

Subject: Hyperbaric Oxygen Therapy (HBOT		Original Effective Date: 4/30/2008
Policy Number: MCR-050	Revision Date(s): 12/16/09, 1/14 6/20/16 This MCR is no longer scheduled	
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DISCLAIMER

This Molina Clinical Review (MCR) is intended to facilitate the Utilization Management process. It expresses Molina's determination as to whether certain services or supplies are medically necessary, experimental, investigational, or cosmetic for purposes of determining appropriateness of payment. The conclusion that a particular service or supply is medically necessary does not constitute a representation or warranty that this service or supply is covered (i.e., will be paid for by Molina) for a particular member. The member's benefit plan determines coverage. Each benefit plan defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their providers will need to consult the member's benefit plan to determine if there are any exclusion(s) or other benefit limitations applicable to this service or supply. If there is a discrepancy between this policy and a member's plan of benefits, the benefits plan will govern. In addition, coverage may be mandated by applicable legal requirements of a State, the Federal government or CMS for Medicare and Medicaid members. CMS's Coverage Database can be found on the CMS website. The coverage directive(s) and criteria from an existing National Coverage Determination (NCD) or Local Coverage Determination (LCD) will supersede the contents of this Molina Clinical Review (MCR) document and provide the directive for all Medicare members.



DESCRIPTION OF PROCEDURE/SERVICE/PHARMACEUTICAL

The Undersea and Hyperbaric Medical Society defines systemic hyperbaric oxygen therapy (HBOT) as a treatment in which a patient breathes near 100% oxygen intermittently while inside a treatment chamber at a pressure higher than sea level pressure (i.e., >1 atmosphere absolute; atm abs). Treatment can be carried out in either a mono- or multiplace chamber. The former accommodates a single patient; the entire chamber is pressurized with near 100% oxygen, and the patient breathes the ambient chamber oxygen directly. The latter holds two or more people (patients, observers, and/or support personnel); the chamber is pressurized with compressed air while the patients breathe near 100% oxygen via masks, head hoods, or endotracheal tubes. ⁵²

No standard protocol has been identified for HBOT sessions. Regardless of the type of chamber used, the interval between sessions and the total number of treatments varies according to the severity of the condition and physician treatment plan. HBOT may begin with 1 to 3 treatments per day for up to 1 week and may continue daily for several days to several months. For each treatment, the pressure in the chamber is increased slowly and then held constant for 30 minutes to several hours. ⁴⁰⁻⁴⁹

Topical oxygen therapy involves the application of gaseous oxygen to a cutaneous wound and can be administered on an outpatient basis in a clinic or medical office setting. To treat an affected hand or foot, a mitten or boot-shaped plastic bag with a gas inlet is attached to the arm or leg with adhesive tape, and the bag is then pumped full of pure oxygen. Cutaneous lesions that are not located on hands or feet can be treated with a plastic sheet that is sealed around the edges and then filled with oxygen. Regardless of the location of the lesion, oxygen is pumped into the bag or plastic sheet until the pressure reaches 1.004 to 1.04 atmospheres, since the elevated pressure is believed to facilitate diffusion of oxygen into the wound. A pressurized bag sealed around an extremity can exert a tourniquet-like effect; during treatment, some practitioners continuously cycle bag pressure from full pressure to no pressure and back to full every 40 seconds to limit this effect. Treatment protocols vary somewhat but wounds are typically exposed to gaseous oxygen for 16 to 21 hours spread over 4 to 14 treatment sessions per week for 2 to 4 weeks. ⁴¹

The FDA regulates hyperbaric oxygen (HBO) chambers as Class II medical devices, and there are a number of different chambers (both monoplace and multiplace chambers) that have been cleared for marketing via the 510(k) process (Product Code CBF, hyperbaric chamber). Devices that are not implantable and pose no risk of fatal outcome to the consumer should they malfunction are assigned Class II status and must meet FDA performance standards. Topical oxygen therapy devices are regulated by the FDA as Class II devices, and several devices have been approved via the FDA 510(k) process. ¹

RECOMMENDATION 3 8 14 18 20 25 26 29-31 42 44 46 50-52

Systemic hyperbaric oxygen therapy is considered medically necessary and may be authorized for any of the following conditions:
☐ Acute cyanide poisoning
☐ Acute peripheral artery insufficiency



2.

