

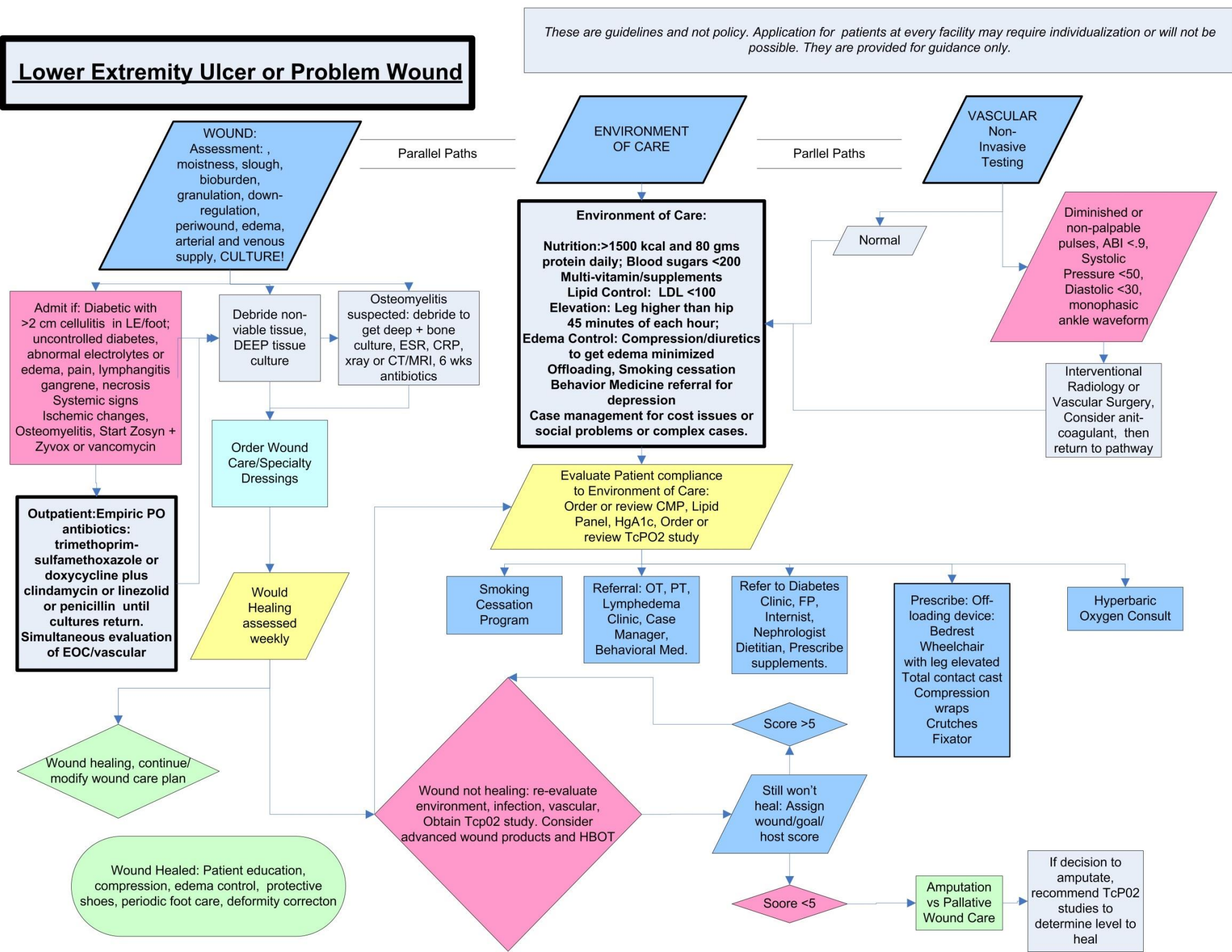
Outcome, Cost and Mortality in Wagner Grade 3 Diabetic Foot Ulcer Patients Completing Hyperbaric Oxygen Therapy

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INTRODUCTION

- Intermountain Healthcare maintains an extensive Electronic Data Warehouse (EDW) that can be queried for cost, mortality, length of stay, discharge disposition, procedures and clinical outcome data by ECD diagnosis type
- Background data from the EDW was collected on all patients undergoing BK/AK amputations between 2007-2013
- Intermountain Dixie Medical Center (DRMC) Hyperbaric Medicine Department has a separate database of all patients treated with one or more hyperbaric treatments (HBOT) since opening in 2005. Data may be sorted by diagnosis, year, number of treatments and outcome. A discharge summary is kept for each patient that can be linked to their complete Electronic Medical Record.
- Patients who received at least one hyperbaric treatment between 2005 and 2013 for the diagnosis of Wagner Grade 3+ Diabetic Foot Ulcer (DFU) were identified.
- IRB protocol approved for developing a Limb Salvage Pathway, and comparing amputation data to patients receiving hyperbaric oxygen therapy for Wagner Grade 3+ DFU.

