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WOUND CARE AND HYPERBARIC MEDICINE

VOLUME 9, ISSUE 1 — SPRING 2018

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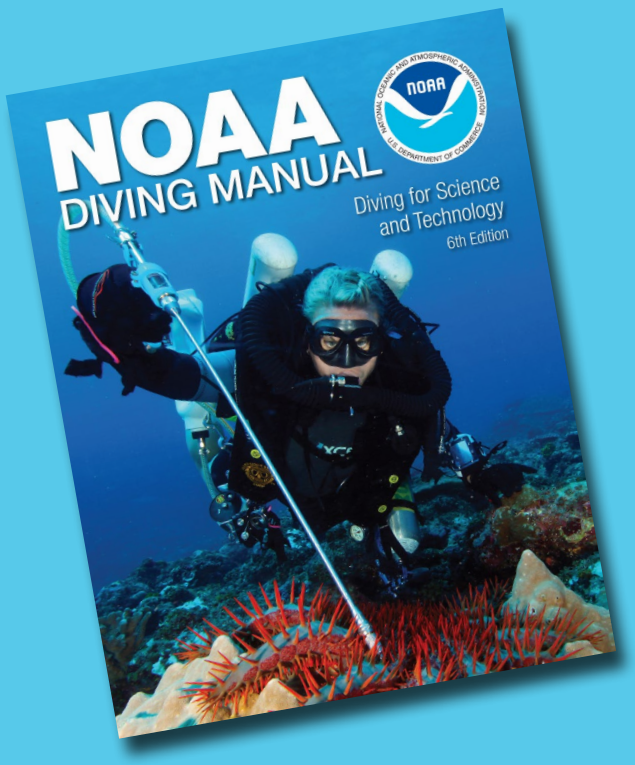
NOAA DIVING MANUAL



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NOTE FROM THE EDITOR

As *WCHM* magazine begins its ninth year, we extend a special thank you to all of our returning sponsors: Sechrist, UHMS, iEvac, and Wound Care Education Partners as well as welcome our newest sponsor, WoundReference. *WCHM* started as a paid subscription for a print publication, the only magazine to cover all topics under pressure: wound care, diving, and hyperbaric medicine. But as our online audience grew over the years, we offered the magazine exclusively online, compliments of Best Publishing Company and the amazing group of *WCHM* Elite and VIP Sponsors.

In this issue's hyperbaric medicine section, the Baromedical Nurses Association (BNA) returns with celebrations and awards recognizing outstanding members in hyperbaric nursing. We congratulate UHMS as they achieve ISO 9001 certification. Registered respiratory therapist Jeff Mize returns to explain the use of RMTs in the HBO department.

Prolific contributor Darren Mazza returns in *WCHM*'s safety section to explain the importance of communication between the CHT and the patient.

Gretchen Dixon also returns to explain the updates and changes to wound care diagnosis ICD-10 diagnosis codes.

The long-awaited *Textbook of Chronic Wound Care: An Evidence-Based Approach to Diagnosis and Treatment* by Drs. Jayesh Shah, Paul Sheffield and Caroline Fife, is published and available in hardcover and ebook format on March 31.

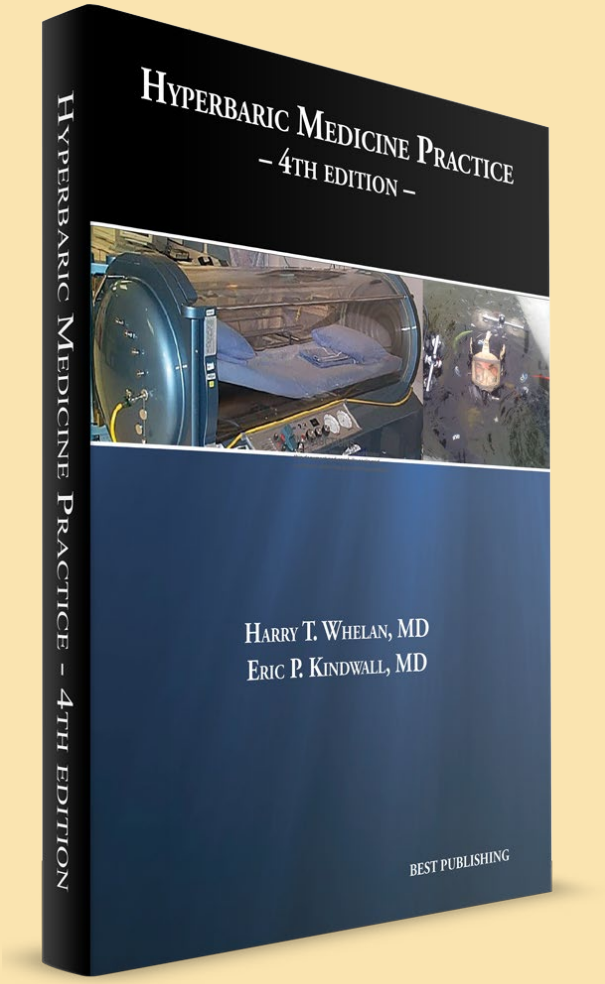
Dr. Michael Strauss begins yet another *WCHM* series. Part 1 of 3 is included in this issue on the topic of diving with disabilities. This series is an excerpt from the revised edition of Dr. Michael Strauss and Dr. Igor Aksenov's *Diving Science* textbook, also due for publication in 2018 by Best Publishing Company.

If you've ever wanted to get an article you authored published to an audience of thousands of wound care and hyperbaric medicine practitioners, 2018 is the year for you to make this happen. Please submit your articles to info@bestpub.com or call 561.776.6066. We also invite you to join our elite group of *WCHM* advertisers and reach your target audience.

We look forward to hearing from you.

Lorraine Fico-White
Managing Editor, *WCHM* Magazine

*The long-awaited, **COMPLETELY REVISED AND UPDATED** edition of Dr. Harry Whelan and Dr. Eric Kindwall's keystone textbook in hyperbaric medicine is now available.*



HYPERBARIC MEDICINE PRACTICE

4TH EDITION

by Dr. Harry Whelan and Dr. Eric Kindwall

Harry T. Whelan, MD, lead editor, collected some of the most renowned practitioners in hyperbaric medicine to create this revised and updated 4th edition, which adds new information of interest to all in the field of diving and clinical hyperbaric medicine.

New contributors have written or revised most chapters, but many authors have returned to update their chapters. New chapters cover areas recently approved for hyperbaric oxygen treatment, such as idiopathic sudden sensorineural hearing loss and central retinal vein occlusion. There are also chapters about submarine rescue and problems that pertain to technical and rebreather diving.

This book will be an essential addition to the library of physicians, nurses, CHTs, CHRNs, and allied health professionals who practice clinical hyperbaric medicine and those involved with the treatment of injured divers.

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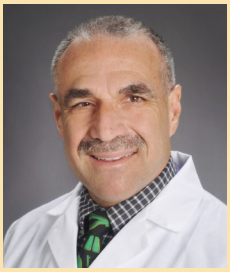

Dr. Whelan, a Milwaukee native, is professor of neurology, pediatrics and hyperbaric medicine at the Medical College of Wisconsin. He is also a captain and a diving medical officer (DMO) in the U.S. Navy and a consultant to the Navy Experimental Diving Unit (NEDU. He recently served as commanding officer of Marine Air Control Group 48 Medical and undersea medical officer for Deep Submergence Unit, which is the Navy's submarine rescue team and its deep-sea research component.