	Acute traumatic peripheral ischemia or severe crush injuries (Grade III) as an adjunct to conventional treatment when loss of function, limb, or life is threatened		
	Actinomycosis refractory to antibiotics and surgical treatment		
	Air or gas embolism		
	Chronic refractory osteomyelitis as an adjunctive therapy when <i>all</i> of the following criteria are met:		
	 documentation of refractory stage 3B or 4B osteomyelitis; and osteomyelitic lesions persist for more than six weeks after treatment is initiated; and no improvement after adequate antibiotic treatments and operative procedure (if a surgical candidate) are performed 		
	Gas Gangrene (clostridial myositis and myonecrosis) as an adjunctive therapy to antibiotics and surgical management		
	Necrotizing soft tissue infections (necrotizing fasciitis)		
	Osteoradionecrosis as an adjunct to conventional treatment		
	Preparation and preservation of compromised skin, preexisting grafts or flaps that are showing signs of failure or necrosis, (not for primary management of wounds)		
	Soft tissue radionecrosis as an adjunct to conventional treatment		
	Severe carbon monoxide poisoning		
	Severe decompression sickness		
HI sig	an adjunctive treatment in wound care: BOT therapy is considered medically necessary as adjunctive therapy only if there are no measurable and of healing for minimally 30 days of standard conventional treatment and must be used in addition standard wound care for all of the following conditions: [ALL]		
	Severe non-healing Type 1 or 2 Diabetes Mellitus (DM) lower extremity wound due to DM when the following criteria are met:		
	 Severe wound documented by Wagner grading with 1 or more of the following: Wagner grade 3 wound, deep ulcer to tendon, capsule or bone Wagner grade 4, deep ulcer with abscess, osteomyelitis, or joint sepsis 		

- Wagner grade 5, localized gangrene of forefoot or heel; and
- O Minimal to no healing following 30 consecutive days of appropriate wound care utilizing moist retentive wound care including *ALL* of the following:
 - > Antibiotic treatment when indicated



- > Evaluation and correction of underlying peripheral vascular disease or neuropathic disease (if applicable)
- > Optimal glycemic control;
- Optimal nutritional status;
- Pressure reduction or off-loading
- Topical wound treatment (e.g., saline, hydrogels, hydrocolloids, alginates)
- ➤ Wound debridement by any means to remove devitalized tissue

CONTINUATION OF THERAPY 3 8 14 18 20 25 26 29-31 42 44 46

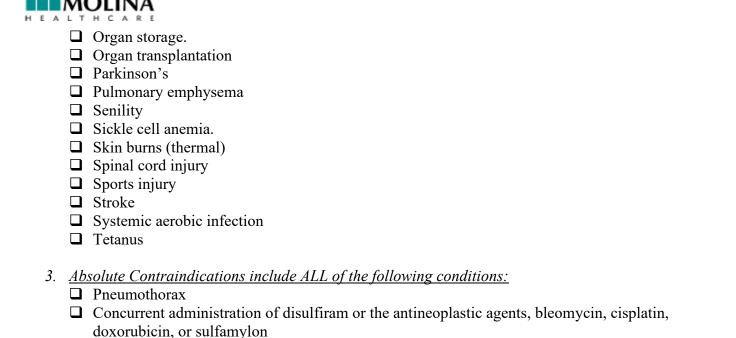
Wounds must be evaluated at least every 30 days during administration of HBOT. After initial authorization of up to 30 days of treatment and or 30 treatments total a progress report must be requested prior to authorization of additional HBO treatment.

Continued treatment with HBO therapy is not considered medically necessary if measurable signs of healing have not been demonstrated within any 30 day period of treatment.

