The Impact of Topical Oxygen Therapy on Wound Healing: Assessing Efficacy and the Influence of Patient Characteristics in a Single-Institution Retrospective Chart Review

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1. BACKGROUND

- Aging can slow healing rates due to poor tissue oxygenation
- **Hyperbaric oxygen therapy (HBOT)** has shown improvements in diabetic ulcer healing, but long-term failures exist
- **Topical oxygen treatments (TOT)** offer more convenience for the elderly and lower systemic oxygen toxicity risks

This study examines TOT's impact on wound healing and the influence of patient characteristics on its efficacy

2. METHODS

Single physician/institution retrospective chart review (8/1/2011 – 7/1/2023) from EPIC

Inclusion Criteria: Any wound etiology, not currently undergoing TOT, started device after failed alternative treatments
Data extraction: Obtained patient demographics, wound data, device usage interruptions
Data analysis: Two versions of a linear mixed effects model (LME)—one for comorbidity groups and one for number of comorbidities per patient

3.1 RESULTS - OVERVIEW

- 84 wounds from 45 patients (mean: 1.86 wounds per patient)
- Mean age=52.21, mean comorbidity count=7.27
- Wound sizes ranged from 0.08 cm² (grain of sugar) to 482.5 cm² (iPad)
- 68% of wounds decreased in size, 2% showed no change, and 30% increased in size

4. CONCLUSIONS

- Usage of TOT likely aided in wound healing
- Wound location and patient demographics significantly affected healing outcomes, but number of comorbidities and age did not
- Further research with a larger patient cohort and data on patient compliance is needed to fully assess the impact of TOT on wound healing

3.2 RESULTS – KEY POINTS

TOT reduced the overall wound size, regardless of the patient's age.

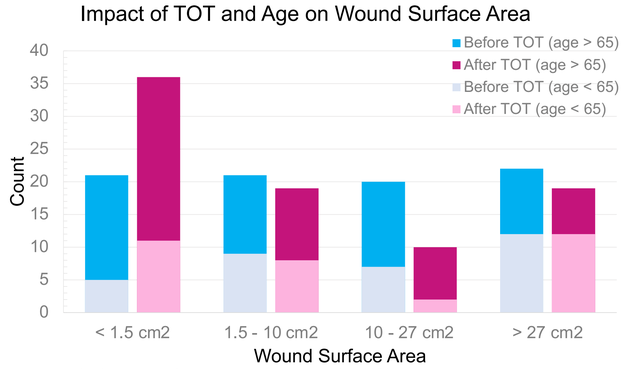

Figure 1: Wound surface area before and after TOT, categorized by age groups

Uninterrupted TOT improved healing in surface area, depth, and volume.

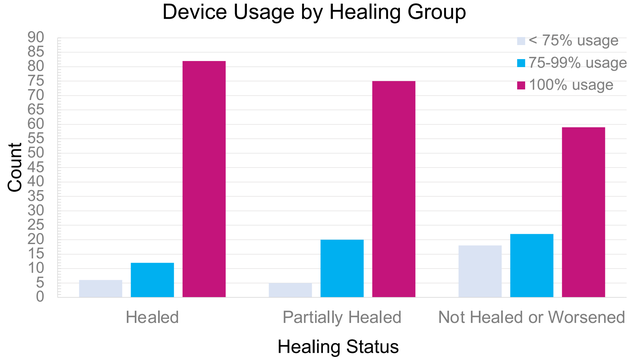

Figure 2: Number of wounds within each healing group, categorized by device usage

3.3 RESULTS - DEMOGRAPHICS

Table 1: Patient Demographics

	N (Col. %)
Total Patients	45 (100%)
Gender:	
Male	16 (36%)
Female	29 (64%)
Age group:	
<65	18 (40%)
>65	27 (60%)
Race:	
White	18 (40%)
Black	15 (33%)
Other	12 (27%)
Smoking Status:	
Current smoker	5 (11%)
Former smoker	13 (29%)
Never smoked	27 (60%)
Diagnoses:	
Autoimmune/inflammatory disea	19 (42%)
Blood Disease	15 (33%)
Bone disease	8 (18%)
Cancer	10 (22%)
Cardiopulmonary	22 (49%)
Endocrinopathy	31 (69%)
Impaired mobility and sensation	23 (51%)
Vascular	38 (84%)
Concurrent illness	26 (58%)
Radiation Usage	
Yes	8 (18%)
No	37 (82%)
Nutrition level	
Normal nutrition	37 (82%)
Moderate protein-calorie malnutr	4 (9%)
Severe protein-calorie malnutritic	4 (9%)