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Baromedical Nurses Association (BNA)

Celebrating Diane Norkool Award, Circle of Excellence Award, Hyperbaric Nurses Day: April 3, 2018

By Laura Josefsen, RN, ACHRN

Hyperbaric nursing as a nursing specialty is a dream we had in June 1985 that became a reality. A specialty that would take an unknown field of nursing and develop an organization for nurses working in the hyperbaric field to create and provide professional support to nurses worldwide, dedicated to offering educational opportunities, support nursing research efforts, have a presence on committees and boards of national organizations, having a public voice in those issues which impact nursing, and to provide opportunities for networking and information exchange. The dedication and hard work of amazing nurses worldwide over the years has made this possible.

Diane Norkool, one of the first pioneers in this field, provided leadership, research contributions, and educational efforts and was instrumental in developing hyperbaric nursing standards of care, hyperbaric nursing certification and the Baromedical Nurses Association. *The Diane Norkool Award* was established in 1996 to recognize nurses making a significant contribution to the field of hyperbaric medicine. The recipients of this award to date are:

2017- Richard "Gus" Gustavson

2016- Robin Ortega

2015- Connie Hutson

2014 – Mary Hirsch

2013 – Ann L. "Tina" Ziemba

2008 – Monica Skarban

2006 – Kathy Furnas

2005 – Susan Churchill

2004 – Laura Josefsen

2002 – Helen Norvell

2001- Claude Wreford-Brown

1999 – Christy Pirone

1997 – Valerie Larson-Lohr

1996 – Diane Norkool

It is time to start thinking of who should receive this award for 2018! We invite you to think of the efforts of your team members who make a difference in your units and in your practice. Submit your nominations through the BNA website at hyperbaricnurses.org!

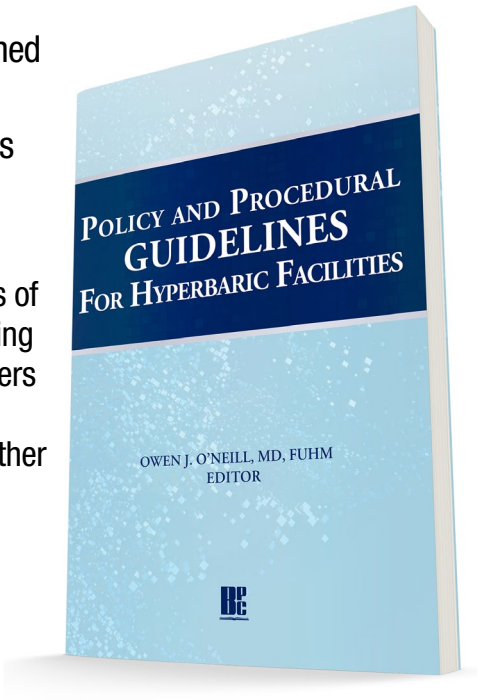
As the BNA continues to develop, we wanted to recognize persons outside the nursing realm that make a difference. *The Circle of Excellence Award* was developed in 2017 to honor individuals who exemplified extraordinary mentoring and/or professional support to promote the mission and vision of hyperbaric nursing, including but not limited to research, education, or safety. The first recipient of this award is Dr. Eugene Worth for his ongoing support and dedication.

Our newest project is the establishment of the first annual Hyperbaric Nurses Day: April 3, 2018 in recognition of the hard work and commitment made each and every day (and sometimes nights!) by all hyperbaric nurses. Visit the BNA website for the many activities and announcements to help promote the hard work you do! There will be live online presentations at the start of the in-service about the history and role of the HBO nurse. (CEU category A). The first part is a tribute to HBO nurses everywhere so please send BNA President Annette (President@hyperbaricnurses.org) a picture of you and your HBO team, posed or providing care in your facility. We would like to include as many HBO nurses as possible in the presentation.

Join us in our exciting new venture! ■

POLICY AND PROCEDURAL GUIDELINES FOR HYPERBARIC FACILITIES

Provides needed resource and reference guidelines for new and established hyperbaric facilities, serving as a reference for the development of new hyperbaric policies as well as customizing and enhancing current policies and procedures already in place.



Policy and Procedural Guidelines for Hyperbaric Facilities addresses issues of safety and practice for both the multiplace and monoplace environments. Utilizing regulatory guidelines and standards of practice as its foundation, this book covers governance, administration, emergency procedures, patient care, hyperbaric chamber maintenance, treatment protocols and quality improvement, among other topics. The appendices include sample forms for both Class A multiplace and Class B monoplace chambers.

The guidelines provided in this document will benefit the diverse group of physicians, nurses, tecnicians, and allied health-care personnel in the hyperbaric field as they customize their unit-specific policies and procedures.

Endorsement from Baromedical Nurses Association (BNA)

The Baromedical Nurses Association endorses **Policy and Procedural Guidelines for Hyperbaric Facilities** as guidelines to enable hyperbaric facilities to develop and/or endorse their unit-specific policies.

The Baromedical Nurses Association (established in 1985) provides a forum for hyperbaric nursing that encompasses quality, safety, teamwork, mentoring, research, education, and nursing guidelines of standards of care for the patient receiving hyperbaric oxygen therapy.

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UHMS Achieves ISO 9001 Certification

By Renée Duncan, UHMS Communications Coordinator

The UHMS has once again achieved ISO 9001:2015 certification. The announcement was made in early March by the UHMS Hyperbaric Facility Accreditation Department.

"This was a big year for the HFA Office," said Derall Garrett, Hyperbaric Facility Accreditation Director. "Not only have we made a lot of changes in and around the office, we transitioned from the ISO 9001:2008 to the 2015 standards. We in the HFA office as well as the entire UHMS team are excited to have done so well in receiving this certification."

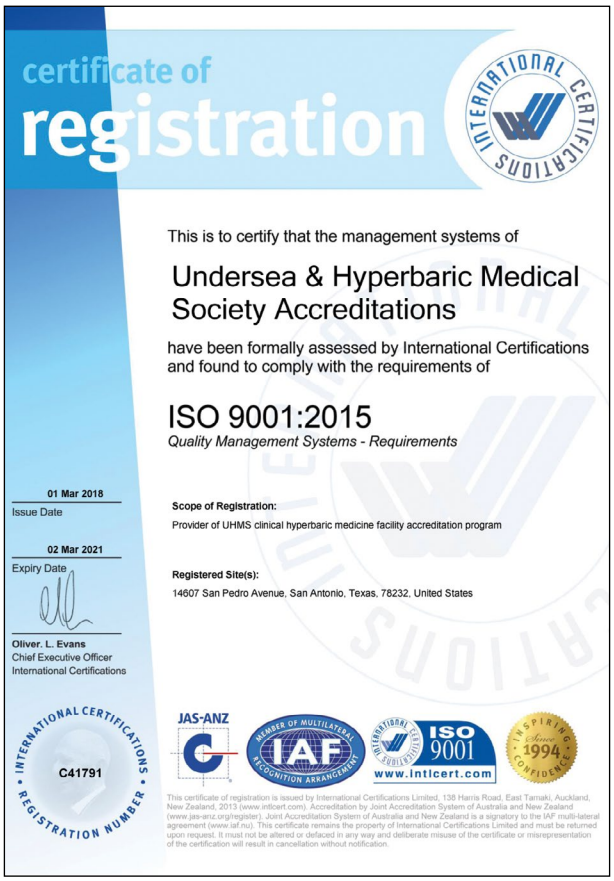
The HFA program works with hyperbaric facilities to ensure that they are meeting the highest standards of care and patient safety through UHMS' rigorous evaluation of facility, equipment, staff and training to ensure that the utmost quality is maintained within our specialty. The UHMS is committed to providing, promoting, developing and raising the quality of care across the spectrum in scientific communication, life sciences and clinical practices of hyperbaric medicine by promoting high standards of patient care and operational safety.