COVERAGE LIMITATIONS 2 3 5-7 9-13 15-17 19 21-24 27 28 32-35 43 44 47-49

1. <u>Topical hyperbaric oxygen therapy</u> is considered experimental, investigational, and unproven because the clinical efficacy has not been proven for any condition. ^{3 41 52}

2. <u>Systemic hyperbaric oxygen therapy</u> is considered not medically necessary and excluded because the			
	ins	ufficient evidence in the peer reviewed medical literature for any of the following conditions that	
	inc	lude but are not limited to:	
		Acute cerebral edema	
		Acute or chronic cerebral vascular insufficiency.	
		Acute thermal and chemical pulmonary damage, i.e., smoke inhalation with pulmonary	
		insufficiency.	
		Aerobic septicemia	
		Anaerobic septicemia and infection other than clostridial	
		Arthritic Diseases	
		AIDS/HIV	
		Alzheimer's Disease	
		Asthma	
		Bell's Palsy	
		Cardiogenic shock	
		Cerebral Palsy	
		Chronic peripheral vascular insufficiency	
		Cutaneous, decubitus, and stasis ulcers	
		Depression	
		Exceptional blood loss anemia	
		Hepatic necrosis	
		Migraines	
		Multiple Sclerosis	
		Myocardial infarction	
		Nonvascular causes of chronic brain syndrome (Pick's disease, Alzheimer's disease, Korsakoff's	
		disease).	



SUMMARY OF MEDICAL EVIDENCE 5-35 40-50

There is a large body of published peer-reviewed scientific literature, including systematic reviews and randomized controlled trials that support the effectiveness, safety and improvement of net health outcomes of HBOT for many conditions including: decompression illness, arterial or air gas embolism, cyanide and carbon monoxide poisoning, gas gangrene, necrotizing infections, soft tissue radionecrosis and osteoradionecrosis, non-healing wounds in diabetes mellitus, peripheral artery insufficiency, actinomycosis, skin grafts and flaps, acute traumatic ischemia or crush injuries and osteomyelitis. 8 14 18 20 25 26 29-31 42 44 46 51-52

There is insufficient evidence in the published peer-reviewed scientific literature to support HBOT for any of the conditions outlined in the coverage exclusions section above. The published literature is from low quality studies and primarily consists of case series and retrospective reviews with small heterogeneous patient populations, short-term follow-ups and has reported conflicting and various outcome data. 5-7 9-13 15-17 19 21-24 27 28 32-35 43 45 47-49

There is insufficient evidence in the peer reviewed medical literature for any condition treated with topical oxygen therapy. 41 52

CODING INFORMATION THE CODES LISTED IN THIS POLICY ARE FOR REFERENCE PURPOSES ONLY. LISTING OF A SERVICE OR DEVICE CODE IN THIS POLICY DOES NOT IMPLY THAT THE SERVICE DESCRIBED BY THIS CODE IS A COVERED OR NON-COVERED. COVERAGE IS DETERMINED BY THE BENEFIT DOCUMENT. THIS LIST OF CODES MAY NOT BE ALL INCLUSIVE.

CPT	Description
99183	Physician attendance and supervision of hyperbaric oxygen therapy, per session
HCPCS	Description
G0277	Hyperbaric oxygen under pressure, full body chamber, per 30 minute interval
ICD-10	Description: [For dates of service on or after 10/01/2015]
A42.0-A42.9	Actinomycosis
A48.0	Gas gangrene



E08-E11.9	Diabetes mellitus
I73.89-I73.9	Other peripheral vascular disease
L97-L97.929	Non-pressure chronic ulcer of lower limb
M86.30-M86.9	Chronic osteomyelitis
S07-S07.9	Crushing injury of head
S17-S17.9	Crushing injury of neck
S28-S28.0	Crushing injury chest
S38-S38.1	Crushing injury of abdomen, lower back and pelvis
S47-S47.9	Crushing injury of shoulder and upper arm
S57-S57.82	Crush injury of elbow and forearm
S67-S67.92	Crush injury of wrist, hand and fingers
S77-S77.22	Crush injury of hip and thigh
S87-S87.82	Crush injury of lower leg
S97-S97.82	Crush injury of ankle and foot
T79.0	Air embolism traumatic initial encounter
T58-T58.94	Toxic effect of carbon monoxide
T65-T65.0x4	Toxic effect cyanides
T70.3	Decompression sickness Caisson disease initial encounter
T86.82-T86.829	Complications of skin graft