LIMB SALVAGE PATHWAY



METHODS

- Literature search to determine expected outcomes and mortality in patients with Grade 3+ DFU
- Cost data analysis from Intermountain EDW database on patients with below knee (BK) and above knee (AK) amputations
- Outcome and mortality data on patients who completed >20 HBOT for diagnosis of Wagner Grade 3+ DFU at Dixie Regional Medical Center from the hyperbaric chamber database

COST AND OUTCOMES BK/AKA 2007 - 2013

Admissions	BK-Diabetic	AK-Diabetic
No. BK/AK Admits:	40	31
LOS & Range	8.23 (3-22)	9.52 (3-33)
Average Charge	\$42,318	\$54,268
Range of Charges	\$7413-\$137,241	\$9041-\$148,940
Average Cost	\$21,282	\$28,044
Median Cost	\$18,117	\$25,216
Death by 5/1/2014*	47%	48%
Discharged to home	20%	27%

PATIENTS WHO RECEIVED HYPERBARIC OXYGEN THERAPY

- Ninety-six patients with Wagner Grade 3+ DFU completed 104 series of HBOT.
- “Completed” means 20 or more HBOT sessions
- Average number of sessions was 27 per series, estimated average cost \$13,000.
- Eighty-six of 96 (89.5%) healed or had significant improvement at the end of HBOT
- Eight patients had BK, and one had an AK amputation within one year after finishing HBOT

Fifteen Patients Who Did Not Complete 20 HBOT

- 8 had Urosepsis/MI or chose hospice
- 3 chose amputation or complex flap closure
- 1 claustrophobic, 1 moved out of state, 1 opted for a wound study, and 1 had transportation issues
- 8 confirmed dead (53%)

CONCLUSIONS

- Wagner Grade 3 DFU as well as BK/AKA are associated with high 5-year mortality rate.
- Our limb salvage approach had an 89% success rate for avoiding BK/AKA in patients with Grade 3 DFU.
- 29% of these patients were confirmed dead by the end of the study which is an underestimate of their 5 year mortality rate.
- The average cost of utilizing HBOT for these patients was less than the cost of a single hospitalization for BK/AK amputation.
- We need better prospective cost and mortality data in order to determine whether a Limb Salvage approach with HBOT for Grade 3 DFU is more or less costly than amputation.

MORTALITY

- Twenty-seven (29%) were confirmed dead by May 2014
- Deaths peaked between 1 and 4 years
- Highest death rate occurred in year 2
- Causes of Death were:
 - Heart failure (7), Myocardial Infarction (9)
 - Renal failure (4)
 - Sepsis (4)
 - Cancer (2)
 - Heatstroke (1)
- Mortality by Age
 - <60 yrs old: 32 treated, 4 deceased (12.5%)
 - 60-69: 27 treated, 6 deceased (22%)
 - 70-79: 24 treated, 8 deceased (34%)
 - ≥80: 13 treated, 9 deceased (69%)

Age	Mortality SW Utah Diabetics-1999	Mortality All Causes USA 2010
35-44	.01%	.170%
45-54	.008	.407
55-64	.066	.851
65-74	.102	1.87
75-84	.299	4.79
85+	.352	13.9

COSTS OF HBOT vs. AMPUTATION

- DOES NOT include costs of prosthesis, rehab, SNF, or loss of work time
- 96 patients received an average of 27 hyperbaric treatments = estimated cost of \$13,000 per patient
- One patient had an AKA, average hospital costs alone were \$28,000.00
- Eight patients had an BKA, average hospitalization costs alone were \$21,000 per patient
- Average cost per patient for 96 patients (including failure costs) was \$15,041.66

WOUND CARE/OTHER COSTS

- Level 3 Wound Clinic Visit: average cost = \$125.
- BK Prosthesis: First year approximate Cost = \$22,000
- CT Angio: \$800.
- Interventional Angio and Revascularization: \$2500.

COMMENTS - AMPUTATION

- The wide range of costs for emergent amputation hospitalizations may have included revascularization or initial debridement and thus be higher than the cost of a non-emergent amputation where revascularization or debridement may have been done as an outpatient or during a previous hospitalization
- Costs for amputation do not include physician, rehab, SNF, prosthesis costs or amputation complications

COMMENTS - HBOT

- Patients who quit HBOT before completion had a higher mortality rate and can “skew” statistics for overall Wagner Grade 3+ DFU

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