Certification by the International Certifications Inc. to the ISO 9001:2015 standards demonstrates the UHMS' dedication and adherence to these goals.

ISO promotes global standardization for specifications and requirements for materials, products, procedures, formats, information and quality management. Certification under ISO standards is an assurance that the ISO-required management of processes and documentation is in place

Standards were originally published in 1987 by the International Organization for Standardization (ISO), a specialized international agency for standardization composed of the national standards bodies of more than 160 countries. UHMS is certified under ISO 9001:2015, the most current version of the program.

The ISO 9001:2015 standards of quality management are based on seven quality management principles: customer focus, leadership, engagement of people, process approach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Issue Date

02 Mar 2021
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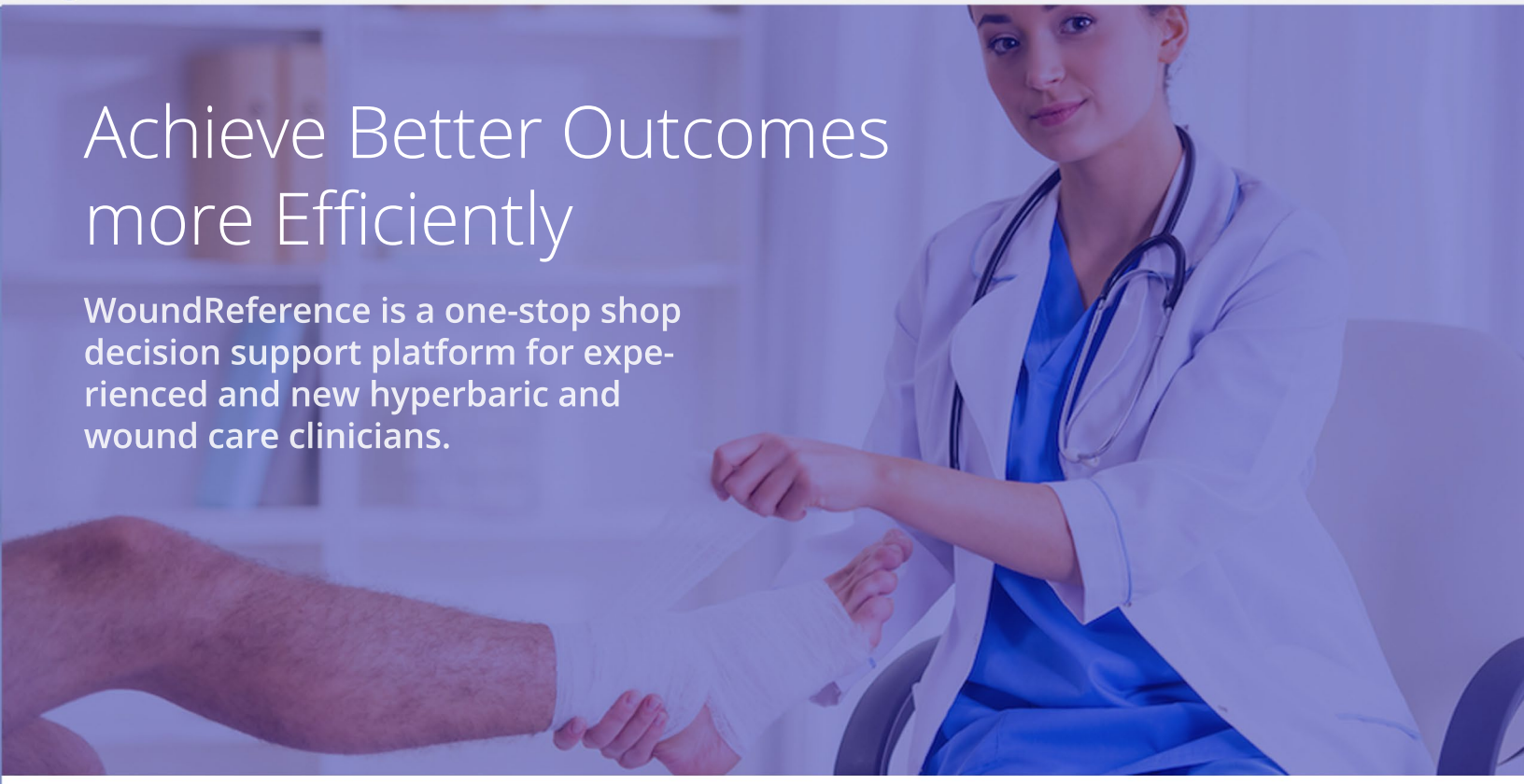
in activities, improvement, evidence-based decision-making and relationship management with partners and suppliers. The goal of ISO 9001 is to embed a quality management system within an organization, increasing productivity, reducing unnecessary costs, and ensuring quality of processes and products.

These have always been the goals of UHMS," notes Executive Director John Peters. "We are pleased to have the added guidance, legitimacy and support that comes with ISO 9001 certification.

The workup to successful certification began with former Quality Assurance and Regulatory Affairs Director Tom Workman, who oversaw UHMS' first certification and provided tultelage and support for this newest effort. ■



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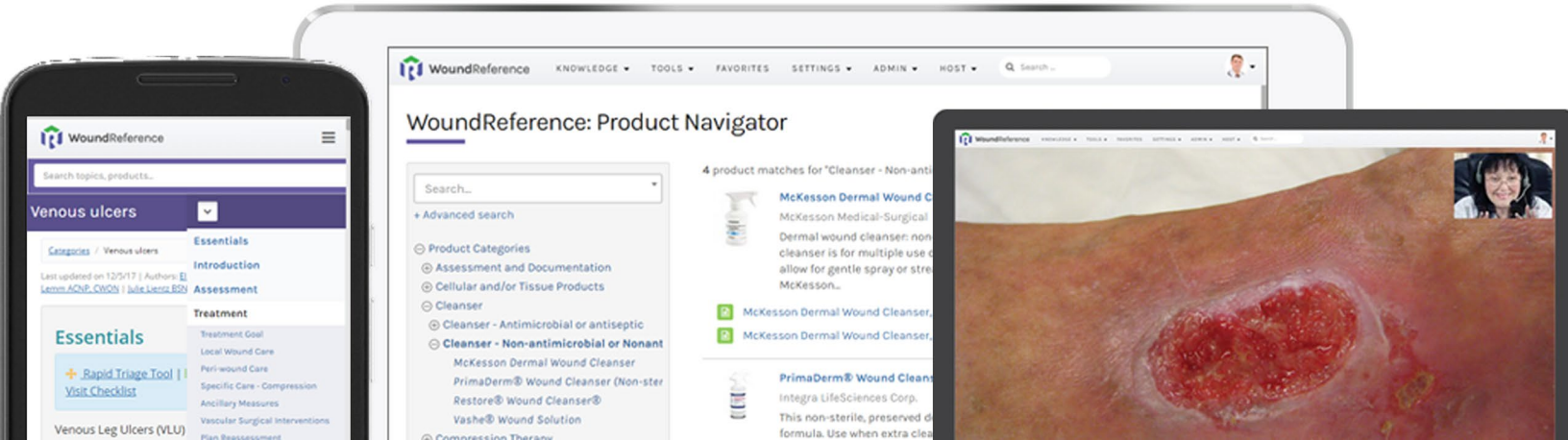

Respiratory Therapists and the Hyperbaric Medicine Service

Jeff Mize RRT, CHT, CWCA

The use of a respiratory therapist in the hyperbaric medicine department is essential for the care of patients requiring mechanical ventilation. This is a common standard in facilities that provide 24/7 service for emergent indication(s) and the critically ill hyperbaric patients.

