Chronic Refractory Osteomyelitis

ELECTIVE — after surgery and antibiotics have failed

An adjunct for chronic osteomyelitis that has failed appropriate surgical debridement and antibiotic therapy. ***No randomised trial exists.***

TREATMENT PROTOCOL

Pressure	**2.4–2.5 ATA** — the manual's stated best physiological balance. Target a bone oxygen tension of at least **150 mmHg**; an animal model reached only 104 mmHg at 2.0 ATA
Duration	90–120 min
Frequency	Daily, 5–7 days per week. Some give twice daily for the first 2–3 post-operative days
Sessions	Approximately **4–6 weeks** alongside antibiotics. The manual states plainly that no specific total can be recommended
Review	After 30–40 treatments

PATIENT SELECTION

Who to treat	Chronic refractory osteomyelitis that has failed appropriate surgical debridement and antibiotic therapy, as an adjunct to ongoing surgical and antimicrobial management.
Who not to treat, or when to stop	Reserve for genuinely refractory disease — failed adequate surgery and antibiotics. If there is no prompt improvement, or healing stalls, do not simply continue; reassess surgery and antibiotics.
Mechanism	Infected bone is hypoxic (rabbit: 21 vs 45 mmHg; 104 mmHg at 2 ATA oxygen with no change in bone blood flow, the range where neutrophils kill S. aureus — Mader 1980). Raising bone and soft-tissue oxygen tension supports osteoclast, osteoblast and neutrophil oxidative function, enhances certain antibiotics, and promotes angiogenesis in the compromised bed.
Outcome measure	Successful outcome or remission as defined across the included studies; relapse.

WHAT THE NUMBERS SHOW

- **Savvidou 2018** (systematic review, 45 studies of which 5 were animal; patients **had already failed antibiotics and surgery**): adjuvant treatment judged effective in 16 of 20 cohort studies and 19 of 20 case reports; only one study had a control group and none tested the outcome statistically, so **this is not an effect estimate**.
- **Goldman 2009** (single-author GRADE review, one database; AMSTAR-2 critically low): refractory lower-extremity osteomyelitis graded a **moderate** level of evidence, noting a randomised trial is still lacking.
- **Esterhai 1987** (the only concurrently controlled human study, n=28): **null on all four pre-specified endpoints** — length of stay, speed of wound repair, initial outcome and recurrence. The control arm healed 13 of 14, a near-ceiling comparator.
- **Mendel 1999** (104 rats): bone bacterial counts fell significantly below control with hyperbaric oxygen alone and with cefazolin alone.

EVIDENCE BASE

Shape and certainty	**No randomised trial exists**, stated explicitly. The best synthesis is one systematic review of 45 studies, observational and all but one uncontrolled — supportive but very low certainty.

Study	Design	Result and risk of bias
Savvidou 2018 — PMID 30035798	SR, 45 studies (5 animal)	Favourable but uncontrolled; no statistical test; AMSTAR-2 critically low
Goldman 2009 — DOI 10.1016/j.pmrj.2009.03.012	Single-author GRADE review	Author-graded moderate; AMSTAR-2 critically low
Esterhai 1987 — PMID 3612850	Prospective controlled, n=28	**Null on all four endpoints**; ROBINS-I serious
Hart 2021, UHMS ch12 — PMID 34390634	Governing chapter	Narrative and mechanism
Larsson 2002, Neurosurgery — PMID 11844263	Consecutive series, post-operative cranial and spinal bone/implant infection, n=39	27/36 healed with flap or implant kept; no comparator

WHAT THE EVIDENCE DOES NOT SUPPORT

Cautions	No randomised trial exists for this indication. The only concurrently controlled human study is null. **A frequently quoted sternal-infection series (Yu 2011, n=12) reports ICU stay of 8.7 against 48.8 days — these figures are not credible as causal estimates and must never be quoted as a hyperbaric effect**; the sicker patient does not reach the chamber, the survivor does. In skull-base osteomyelitis Cochrane found no trials at all.

STATUS AND SOCIETY POSITIONS

Status	Accepted indication in South Africa (SAUHMA Level C). Maps directly to the chronic osteomyelitis diagnosis-treatment pair, a PMB-level diagnosis, with hyperbaric oxygen as the adjunct to surgery and antibiotics.
ICD-10 (SA)	M86.47, M86.46, M86.45, M86.49, M86.67, M86.66, M86.65, M86.69
ECHM 2017 (Type, Level)	2C; at least 11–12 weeks (about 60 sessions)

Compiled from the **UHMS Hyperbaric Oxygen Therapy Indications Manual, 15th edition (2023)** and the appraised trial evidence held in an HBOT evidence library. All treatments are 100% oxygen. US Navy Treatment Table profiles are named, not reproduced — the US Navy Diving Manual is the operative document at the chamber. Session counts are largely guideline convention rather than dose-finding evidence. This card summarises published parameters and does not replace those source documents or clinical judgement for the individual patient. Generated 31 October 2026. Not a SAUHMA publication and carries no society endorsement.