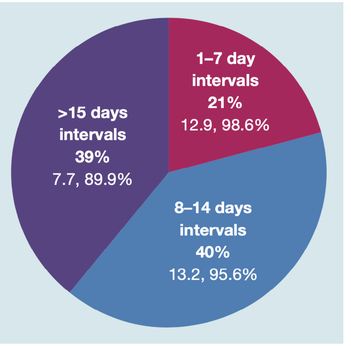
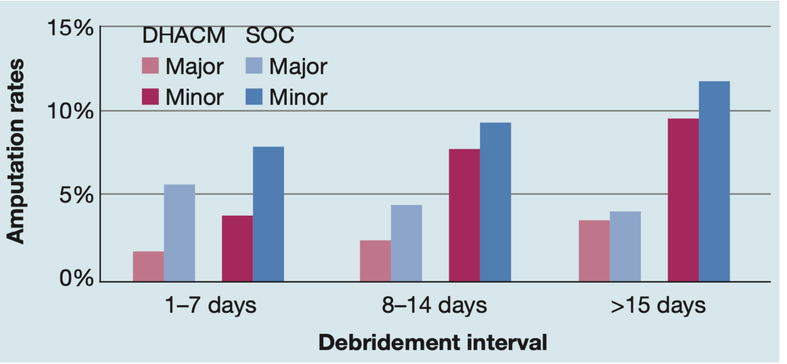


Figure 3: Comprehensively, Medicare amputation rates increased correlatively with longer debridement intervals. Major amputation rates were lowest when treated with dehydrated human amnion/chorion membrane (DHACM) and at debridement intervals of 1–7 days. Minor amputation rates were greatest for standard of care (SOC).



CONCLUSION

Prospectively collected data examining the quality of debridement and retrospectively analyzed data examining the frequency of debridement supports routine adequate wound debridement, particularly at intervals of seven days, as an essential component of wound care. In addition, optimal use of placental-derived allografts improved outcomes and lowered the use of healthcare resources.

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