As health care evolves, so has the role of every health-care professional. That has certainly been the case with the role and impact of the respiratory therapist in the field of hyperbaric medicine and wound care.

Respiratory therapist involvement in the hospital setting has long been that of a valued component on code blue and emergency response teams. We probably have all experienced the situation of a code blue being called and a seemingly endless number of respiratory therapists respond. It this eagerness and desire to be involved in all aspects of patient care that make a respiratory therapist well suited for the role of hyperbaric technologist.

The core curriculum for respiratory therapy education emphasizes physics and gas laws as the foundation in the development of the students' clinical knowledge base. While it is obvious that a great understanding of physics and gas laws is necessary for anyone working the field of hyperbaric medicine, what is often overlooked for the hyperbaric tech is the clinical skill set, scope of practice and licensure to provide patient care. The reality every department is faced with is the ability to produce more with fewer resources . . . FTEs.

State licensure and practice scope for a respiratory therapist varies from state-to-state. Over time a significant change in the opportunities and utilization of respiratory therapists in all areas of patient care has occurred. For example, in addition to the traditional responsibilities, qualified therapists perform arterial-line insertion, emergency intubation, and bedside hemodynamic monitoring. This, of course, is dependent on the individual state and institutional scope of practice.

Educational Requirements

All states that license respiratory therapists require license candidates to complete an accredited degree program in respiratory care recognized by the Commission on Accreditation for Respiratory Care (CoARC). To date, there are 441 accredited CoARC programs across the U.S. Nearly all states have at least one campus location that houses a CoARC-accredited program.

The minimum requirement for licensure in all states where license respiratory therapists is an associate's degree including two full academic calendar years of study and a clinical experience. Bachelor's degree programs, however, are gaining in popularity to meet the demand of today's employers, many of which look for respiratory therapists with more advanced education.[1]

Respiratory Therapist Certification Requirements

National certification through the National Board for Respiratory Care, Inc. (NBRC) is a standard requirement and the basis for licensing among all state boards of respiratory care.

Respiratory therapists also frequently choose to pursue the registered respiratory therapist (RRT) credential, the advanced-level credential in the field of respiratory care. As of January 2015, the RRT credential became the standard for licensing in Ohio and California, and other states are likely to follow suit in the coming years. Many employers are now demanding that candidates for respiratory therapy jobs possess the RRT credential. The Bureau of Labor Statistics reports that many employers are now seeking respiratory therapists who hold bachelor's degrees in respiratory care.

Among the 8,132 graduates of CoARC-accredited programs in 2012, 89.6 earned an associate degree, a 1% decrease from 2011 and a 5% increase from 2010. Another 10.4% of the graduates in 2012 earned a bachelor's degree, a 30.3% increase since 2011 and a 9.6% increase since 2010. This highlights the trend toward bachelor's degrees in the profession.

Occupational Outlook

The median annual wage for respiratory therapists was $58,670 in May 2016. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10% earned less than $42,490, and the highest 10% earned more than $81,550.

In May 2016, the median annual wages for respiratory therapists in the top industries in which they worked were as follows:[2]

Nursing care facilities (skilled nursing facilities)	$59,860
Offices of physicians	$59,150
Hospitals; state, local, and private	$58,740

The complexities and challenges of patient care and the management of health-care services require, perhaps more than ever, multidiscipline teams. This is evident in the field of hyperbaric medicine. Respiratory therapists interested in the hyperbaric medicine field have opportunity for professional growth as well as the chance for lasting impact on the profession of respiratory care. ■

References

1. AARC website: http://www.aarc.org/advocacy/state-society-resources/state-licensure-information/
2. Bureau of Labor Statistics: https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm

About the Author
Jeff Mize RRT, CHT, CWCA

With over thirty years of health-care experience, Jeff has extensive experience in critical care that is the result of seven years as a flight respiratory therapist/paramedic for the Spirit of Kansas City Life Flight.

In 1993, he entered the field of hyperbaric medicine and wound care, advancing to the role of program director and provided oversight for all aspects of administrative, clinical and daily operations within the wound care and hyperbaric facility. Jeff is a principal partner with Midwest Hyperbaric LLC and is the co-founder and Chief Clinical Officer for Wound Reference.

Jeff is a certified hyperbaric technologist (CHT) by the National Board of Diving and Hyperbaric Medical Technology, a certified wound care associate (CWCA) by the American Academy of Wound Management, trained as a UHMS safety director and is a UHMS Facility Accreditation Surveyor.

Jeff is the 2010 recipient of the Gurnee Award and the 2013 recipient of the Paul C. Baker Award for Hyperbaric Oxygen Safety Excellence. He has served on the UHMS Board of Directors (2010-2015,) the UHMS Finance Committee (2010-2015) and the UHMS Scientific Committee (2011-2012).

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About the Author:
Dr. Neil Hampson, a Seattle native, is a retired pulmonary, critical care, and hyperbaric medicine physician. He has an international reputation in hyperbaric medicine, specifically in the area of carbon monoxide poisoning. During his clinical career, he treated more than 1,000 patients with carbon monoxide poisoning and published numerous papers in medical journals about the condition.

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Body Language

By Darren Mazza CHT

New patient education is provided to every patient prior to starting hyperbaric therapy, and being able to communicate with a patient is an absolute must in order to provide a safe treatment. Occasionally an interpreter may be required for patients who speak a primary language other than English, and other patients may be extremely hard of hearing or deaf.

Once the treatment begins, during the descent phase, the pressure differential is significantly increased on the patient's ears, making it increasingly difficult for the patient to hear the CHT speaking to them. This is the time when good patient communication requirements come into play ensuring the patient is able to both clear their ears and communicate it to the CHT. The CHT always maintains eye contact with the patient during descent. All new patients are instructed to use hand signals in the event they are having trouble clearing their ears during this time.

For 14 years now, I have treated a large number of hyperbaric patients, some of whom have been challenging to communicate with, either because of a language barrier, hearing difficulties, or some medical deficit such as aphasia from a prior CVA. Patient body language is extremely important to observe during a hyperbaric treatment. One recent example was with a patient who did not speak English. The patient became a bit restless during treatment and pulled his blankets off. Although it was quite obvious the patient was over heating, I have also seen patients do this when they are experiencing confinement anxiety. I used a hand gesture to the patient simulating it was hot by wiping my forehead. The patient then nodded and gave me a thumbs up! I then increased the ventilation rate and cooled the patient down.

Now it's not always this simple. There was another incident where a patient urgently needed something during the treatment but did not speak English, making it very difficult for the patient to communicate with me! I couldn't tell if the patient was ill or something else was wrong. The patient didn't seem to be in a lot of distress but needed something urgently. I ended the treatment and gave the patient the hand signal that he was coming up. The patient nodded in acknowledgment. During the ascent, I motioned to the patient by rubbing my abdomen in an effort to illustrate having an upset stomach. The patient nodded with a big smile. I said to myself that's what he's needing, and as soon as the patient was at surface, I slid the gurney out and put the rail down. The patient jumped up and ran to the restroom.