RESOURCE REFERENCES

Government Agencies

- 1. U.S. Food and Drug Administration. 510K Summary of Safety and Effectiveness. Accessed at: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPCD/classification.cfm
- 2. U.S. Food and Drug Administration. Consumer Update. Hyperbaric Oxygen Therapy: Don't Be Misled. Jan, 2015. Accessed at: https://www.fda.gov/consumers/consumer-updates
- 3. Centers for Medicare & Medicaid Services. NCD for Hyperbaric Oxygen Therapy (20.29). June 19, 2006. Revised 5/2014. Accessed at: http://www.cms.gov/medicare-coverage-database/
- 4. Centers for Medicare & Medicaid. Technology Assessment: Hyperbaric oxygen therapy in treatment of hypoxic wounds. Accessed at: http://www.cms.hhs.gov/mcd/viewtechassess.asp?from2=viewtechassess.asp&where=index&tid=12&
- 5. McDonagh MS, Carson S, Ash JS. Et al. Hyperbaric oxygen therapy for brain injury, cerebral palsy, and stroke. Agency for Healthcare Research and Quality. September 2003. Number 85.
- 6. Raman G, Kupelnick B,Chew P,Lau J. A Horizon scan: Uses of hyperbaric oxygen. Technology Assessment Report. Agency for Healthcare Quality and Research. October, 2006. Accessed at: http://www.cms.hhs.gov/determinationprocess/downloads/id42TA.pdf

Cochrane and other Peer Reviewed Publications

- 7. Bennett M, Jepson N, Lehm JP. Hyperbaric oxygen therapy for acute coronary syndrome. Cochrane database of Systematic Reviews 2009, Issue 4. Art No.:CD004818. DOI: 10.1002/14651858.CD004818.pub2.
- 8. Bennett M; Feldmeier J; Hampson N; Smee R; Milross C. Hyperbaric oxygen therapy for late radiation tissue injury. Cochrane Database Syst Rev 2009;(4):CD005005.
- 9. Bennett MH, Best TM, Babul-Wellar S, Taunton JE. Hyperbaric oxygen therapy for delayed onset muscle soreness and closed soft tissue injury. Cochrane Database of Systematic Reviews Updated, 2009, Issue 4. Art. No.: CD004713. DOI: 10.1002/14651858.CD004713.pub2.
- 10. Bennett MH, Feldmeier J, Smee R, Milross C. Hyperbaric oxygenation for tumor sensitization to radiotherapy. Cochrane Database of Systematic Reviews Updated September, 2008, Issue 4. Art.No.:CD005007. DOI: 10.1002/14651858.CD005007.pub2.
- 11. Bennett MH, French C, Schnabel A, Wasiak J, Kranke P. Normobaric and hyperbaric oxygen therapy for migraine and cluster headache. Cochrane Database of Systematic Reviews October 2009, Issue 3. Art. No.: CD005219. DOI: 10.1002/14651858.CD005219.pub2.
- 12. Bennett MH, Kertesz T, Yeung P. Hyperbaric oxygen for idiopathic sudden sensorineural hearing loss and tinnitus. Cochrane Database of Systematic Reviews Update 2009, Issue 1. Art.No.: CD004739. DOI: 10.1002/14651858.CD004739.pub3.



