

Hyperbaric O₂ Indications for the Salvage of Limb Threatening Wounds: An Algorithmic Approach

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Introduction

Currently, indications for hyperbaric O₂ (HBO) therapy for limb threatening wounds is based on clinical impressions of (as well as experience in working with) diagnosed conditions

This is exemplified by the use of the Wagner grading system as a justification to use HBO for diabetic foot wounds¹

We present an algorithmic, evidenced-based approach for the evaluation and management of limb threatening wounds. The approach provides objective criteria for the evaluation and management of wounds of all varieties and at all locations

Materials & Methods

The use of unambiguous clinical assessments paired with transcutaneous oxygen (PtcO₂/TCOM) measurements makes it possible to generate an algorithmic, evidence-based approach to determine objectively the indication for HBO as well as reliably predict the outcomes of limb threatening wounds

The **Wound Score** is a 0-to-10 (with 10 being best) system that summates 5 clearly defined assessments each graded from 2 (best) to 0 (worst) using objective criteria for each grade²

Wound Score

Assessment	2 Points	1 Point	0 Points
Base ¹	Red	White/Yellow	Black
Size ²	<Thumb print	Thumb→Fist	>Fist Area
Depth ³	Skin/SC	Muscle	Bone/Joint
Infection	Colonized	Cellulitis	Sepsis ⁴
Perfusion*	Pulses	Doppler	~None

Notes: ¹Base—i.e. color appearance of wound base; ²Size include undermining; ³Depth use maximum depth of probing and ⁴Sepsis findings includes cellulitis with dysglycemia, ↑WBC, + blood culture, fever, chills and/or malaise

Quantifying “Wound Type” via Wound Score

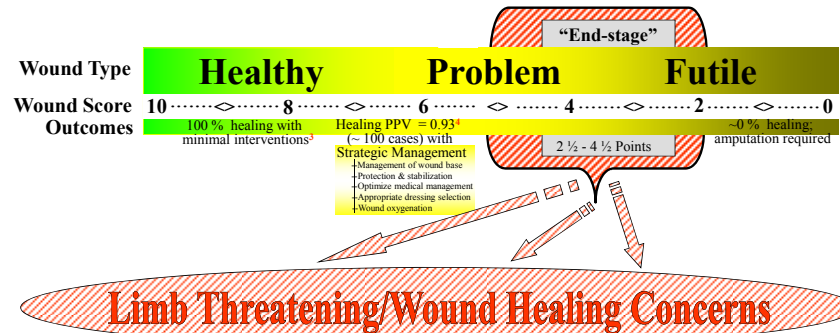
Healthy Wound = 8-10 points
Problem Wound = 4-7 points
Futile Wound = 0-3 points

Challenges of the *Perfusion Assessment

Of the 5 assessments, perfusion is the most challenging to grade. Scaring, edema, induration, peripheral artery disease, open wounds and/or hide-bound skin often make this crucial assessment difficult or impossible to assess primarily

Consequently, secondary and tertiary methods (see algorithm) are utilized to grade this assessment and integrate well with our algorithm

Hyperbaric O₂ Indications Algorithm

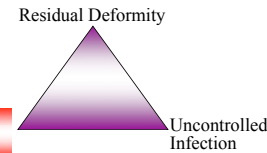


< Hypoxia/Ischemia Concerns⁵

Perfusion Grade ≤ 1 point from Wound Score assessment and/or from Secondary Techniques to measure perfusion (see following table)			
Assessment	2 Points	1 Point	0 Points
Use 1/2 points if findings are mixed or intermediate between 2 grades			
Temperature	Warm	Cool	Cold
Color	Pink	Pale, dusky	Cyanotic, purplish, black
Capillary refill	< 2 seconds	2-5 secs	> 5 secs

Non-healing Findings⁵

(Major reasons wounds do not heal)



Juxta-wound TCOM Study in Room Air

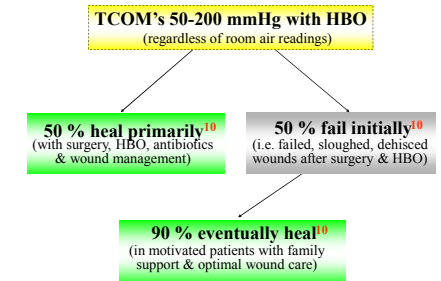
mmHg	Interpretation
> 40 ^{6,7,8}	Healing likely without adjunctive HBO
30-40	Healing possible depending on Wound Score , size, location, deformity correction & infection control even without HBO
< 30 ^{6,7,8}	Healing unlikely in room air

Juxta-wound TCOM Study with HBO (at 2 ATA)

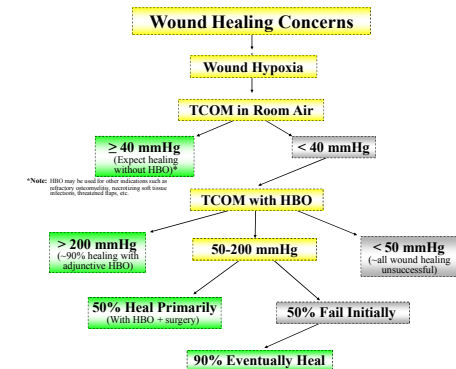
	Responder	Intermediate Responder	Non-Responder
PtcO ₂ (mmHg)	>200*	50-200	<50
Primary Healing w/HBO ⁹	PPV 0.88	~ 50 %	~ 0%

*Regardless of Room Air Readings

Intermediate Responders



Summary/Abbreviated Algorithm



Citations/References

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