Take-Home Message

The hyperbaric patient is completely dependent on the CHT while in the chamber, from temperature control through ventilation rates to TV channels and volume. Paying close attention to a patient's body language will provide many clues as to the needs of each patient. Sometimes patients don't or can't communicate their every need. It's up to us to stay alert and keep the patient both comfortable and safe. ■

About the Author

DARREN MAZZA has been the CHT and safety director at the Center for Wound Healing and Hyperbarics at Swedish Edmonds in Washington since 2008. He began his health-care career working as both an EMT and an emergency room preceptor in Sacramento, California. In 2005, he moved his family to Idaho, where he was department head of the hospital's outpatient wound-care and hyperbaric center. With more than 28 years in health care, he has been able to apply his past to his current role in the hyperbaric industry, making him a more responsible CHT and safety director.

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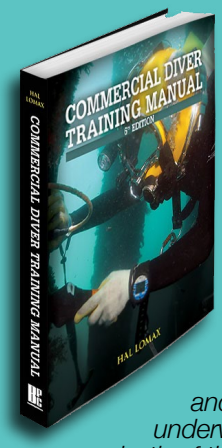

The 6th edition of the *Commercial Diver Training Manual* is an almost total rewrite. Where previous editions were designed to be utilized in conjunction either the *NOAA Diving Manual* or the *U.S. Navy Diving Manual*, the 6th edition has been written as a stand-alone work that covers history, physics, physiology, diving medicine, and first aid in addition to diving techniques, diving equipment, and working underwater. Updates in the 6th edition include the following:

- comprehensive rewrite that can be used as stand-alone reference
- extensive index
- easy-to-read formatting
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— Don Barthelmess
Professor, Santa Barbara City College
Marine Diving Technology Department

Hal Lomax ran his own diving business for a couple of decades and at the same time operated his own school, where he wrote all of the course material and texts. In 2006, he went back to work offshore as a freelance supervisor. He is a founding member of the Divers Association International and currently sits on the Board of Directors as board member for Canada. Since hanging up his helmet at the end of 2007, Hal has worked in various locations around the world as a diving superintendent and supervisor.

The Spinning World of Coding Updates

By Gretchen Dixon

Have you reviewed the added wound severity codes effective October 1, 2017? Do you sometimes second guess the diagnosis codes selected? Do the codes accurately reflect the patient's medical condition? Are you comfortable the claim will not hit any edits and reimbursement will be timely? You may answer yes, no, maybe or doubt sets in with a big question mark of "am I sure?". Here are some updates and changes to wound care diagnosis ICD-10 diagnosis codes.

For the fiscal year of 2018 starting October 1, 2017, the Cooperating Parties [the American Hospital Association (AHA), the American Health Information Management Association (AHIMA), Centers for Medicare and Medicaid Services (CMS), and National /Center for Health Statistics (NCHS)] for the ICD-10-CM approved expanding the category for non-pressure chronic ulcers is a positive change. Notice the new options of choosing a code with or without necrosis of muscle or bone. This article will focus on the added new codes (63) with descriptions stating "without evidence of necrosis . . ." providing a more accurate acuity level, complexity of care and intensity of services provide in wound care.

The category of L97 titled Non-Pressure Chronic Ulcer of Lower Limb, not elsewhere classified, includes the following descriptions:

- Chronic ulcer of skin of lower limb NOS (not otherwise specified)
- Non-healing ulcer of skin
- Non-infected sinus of skin
- Trophic ulcer NOS
- Tropical ulcer NOS
- Ulcer of skin lower limb NOS

Within the ICD-10 coding manual for this code family L97, there are specific coding directions involving underlying medical conditions and the hierarchy of code reporting these diagnoses. Under this family, the anatomy hierarchy includes laterality (unspecified, right or left respectively) and begins with the L97.1 Non-Pressure Chronic Ulcer of Thigh and ending with the last L97.92 Non-Pressure Chronic Ulcer of Unspecified Part of Left Lower Leg. All of these specific codes require a total of 6 characters for completeness. The following charts include samples of the new codes and description changes noted in red which must be supported with clinical documentation. However, due to the numerous codes, refer to your *2018 ICD-10-CM Coding Manual for the complete listing beginning with L97.101 through L97.629.*

NOTE: In the wound care setting, there never should be ICD-10 codes selected with the term unspecified severity. The ICD-10 diagnosis codes to watch for end with the number "9" such as code L97.329 Non-Pressure Chronic Ulcer of Left Ankle with Unspecified Severity.

Relative Code	ICD-10 Diagnosis Code	ICD-10 Code Description
L97.10 – Non-Pressure Chronic Ulcer of Unspecified Thigh	L97.105	Non-pressure chronic ulcer **unspecified thigh** with muscle involvement without evidence of necrosis
	L97.106	Non-pressure chronic ulcer **unspecified thigh** with bone involvement without evidence of necrosis
	L97.108	Non-pressure chronic ulcer **unspecified thigh** with other specified severity.
L97.11- Non-Pressure Chronic Ulcer of Right Thigh	L97.115	Non-pressure chronic ulcer **right thigh** with muscle involvement without evidence of necrosis
	L97.116	Non-pressure chronic ulcer **right thigh** with bone involvement without evidence of necrosis
	L97.118	Non-pressure chronic ulcer **right thigh** with other specified severity.
L97.12- Non-Pressure Chronic Ulcer of Left Thigh	L97.125	Non-pressure chronic ulcer of **left thigh** with muscle involvement without evidence of necrosis

Relative Code	ICD-10 Diagnosis Code	ICD-10 Code Description
	L97.126	Non-pressure chronic ulcer **left thigh** with bone involvement without evidence of necrosis
	L97.128	Non-pressure chronic ulcer **left thigh** with other specified severity.
L97.20- Non-Pressure Chronic Ulcer of Unspecified Calf	L97.205	Non-pressure chronic ulcer **unspecified calf** with muscle involvement without evidence of necrosis
	L97.206	Non-pressure chronic ulcer **unspecified calf** with bone involvement without evidence of necrosis
	L97.208	Non-pressure chronic ulcer **unspecified calf** with other specified severity.
L97.21 – Non-Pressure Chronic Ulcer of Right Calf	L97.215	Non-pressure chronic ulcer **right calf** with muscle involvement without evidence of necrosis
	L97.216	Non-pressure chronic ulcer **right calf** with bone involvement without evidence of necrosis
	L97.218	Non-pressure chronic ulcer **right calf** with other specified severity.

Relative Code	ICD-10 Diagnosis Code	ICD-10 Code Description
	L97.318	Non-pressure chronic ulcer of **right ankle** with other specified severity
L97.32– Non-Pressure Chronic Ulcer of Left Ankle	L97.325	Non-pressure chronic ulcer **left calf** with muscle involvement without evidence of necrosis
	L97.326	Non-pressure chronic ulcer **left calf** with bone involvement without evidence of necrosis
	L97.328	Non-pressure chronic ulcer **left calf** with other specified severity.
L97.41– Non-Pressure Chronic Ulcer of Right Heel and Midfoot	L97.415	Non-pressure chronic ulcer **right heel and midfoot** with muscle involvement without evidence of necrosis
	L97.416	Non-pressure chronic ulcer **right heel and midfoot** with bone involvement without evidence of necrosis
	L97.418	Non-pressure chronic ulcer **right heel and midfoot** with other specified severity.

