

# Hyperbaric Oxygen Therapy in Chronic Pain Management

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Chronic pain is one of the frequently encountered clinical problems that is difficult to cure. Hyperbaric oxygen (HBO) therapy has been reported in chronic pain syndromes with promising results. In this review, we focus on the effectiveness of HBO in fibromyalgia syndrome, complex regional pain syndrome, myofascial pain syndrome, migraine, and cluster headaches. HBO may be beneficial if appropriate patients are selected. HBO is a reliable method of treatment. However, physicians performing HBO must be aware of oxygen toxicity. Another problem regarding HBO is the scarcity of centers administering it. Further research is required focusing on the optimal treatment protocol, the cost/benefit ratio, and the safety of HBO in chronic pain management.

## Introduction

Pain is the most frequent symptom that causes patients to visit health institutions. Pain is a normal sensation that warns the nervous system, as the result of a chemical, thermal, or mechanical stimulus, that it needs to protect itself against a probable danger. In addition to this physiologic pain, patients also complain of pathologic pain. There are two kinds of pathologic pain: acute and chronic. Acute pain occurs immediately after illness or injury and resolves after healing. Conversely, chronic pain persists beyond the usual course of the disease and may cause intermittent or continuous pain for months to many years. Chronic pain can occur after a disease or without a known reason. The treatment of chronic pain calls for an extraordinary effort from all physicians, but satisfying results cannot be obtained in most cases. For that reason, the efficacy of several pharmacologic and nonpharmacologic methods for the treatment of chronic pain is being investigated. Many

studies have been published examining the use of hyperbaric oxygen (HBO) therapy, used as an adjunct therapy in the treatment of chronic pain in recent times [1•,2•,3-8,9•,10-15]. The aim of this review is to investigate the role and effectiveness of HBO treatment as an adjunct in chronic pain management.

## Principles of Hyperbaric Oxygen Therapy

Hyperbaric oxygen therapy is defined as the intermittent inhalation of 100% oxygen in a hyperbaric chamber at a pressure higher than 1 absolute atmosphere (1 ATA = 760 mmHg, the normal atmospheric pressure at sea level) [16]. HBO therapy usually is administered at 1 to 3 ATA. Typically, the duration of HBO therapy varies from 30 to 120 minutes. The frequency and total number of HBO sessions are not standard among hyperbaric medicine centers. HBO therapy is administered using monoplace or multiplace chambers. In the former, a single patient is treated and internal pressure is raised with oxygen. Multiplace chambers permit patients to be in the pressure chamber together with health personnel. In multiplace chambers, pressure is raised with compressed air and patients breathe oxygen through masks.

Hyperbaric oxygen therapy causes mechanic and physiologic effects. The mechanic effects are linked to Boyle's law, which states that there is an inverse relationship between pressure and volume. Use is made of the mechanic effects of HBO in the treatment of decompression sickness and arterial gas embolism. Gas bubbles that form in the vein shrink with increasing pressure and, as a result, are eliminated by collapse or expulsion from the lungs. At the same time, oxygen accelerates the dissolution of bubbles by replacing the inert gasses within them. The physiologic effects of HBO are linked to the hyperoxia it gives rise to in the tissues. At one atmosphere, 97% of oxygen in the arterial blood is transported with hemoglobin in erythrocytes. The remaining oxygen is transported in dissolved form in plasma. In addition to fully saturating hemoglobin with oxygen, HBO leads to a favorable increase in the amount of oxygen dissolved in plasma. HBO at 3 ATA increases the level of oxygen dissolved in plasma from 0.3 ml/dL to 6 ml/dL [17]. At rest and with good perfusion, tissues require 5 to 6 ml/dL of oxygen. In other words, with HBO at 3

# Oxygen Therapy Chronic Pain Management

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**Ethical Issues in Chronic Pain Management** Michael E. Schatman, 2016-04-19 Specifically designed to address the needs of all specialists involved in the care of chronic pain patients this source clarifies the ethical and legal issues associated with the diagnosis assessment and care of patients suffering from long term pain Divided into five comprehensive sections this source covers a variety of topics to help the ch