- 13. Bennett MH, Lehm JP, Jepson N. Hyperbaric oxygen therapy for acute coronary syndrome. Cochrane Database of Systematic Reviews Updated July, 2007, Issue 2. Art. No.: CD004818. DOI: 10.1002/14651858.CD004818.pub2.
- 14. Bennett MH, Lehm JP, Mitchell SJ, Wasiak J. Recompression and adjunctive therapy for decompression illness. Cochrane Database of Systematic Reviews 2007, Issue 2. Art No. CDOO5277. DOI:10.1002/14651858. CD005277.pub2
- 15. Bennett MH, Stanford R, Turner R. Hyperbaric oxygen therapy for promoting fracture healing and treating fracture non-union. Cochrane Database of Systematic Reviews 2009, Issue 4 Art No: CD004712. DOI:10.1002/14651858.CD004712.pub2
- 16. Bennett MH, Trytko B, Jonker B. Hyperbaric oxygen therapy for the adjunctive treatment of traumatic brain injury. Cochrane Database of Systematic Reviews January, 2009 Update, Issue 4. Art.No.: CD004609. DOI: 10.1002/14651858.CD004609.pub2.
- 17. Bennett MH, Wasiak J, Schnabel A, Kranke P, French C. Hyperbaric oxygen therapy for acute ischemic stroke. Cochrane Database of Systematic Reviews 2009, Issue 4. Art No.: CD004954, DOI:10.1002/14651858.CD004954.pub2.
- 18. Buckley NA, Juurlink DN et al. Hyperbaric Oxygen for carbon monoxide poisoning. Cochrane Database Syst Rev. 2011 Apr 13;(4):CD002041
- 19. Eskes A, Ubbink DT et al. Hyperbaric oxygen therapy for treating acute surgical and traumatic wounds. Cochrane Database Syst Rev. 2010 Oct 6;(10):CD008059
- 20. Juurlink DN, Buckley NA, Stanbrook MB et al. Hyperbaric oxygen for carbon monoxide poisoning. The Cochrane Database of Systematic Reviews, 2009, Issue 4. Art No. CD002041. DOI:10.1002/14651858.CD002041.pub2
- 21. Kranke P, Bennett MH et al. Hyperbaric oxygen therapy for chronic wounds. Cochrane Database Syst Rev. 2012 Apr 18;4:CD004123
- 22. Philips JS, Jones S. Hyperbaric oxygen as an adjuvant treatment for malignant otitis externa. Cochrane Database of Systematic ReviewsOctober, 2008 Issue 4. Art. No.: CD004617. DOI: 10.1002/14651858.CD004617.pub2
- 23. Phillips JS, Jones SEM. Hyperbaric oxygen as an adjuvant treatment for malignant otitis externa. Cochrane Database of Systematic Reviews 2005, Updated October 2008 Issue 2. Art. No.: CD004617. DOI: 10.1002/14651858.CD004617.pub2.
- 24. Villanueva E, Bennett M, Wasiak J, Lehm J. Hyperbaric oxygen therapy for thermal burns. Cochrane Database Systematic Review 2004;3:CD004727.
- 25. Clarke RE, Tenorio LM, Hussey JR, et al. Hyperbaric oxygen treatment of chronic refractory radiation proctitis: a randomized and controlled double-blind crossover trial with long-term follow-up. Int J Radiat Oncol Biol Phys. 2008;72(1):134-143
- 26. Annane D, Depondt J, Aubert P, et al. Hyperbaric oxygen therapy for radionecrosis of the jaw: a randomized, placebo-controlled, double-blind trial from the ORN96 Study Group. J Clin Oncol. 2004;22(24):4893-4900.
- 27. Rossignol DA, Rossignol LW, Smith S, et al. Hyperbaric treatment for children with autism: a multicenter, randomized, double-blind, controlled trial. BMC Pediatrics. 2009;9:21.
- 28. Roeckl-Wiedmann I, Bennett M, Kranke P. Systematic review of hyperbaric oxygen in the management of chronic wounds. Br J Surg. 2005;92(1):24-32.
- 29. Weaver LK, Hopkins RO, Chan, KJ, et al. Hyperbaric oxygen for acute carbon monoxide poisoning. New Engl J Med. 2002;347(14):1057-1067.
- 30. Guo S, Counte MA, Romeis JC. Hyperbaric oxygen technology: an overview of its applications, efficacy, and cost-effectiveness. Int J Technol Assess Health Care. 2003;19(2):339-346.
- 31. Wang C, Schwaitzberg S, Berliner E, et al. Hyperbaric oxygen for treating wounds: a systematic review of the literature. Arch Surg. 2003;138(3):272-280.
- 32. Chau JK, Lin JR, Atashband S, Irvine RA, Westerberg BD. Systematic review of the evidence for the etiology of adult sudden sensorineural hearing loss. Laryngoscope. 2010;120:1011-1021.
- 33. Esposito M, Worthington HV. Interventions for replacing missing teeth: hyperbaric oxygen therapy for irradiated patients who require dental implants. Cochrane Database of Systematic Reviews 2013, Issue 9. Art. No.: CD003603. DOI: 10.1002/14651858.CD003603.pub3
- 34. Xiao Y, Wang J, Jiang S, Luo H. Hyperbaric oxygen therapy for vascular dementia. Cochrane Database of Systematic Reviews 2012, Issue 7. Art. No.: CD009425. DOI: 10.1002/14651858.CD009425.pub2
- 35. Holland NJ, Bernstein JM, Hamilton JW. Hyperbaric oxygen therapy for Bell's palsy. Cochrane Database of Systematic Reviews 2012, Issue 2. Art. No.: CD007288. DOI: 10.1002/14651858.CD007288.pub2