Relative Code	ICD-10 Diagnosis Code	ICD-10 Code Description
L97.22-Non-Pressure Chronic Ulcer of Left Calf	L97.225	Non-pressure chronic ulcer **left calf** with muscle involvement without evidence of necrosis
	L97.226	Non-pressure chronic ulcer **left calf** with bone involvement without evidence of necrosis
	L97.228	Non-pressure chronic ulcer **left calf** with other specified severity.
L97.30 -Non-Pressure Chronic Ulcer of Unspecified Ankle	L97.305	Non-pressure chronic ulcer of **unspecified ankle** with muscle involvement without evidence of necrosis
	L97.306	Non-pressure chronic ulcer of **unspecified ankle** with bone involvement without evidence of necrosis
	L97.308	Non-pressure chronic ulcer of **unspecified ankle** with other specified severity
L97.31 -Non-Pressure Chronic Ulcer of Right Ankle	L97.315	Non-pressure chronic ulcer of **right ankle** with muscle involvement without evidence of necrosis
	L97.316	Non-pressure chronic ulcer of **right ankle** with bone involvement without evidence of necrosis

Relative Code	ICD-10 Diagnosis Code	ICD-10 Code Description
L97.42– Non-Pressure Chronic Ulcer of Left Heel and Midfoot	L97.425	Non-pressure chronic ulcer **left heel and midfoot** with muscle involvement without evidence of necrosis
	L97.426	Non-pressure chronic ulcer **left heel and midfoot** with bone involvement without evidence of necrosis
	L97.428	Non-pressure chronic ulcer **left heel and midfoot** with other specified severity.

Coding Question Related to Radiation Late Effects or Complications

Proctitis:

Radiation proctitis or colitis seems to be an issue for Medicare claim reporting with ICD-10 hierarchy. Based on CMS transmittals and websites for hyperbaric oxygen Therapy (HBOT), there is a coding hierarchy which will need to be followed to prevent claim edits. ICD-10 code L59.8 – Other Specified Disorders of the Skin and Subcutaneous Tissues Related to Radiation will need to be listed as the first or principle diagnosis code. The reason for this is CMS has clearly documented this diagnosis as a covered diagnosis.

In commemoration of the 75th anniversary of the attack on Pearl Harbor,
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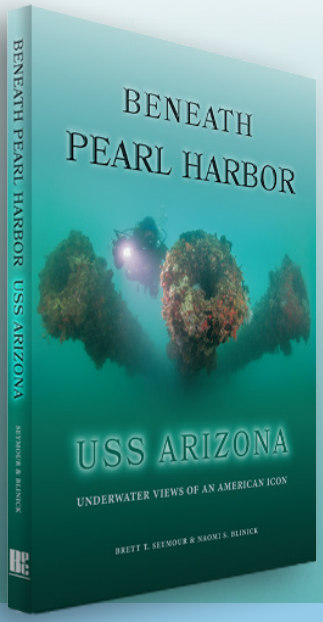

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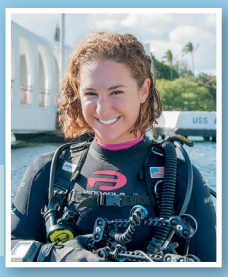
—Lauren Bruner, USS *Arizona*

Brett Seymour is the Deputy Chief of the U.S. National Park Service's Submerged Resources Center (SRC).

Naomi Blinick is a freelance photographer and marine biologist.



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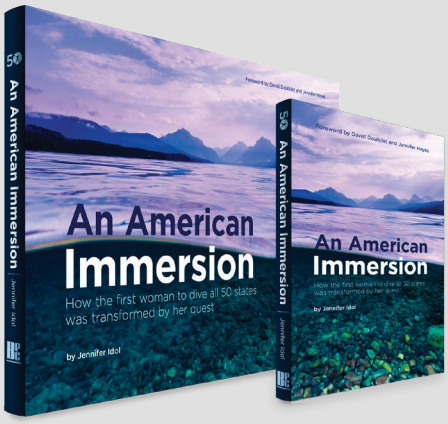

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Adding ICD-10 diagnosis codes K52.0 – Gastroenteritis and Colitis Due to Radiation or K62.7 – Radiation Proctitis as Secondary Diagnoses should provide additional support for the designed treatment plan. In the coding manual, the coder is directed to select an additional code to identify the type of radiation; therefore, clinical documentation history needs to provide details of the past radiation treatment regime. Unfortunately, even though the code selection may not make sense to us, as coders we must follow the various third-party payers such Medicare for their unique coding and billing requirements to the best of our ability.

Here is the access to the most current Centers of Medicare and Medicaid Services HBO spreadsheet regarding covered diagnosis as of October 30, 2017, for your reference: https://www.cms.gov/Regulations-and-Guidance/Transmittals/2017Downloads/R1975OTN.pdf

With the above stated, this is an example of how the codes should be reported; however, understand there is no guarantee even this hierarchy would be accepted. Patient history notes history of adenocarcinoma of prostate, treated with radioactive seed implants 24 months ago, presents with diagnosis of proctitis due to radiation therapy and severe pelvic pain. What is missing is the other details on the type, number and length of treatment with radioactive seed implants.

Principle Diagnosis	Secondary Diagnoses
L59.8 - Other Specified Disorders of the Skin and Subcutaneous Tissues Related to Radiation	K62.7 - Radiation Proctitis R10.2 - Pelvic and Perineal Pain Z85.46 - Personal History of Malignant Neoplasm of Prostate W88.1 - Exposure to Radioactive Isotopes Y84.2 – Radiological Procedure and Radiotherapy as the Cause of Abnormal Reaction of the Patient, or of Later Complication, without Mention of Misadventure at the Time of the Procedure

Skin Grafts Versus Tissue Grafts Clarification

There have been some questions circulating in our industry about the term skin graft being documented on the HBO_2 evaluation. However, the clinical documentation references note the patient received a tissue graft and within a few hours of the surgical procedure, the tissue graft was compromised with a change in color from pink to turning dusky. This was a sign the tissue graft was compromised and needed immediately post-surgical intervention with hyperbaric medicine therapy.

First review the definition of both skin graft and graft or tissue flap/ graft. A skin graft is a thin sheet of skin harvested from a donor site creating two possible wound care sites.

Skin graft is a surgical procedure involving harvesting a sheet of healthy skin from an area of the body and transplanting it to a different part of the body to provide a protective covering of an area missing normal skin. The skin graft may consist of partial or full thickness to replace damaged layers of the skin. This may be due to burns, injury or an illness. A partial or split thickness skin graft contains the epidermis and part of the dermis layer of skin tissue where as a full thickness skin graft contains the epidermis and entire thickness of the dermis.

A tissue flap is tissue transferred with its own blood supply intact from one area of the body to another area of the body. A flap is attached to the body by an artery or vein at its base to be used for reconstructive surgery repairing a large defect deeper than the top layers of the skin. There are two different surgical methods:

- Pedicle flap means the flap of tissue from the back or belly is moved to the chest without cutting its original blood supply. The tissue is pulled under the skin up to the chest area and attached.
- Free flap means the tissue and blood vessels are cut. After the flap is in place, the surgeon sews the blood vessels in the flap to blood vessels in the body chest. This requires microscopic surgery to anastomose the blood vessels from the donor tissue to the recipient tissues.

A tissue graft is a transfer of tissue mass without its own blood supply and depends entirely on the blood supply from the recipient site for growth of new blood vessels.

In summarization, a tissue flap has its own blood supply and a graft does not, requiring a good vascular bed at the site to survive.

Complications post-surgical flap or graft present with ischemia, change in skin temperature, skin or fat necrosis, venous congestion or occlusion, arterial occlusion or mechanical meaning there is no overt explanation. Clinical documentation must include details of the situation in the history of present illness (HPI) to support the medical necessity of trying to salvage the flap or graft.