*Clinical Pain Management : Chronic Pain* Peter Wilson, Paul Watson, Jennifer Haythornwaite, Troels Jensen, 2008-09-26 The second edition of Chronic Pain now covers a vast scientific and clinical arena with the scientific background and therapeutic options much expanded In common with the other titles comprising Clinical Pain Management the volume gathers together the available evidence based information in a reader friendly format without unnecessary detail an

*Treatment of Chronic Pain Conditions* Jason E. Pope, Timothy R Deer, 2017-09-01 There is an unmet need in both acute and chronic care settings for a comprehensive clinically focused fast reference on pain management Written by high profile internationally recognized experts in field Pain Treatment for Acute and Chronic Conditions A Comprehensive Handbook is one of the first manuals of its kind to provide balanced and comprehensive coverage of pain medicine modalities The book is structured into sixteen sections with each chapter providing key points for quick reference followed by a more detailed overview of the topic at hand with extensive tables and figures to illustrate Beautifully laid out and extensively furnished with both research and experience this book is a necessary resource in the field of pain medicine

*Cumulated Index Medicus* ,1985

*Chronic Pain Management for Physical Therapists* Harriët Wittink, Theresa Hoskins Michel, 2002 This is the first and only book on chronic pain management written specifically for physical therapists This unique resource provides physical therapists and physical therapy students with practical information for treating patients with chronic pain

**Pain Management: A Multidisciplinary Approach, 1e (Clinics Collections)** Joel J. Heidelbaugh, 2015-10-15 Clinics Collections Pain Management draws from Elsevier s robust Clinics Review Articles database to provide multidisciplinary teams including general practitioners orthopedists obstetricians neurologists gastroenterologists nurses and other healthcare professionals with practical clinical advice and insights on this highly prevalent disease and its comorbidities Clinics Collections Pain Management guides readers on how to apply current primary research findings on pain management to everyday practice to help overcome challenges and complications keep up with new and improved treatment methods and improve patient outcomes Areas of focus include physiology and general management musculoskeletal pain of the head neck upper body and lower body as well as neurologic disorders psychologic disorders and special considerations Each article begins with keywords and key points for immediate access to the most critical information Articles are presented in an easy to digest and concisely worded format Elsevier Clinics Collections provide concise reviews of today s most prevalent conditions and significant medical developments Other Clinics Collections titles available include Type II Diabetes Mellitus Asthma and Obesity

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Wellness Dr. Robin E. Berman, Arthur Kurzweil, Dale L. Mintz, 2006-03-17 The Jewish people have special concerns approaches and attitudes about health and wellness due in part to certain illnesses known as Jewish genetic diseases such as Tay Sachs Niemann Pick Gaucher and others Beyond these genetic diseases however the entire range of topics and issues related to health and wellness has long been of great interest to the religious and secular Jewish community Jewish tradition has developed many special approaches to health and health related issues based on the hallowed traditions and precepts found in the Torah its commentaries and the vast literature written by rabbinic authorities throughout the centuries Similarly Jewish secular culture has developed many special attitudes and approaches to the issues in this book regarding women s health nutrition raising children caregiving and other special issues The Hadassah Jewish Family Book of Health and Wellness written in collaboration with Hadassah The Women s Zionist Organization of America known throughout the world for its leadership as a major force in health research and education provides a much needed resource and guide to physical health and spiritual issues that are of concern to Jewish families This practical book is an essential reference for maintaining family health in keeping with Jewish tradition It is filled with useful advice in an easy to understand format With contributions from top experts in medicine and Jewish education the book covers the crucial issues of healing and spirituality marriage and family sexuality women s special issues food and diet emotional and mental health and exercise The Hadassah Jewish Family Book of Health and Wellness is a comprehensive health guide that will prove useful for every member of your Jewish family

**The Chronic Pain Management Sourcebook** David Drum, 1999-08-22 More than 34 million people deal with some form of chronic pain and those who manage best are the ones who take responsibility for their condition THE CHRONIC PAIN MANAGEMENT SOURCEBOOK shows how patience determination and knowledge can help you deal more effectively with the debilitating effects of chronic pain