Table 2: Wound Characteristics

	N (Col. %)
Total wounds:	84 (100%)
Wound age:	
≤1 year	31 (37%)
1-3 years	15 (18%)
3-10 years	15 (18%)
>10 years	23 (27%)
Wound starting SA:	
≤1.50	21 (25%)
1.50-10.00	21 (25%)
10.00-27.00	20 (24%)
>27.00	22 (26%)
Wound ending SA	
≤1.50	36 (43%)
1.50-10.00	19 (23%)
10.00-27.00	10 (12%)
>27.00	19 (23%)
Wound starting depth:	
≤0.15	21 (25%)
0.15-0.20	22 (26%)
0.20-0.30	17 (20%)
>0.30	24 (29%)
Wound ending depth:	
≤0.15	34 (40%)
0.15-0.20	15 (18%)
0.20-0.30	14 (17%)
>0.30	21 (25%)
Wound location:	
Ankle	36 (43%)
Leg	24 (29%)
Foot	7 (8%)
Toe	7 (8%)
Hip	4 (5%)
Abdomen	3 (4%)
Other	2 (2%)
Finger	1 (1%)
Wound etiology:	
Venous stasis	27 (32%)
Sickle cell	16 (19%)
Trauma	13 (15%)
Radiation	7 (8%)
Pressure	6 (7%)
Mixed vascular	5 (6%)
Surgical	5 (6%)
Scleroderma	3 (4%)
Diabetes	2 (2%)
Treatment chronicity:	
<75% usage	9 (11%)
75-99% usage	17 (20%)
100% usage	58 (69%)

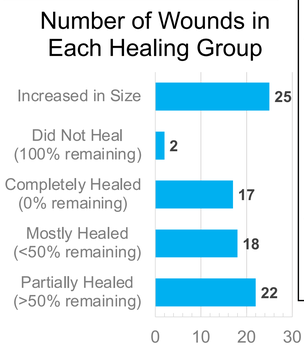

Figure 3: Number of wounds in each healing outcome

3.4 RESULTS – LME

Table 3a: LME with comorbidity count results for surface area (SA)

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	-2.060	3.599	-0.572	0.567	-9.113	4.994
Patient Demographics						
Age	-0.001	0.035	-0.036	0.972	-0.070	0.068
Male	1.051	0.715	1.470	0.141	-0.350	2.453
White	-1.284	0.916	-1.402	0.161	-3.079	0.511
Current smoker	-0.528	0.957	-0.552	0.581	-2.404	1.348
Comorbidities						
Comorbidity count	0.093	0.116	0.803	0.422	-0.135	0.321
Wound Characteristics						
Days used: scaled	1.092	0.456	2.393	0.017	0.198	1.986
Initial depth: scaled	-0.472	0.200	-2.363	0.018	-0.864	-0.080
Initial surface area: scaled	-0.057	0.208	-0.273	0.785	-0.464	0.351
Wound Location						
Foot	1.597	0.696	2.294	0.022	0.233	2.962

Table 3b: LME with comorbidity count results for volume

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	-2.037	3.389	-0.601	0.548	-8.680	4.605
Patient Demographics						
Age	0.013	0.033	0.391	0.696	-0.051	0.077
Male	1.071	0.654	1.638	0.101	-0.210	2.351
White	-1.559	0.871	-1.791	0.073	-3.266	0.147
Current smoker	-0.934	0.899	-1.039	0.299	-2.697	0.828
Comorbidities						
Comorbidity count	-0.005	0.110	-0.042	0.966	-0.220	0.210
Wound Characteristics						
Initial depth: scaled	-0.068	0.208	-0.327	0.744	-0.475	0.339
Initial surface area: scaled	0.197	0.229	0.861	0.389	-0.252	0.647
Days used: scaled	1.021	0.461	2.215	0.027	0.118	1.924
Wound Location						
Foot	2.186	0.726	3.011	0.003	0.763	3.610

Table 3c: LME with comorbidity count results for depth

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	-2.580	3.172	-0.813	0.416	-8.796	3.637
Patient Demographics						
Age	0.036	0.031	1.170	0.242	-0.024	0.096
Male	1.537	0.613	2.506	0.012	0.335	2.738
White	-2.033	0.818	-2.486	0.013	-3.636	-0.430
Current smoker	-1.421	0.853	-1.666	0.096	-3.092	0.251
Comorbidities						
Comorbidity count	-0.063	0.103	-0.613	0.540	-0.265	0.139
Wound Characteristics						
Initial depth: scaled	0.164	0.195	0.841	0.400	-0.218	0.546
Initial surface area: scaled	-0.140	0.222	-0.630	0.528	-0.575	0.295
Days used: scaled	0.954	0.440	2.170	0.030	0.092	1.816
Wound Location						
Finger	-5.120	2.145	-2.386	0.017	-9.324	-0.915
Foot	2.058	0.683	3.012	0.003	0.719	3.396
Leg	1.259	0.571	2.205	0.027	0.140	2.378
Toe	2.498	0.851	2.935	0.003	0.830	4.166

Table 4: LME with comorbidity categories results for surface area

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	0.103	3.038	0.034	0.973	-5.852	6.057
Patient Demographics						
Age	0.011	0.033	0.345	0.730	-0.053	0.075
Male	1.486	0.635	2.340	0.019	0.242	2.731
White	0.543	1.071	0.507	0.612	-1.556	2.642
Current smoker	-0.832	0.933	-0.892	0.373	-2.661	0.997
Comorbidities						
Bone	2.327	0.875	2.659	0.008	0.612	4.042