A statement by the provider needs to include the following details in the HPI:

- Prior surgical interventions: patient response with

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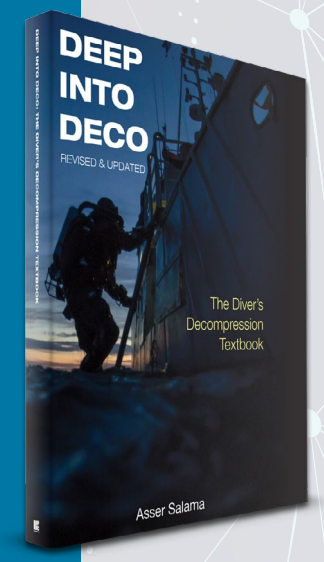


DEEP INTO DECO REVISED AND UPDATED

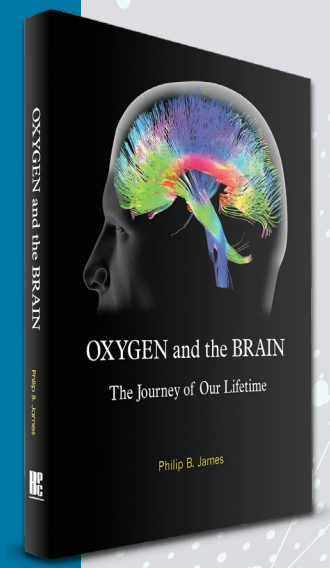
by Asser Salama

This second edition of ***Deep Into Deco*** has been fully updated to reflect the latest research outcomes. Chapter summaries have been added to give a quick overview of each chapter. A new section on nitrogen and helium kinetics has been added as well as a second appendix for calculating the acceleration in post-diving no-fly time associated with breathing surface oxygen.

Deep Into Deco is a comprehensive and well-written reference text that covers various topics of decompression theory. It portrays the latest developments and controversial issues in technical diving in a way that is straightforward, easy to read, understandable and free from technical jargon.

With a writing style that is a mix of strict no-nonsense reporting along with interesting storytelling, ***Deep Into Deco*** includes interviews with accomplished divers, industry professionals, researchers and software developers.

This book is a must read for any diver who wants to understand decompression theory, how it evolved, what it accomplished and where the latest research is headed.



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outcomes

- Date when hypoxia or decreased perfusion was identified as compromising the viability of the flap or graft
- Identify any prior adjunctive treatments performed with responses
- Identify any comorbidities which may need intervention pre-hyperbaric therapy

The following is a sample statement that wraps up the elements noted in the HPI, summarizing the appropriateness of HBO_2:

> "The viability of the graft's survival appears threatened due to a mechanical complication. HBOT during this immediate post-operative period may improve the survival of the flap with the increased perfusion of oxygen."

There are four (4) ICD-10 diagnosis codes CMS lists in their above Excel spreadsheet supporting these complications for both tissue flap or tissue graft located under skin graft or skin terms as follows:

Skin graft (allograft): Rejection T86.820
Failure T86.821
Infection T86.822
Other complications of skin graft (allograft, autograph) T86.828

Compliance Wrap-Up

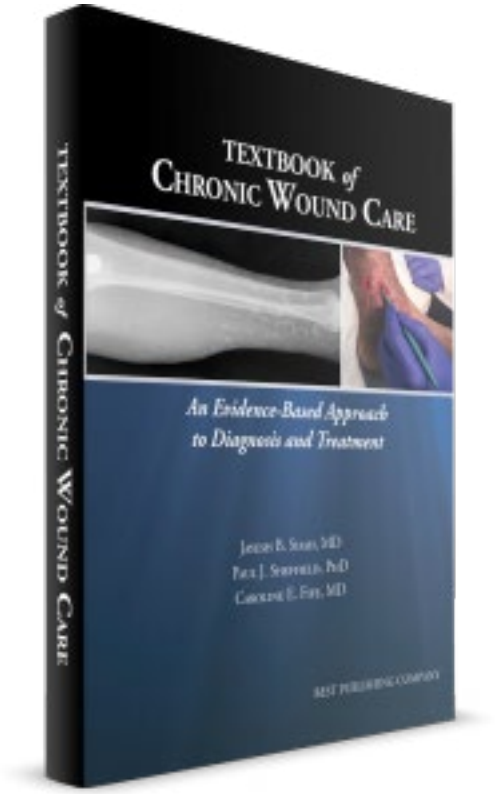
Wound care is under intense scrutiny today, especially hyperbaric medicine. Therefore, providers need to invest by reviewing their own current clinical documentation and identify weaknesses in the details thus making improvements to support medical necessity through a clear and consistent clinical rationale for hyperbaric therapy. The ICD-10 diagnosis codes listed in this article provide an overview of the level of detail required in history of present illness section of the clinical documentation to support selection of diagnosis codes at their highest level of specificity. Keep in mind the bottom line is all submitted diagnosis codes provide the third-party payer a "picture" of the patient's medically complex condition(s) for treatment within the wound care setting. If your diagnosis codes are without specificity, then you risk either a claim held for additional information or possibly a denied claim resulting in a negative toward your department's financial viability. ■

References

1. CMS Transmittal dated January 18, 2018, page 5, Section 10318.4, ICD-10 diagnosis codes listed
2. https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/2018Downloads/R2005OTN.pdf
3. Optum360 2018 ICD-10-CM Professional for Hospital Coding Manual
4. CMS Transmittal 1975 dated November 9, 2017 Change Request 10318
5. https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/2017Downloads/R1975OTN.pdf
6. CMS National Coverage Determination policy for HBO: https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?ncdid=12&ver=3
7. Novitas Solutions HBO policy L35021 dated November 5, 2017 http://go.cms.gov/2GcwzIp
8. First Coast Services Options HBO policy L36504 dated August 11, 2017 https://medicare.fcso.com/lcd/active/l36504.pdf
9. Palmetto GBA Prepayment Service Specific Complex Review Results for Outpatient HBO: https://www.palmettogba.com/palmetto/providers.nsf/vMasterDID/AQHKNG6518?OpenDocument
10. Aetna HBOT policy dated July 18, 2017 http://www.aetna.com/cpb/medical/data/100_199/0172.html
11. WPS Targeted Prove & Educate policy dated February 15, 2018 https://www.wpsgha.com/wps/portal/mac/site/eligibility/news-and-updates/hbo-g0277-99193-per-session
12. United Healthcare HBO policy H-008 dated April 18, 2017 http://bit.ly/2GKVArF

About the Author

Gretchen Dixon, MBA, RN, CCS, is the owner of Professional Compliance Strategies (PCS), LLC, and consults on outpatient departments and physician services. She has provided revenue-cycle compliance audits of services with a focus on wound care department operations for more than 10 years. She holds several credentials including an MBA in healthcare management, an RN with a practicing license in New York, and 23 multistate licensure from Virginia, AHIMA Certified Coding Specialist (CCS), AHIMA ICD-10-CM/PCS Approved Trainer, and is an AAPC Certified Professional (Healthcare) Compliance Officer. A longtime internal healthcare auditor, Dixon identifies issues through audits of D, C, B (documentation, coding and billing) of provided services. The outcome of each audit determines the topics of education to be provided to the staff and physicians, as she proactively believes education is the key to having complete, accurate, and consistent documentation supporting reimbursement for billed services. If you are interested in her services, contact Dixon at gmdixon@cox.net or call 1-615-210-7476.