**Hyperbaric Oxygen Therapy for the Treatment of Chronic Pain :: a Review of Clinical Effectiveness and Cost-effectiveness Version 1.0** Wendy Pejic, *The Homiletic Review* ,1889 *Pharmacotherapy Handbook, Eighth Edition* Barbara G. Wells, Joseph T. DiPiro, Terry L. Schwinghammer, Cecily V. DiPiro, 2011-10-10 Essential drug data in a concise carry anywhere reference Pharmacotherapy Handbook 8e provides practitioners and students with the critical information necessary to support drug therapy decision making for more than 140 diseases and disorders Featuring a convenient alphabetized presentation this handy guide utilizes tables texts figures and treatment algorithms to make the information readily accessible and easily understood The consistent chapter organization includes Disease state definition Review of relevant pathophysiology Clinical presentation Diagnosis Desired outcome Treatment Monitoring The Treatment section usually includes nonpharmacologic therapy drug selection guidelines dosing recommendations adverse effects pharmacokinetic considerations and important drug interactions *Pharmacotherapy Handbook, Eighth Edition* Barbara Wells, 2012 Essential drug data in a concise carry anywhere reference Pharmacotherapy Handbook 8e provides practitioners and students with the critical information necessary to support drug therapy decision

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**Handbook of Chronic Pain Management** Graham D. Burrows,Diana Elton,Gordon Stanley,1987  
*American Agriculturist* ,1889 *Hazzard's Geriatric Medicine and Gerontology, Eighth Edition* Jeffrey B. Halter,Joseph G. Ouslander,Stephanie Studenski,Kevin P. High,Sanjay Asthana,Mark A. Supiano,Christine S. Ritchie,Kenneth Schmader,2022-06-06 The undisputed leader on the subject of geriatrics updated to reflect the most recent advances in the field A Doody s Core Title for 2024 2023 The leading text on the subject of geriatrics this comprehensive guide combines gerontology principles with clinical geriatrics offering unmatched coverage of this area of medicine Anchored in evidence based medicine and patient centered practice Hazzard s Geriatric Medicine and Gerontology presents the most up to date medical information available This updated eighth edition reflects the continued growth and increasing sophistication of geriatrics as a defined medical discipline The book focuses on the implementation of key concepts and covers the foundation for geriatrics as well as frequently encountered syndromes found in older adults In addition it provides valuable insights into the simultaneous management of multiple conditions including psychological and social issues and their interactions an intrinsic aspect of geriatric patient care Features A greater emphasize on the growing knowledge base for key topics in the field including gerontology geriatrics geriatric conditions and palliative medicine NEW chapters on Social Determinants of Health Health Disparities and Health Equity Age Friendly Care Geriatrics Around the World The Patient Perspective Substance Use and Disorders Applied Clinical Geroscience Managing the Care of Patients with Multiple Chronic Conditions UPDATED contributions from a respected and diverse team of geriatricians and subspecialists to reflect clinical breakthroughs and advances NEW Extensive coverage of the COVID 19 pandemic and its impact on vulnerable older adults Updated Learning Objectives and Key Clinical Points Hundreds of full color images The United Service ,1889 The Practitioner ,1876 *Clinical Journal* ,1896 **LANGE Vascular and Endovascular Surgery: Clinical Diagnosis and Management** Munier Nazzal,John Blebea,Mohamed Osman,2023-09-01 A concise introduction to clinical diagnosis and management with 1 500 practice questions and answers for effective board prep LANGE Vascular and Endovascular Surgery Clinical Diagnosis and Management is an essential quick reference guide for residents and attending physicians in vascular surgery general surgery interventional cardiology and interventional radiology Divided into four sections General Vascular Venous Disease Arterial Disease and Special Vascular Conditions the text covers all aspects of vascular disease diagnosis and management Each chapter begins with an overview of the disease process and includes symptoms general considerations

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