36. Fedorko L1, Bowen JM2, Jones W3 et al. Hyperbaric Oxygen Therapy Does Not Reduce Indications for Amputation in Patients With Diabetes With Nonhealing Ulcers of the Lower Limb: A Prospective, Double-Blind, Randomized Controlled Clinical Trial. Diabetes Care. 2016 Jan 6. pii: dc152001. [Epub ahead of print]

Other Resources

- 37. UpToDate: [website]. Waltham, MA: Walters Kluwer Health; 2021. Mechem CC, Manaker S. Hyperbaric Oxygen Therapy.
- 38. UpToDate: [website]. Waltham, MA: Walters Kluwer Health; 2021.Armstrong D, Meyer A. Basic principles of wound management.
- 39. UpToDate: [website]. Waltham, MA: Walters Kluwer Health; 2021. McCulloch D, Asla R. Management of diabetic foot lesions.

Hayes: A Division of TractMananger: Winifred Hayes Inc. Lansdale, PA:

- 40. HTA: Hyperbaric Oxygen Therapy for Chronic Would Healing. November, 2017. Updated Jan, 2021.
- 41. HTA: Topical Oxygen Therapy for Chronic Wound Healing. November, 2018 [Archived]
- 42. HTA: Hyperbaric Oxygen Therapy for Osteoradionecrosis. March 12, 2009. Updated March 1, 2013.
- 43. HTA: Hyperbaric oxygen therapy for soft tissue radiation injuries. March 25, 2009. Updated March 6, 2014. [Archived]
- 44. HTA: Hyperbaric oxygen therapy for autistic disorder. July 16, 2009. Updated July 11, 2013. [Archived]
- 45. HTA: Hyperbaric oxygen therapy for carbon monoxide poisoning. December 22, 2008. Updated Jan 26, 2012. [Archived]
- 46. HTA: Hyperbaric Oxygen Therapy for Sudden Sensorineural Hearing Loss. September, 2016. Updated Jan, 2021.
- 47. HTA: Hyperbaric oxygen therapy for burns, infections, and nondiabetic wounds. September 15, 2008. Updated Aug 7, 2012. [Archived]
- 48. HEA:
 - Hyperbaric Oxygen Therapy for Treatment of Central Retinal Artery Occlusion. Sept, 2018.
 - Hyperbaric Oxygen Therapy for Treatment of Compromised Skin Grafts and Flaps. May, 2016.
 - Topical Oxygen Therapy for Chronic Wound Healing. September, 2017
 - Hyperbaric Oxygen Therapy for Non-healing (Chronic) Diabetic Foot Wounds. July, 2017
- 49. REVIEW OF REVIEWS: Hyperbaric Oxygen Therapy for Diabetes-Related Foot Ulcers. Oct 5, 2018. Updated Feb, 2021

Professional Society

- 50. American College of Hyperbaric Medicine. Approved indications for hyperbaric oxygen. Accessed at: https://www.achm.org/
- 51. Undersea and Hyperbaric Medical Society. Indications for Hyperbaric Oxygen Therapy. UHMS; 2021. Accessed at: https://www.uhms.org/resources/hbo-indications.html
- 52. Undersea and Hyperbaric Medical Society's (UHMS) Clinical Practice Guidelines. Revised 2018. Accessed at: https://www.uhms.org/cpg
- 53. United States Navy Dive Manual, Revision 7. Treatment table 6. Page 20-41. Accessed at: https://www.navsea.navy.mil/Home/SUPSALV/00C3-Diving/Diving-Publications/

Advanced Medical Review (AMR): Policy reviewed externally by a MD board certified in Podiatric Surgery, Fellow American College of Foot and Ankle Surgeons, Diplomat American Board of Podiatric Surgery. 6/17/2016.

REVISION/REVIEW HISTORY

3/8/18, 6/19/19 & 4/23/20: Policy reviewed, no changes to criteria.

4/5/21: Policy reviewed, no changes to criteria. Updated references.