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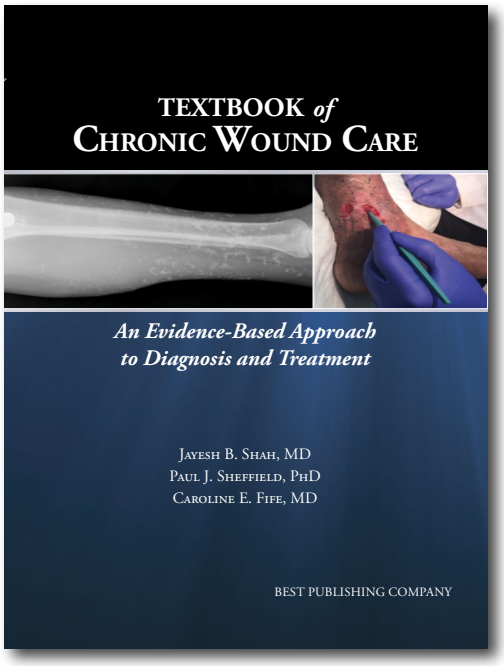


Textbook of Chronic Wound Care: An Evidence-Based Approach to Diagnosis and Treatment by Drs. Jayesh Shah, Paul Sheffield, and Caroline Fife, editors, is now available as of March 31, 2018.

A companion reference book for the *Wound Care Certification Study Guide, 2nd edition*, this textbook provides the best diagnostic and management information for chronic wound care in conjunction with evidence-based clinical pathways illustrated by case studies and more than 350 pictures. The textbook provides up-to-date information for the challenging chronic wound care problems in an easy-to-understand format.

The table of contents and foreword are included in the magazine to give you a sneak peek into this textbook that belongs in the library of every practitioner who treats chronic wound care patients.

Table of Contents from *Textbook of Chronic Wound Care*

Foreword from *Textbook of Chronic Wound Care*

Chronic wounds may have cost the U.S. Medicare system as much as $95 billion dollars in 2014, which rivals the gross domestic product (GDP) of a small European country. Nearly 15% of all Medicare patients are affected, far more than have heart failure, although unlike heart disease, there are no recognized specialty training programs producing wound care experts to manage the growing epidemic of problem wounds. This is in part because a nonhealing wound is not actually a *disease* so much as it is a *symptom*. The typical patient with a nonhealing wound has an average of six serious comorbid conditions and takes an average of ten medications. If a wound fails to achieve healing, there is always a reason, and often more than one reason, with several different organ systems involved.

The most common reason wounds fail to heal is tissue hypoxia. There was a time when we did not know that basic fact. The critical role of hypoxia in chronic wounds was identified in the 1970s through the pioneering work of Paul Sheffield and his colleagues at Brooks Air Force Base in San Antonio, Texas, some of whom implanted gas permeable electrodes in the subcutaneous tissue of their own thighs to better understand oxygen diffusion. It has been four decades since Paul first helped to elucidate the role of oxygen in healing, during which new methods of improving vascular supply have become available. Yet, we continue to struggle with implementing simple, noninvasive vascular screening to identify patients with ischemia. In some ways we have advanced very far, and in other ways, we have made little progress. In the absence of a recognized medical specialty, the training programs and textbooks developed by pioneers like Paul Sheffield continue to fill a vital role in moving the field forward. Jay Shah and I are immeasurably grateful for Paul's guidance and leadership in this latest contribution to the field of wound care. We will borrow a quote from him to express our gratitude to say that in working with him on this project, we have been, "strutting in high cotton."

With Paul's guidance, Jay and I have tried, although perhaps not always succeeded, to do justice to those predecessor texts. With the advent of the Quality Payment Program on January 1, 2017, practitioners have a new focus—how to heal wounds in the shortest period of time at the lowest cost. We hope this textbook will help prepare clinicians for their new role as stewards of resources, providing the right care to the right patient at the right time.

Caroline E. Fife, MD
Editor

Diving with Disabilities

Michael B. Strauss, MD, Lientra Q. Lu, BS

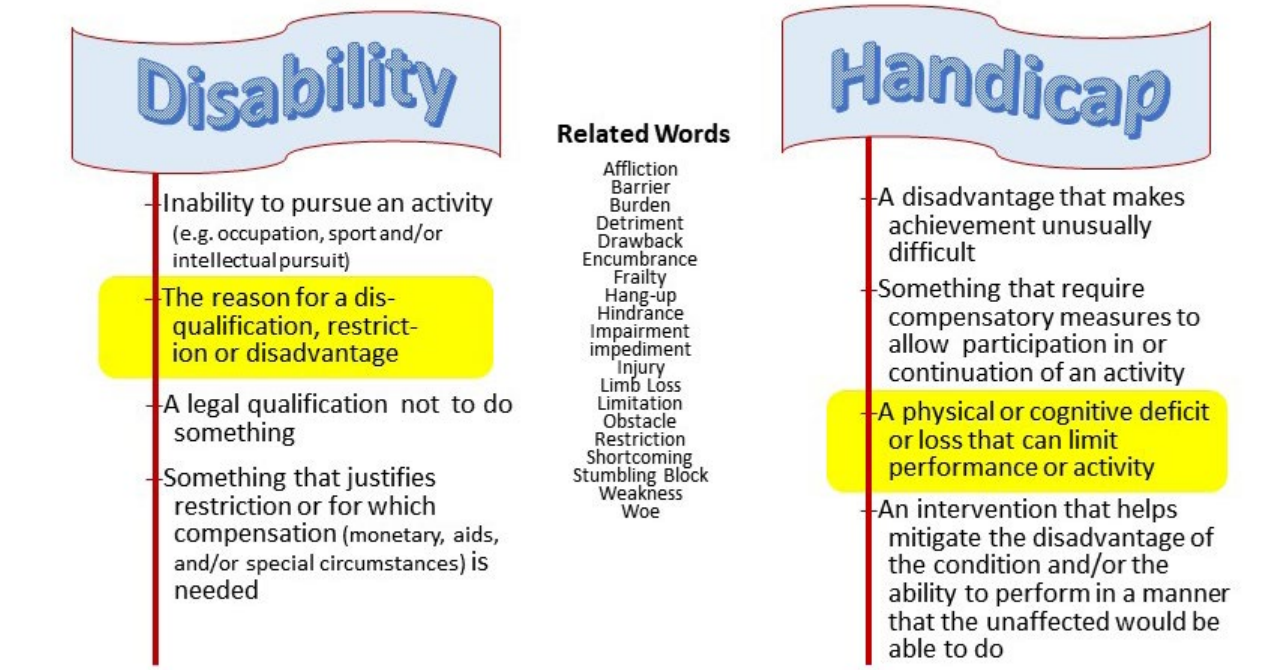
This three-part article series on diving with disabilities is an excerpt from the extensive revision in progress of Dr. Michael Strauss and Dr. Igor Aksenov's *Diving Science textbook*

This article, extracted from a chapter in the second edition of *Diving Science* by Michael B. Strauss, MD, is an excerpt from Part III of the text revision, which covers special diving types, situations and environments. This current article includes introductory information and definitions in addition to cardiovascular and endocrine-metabolic disabilities. Other articles in the three-part series to be published in subsequent issues of *WCHM* will deal with other organ system disabilities, disabilities from previous medical problems of diving, plus a section on organizations and agencies which provide support for divers with disabilities.

Introduction and Defining Disabilities

The Scope of Handicaps The marvels of scuba diving have the potential for greatly enhancing the psychological as well as the physical well being of those with handicaps. Disabilities and handicaps are related terms (Figure 1). They can refer to a physical condition that makes ordinary activities more difficult, something that causes unusual difficulties with particular activities, or something that gives others an advantage due to the condition. All have implications for the handicapped scuba diver. Many, if not all of the conditions discussed in this chapter are mentioned in other chapters of this text. For example, in the young and the older diver chapters, the subject of disabilities and diving with medical conditions was mentioned. This chapter is a

FIGURE 1. Disability Versus Handicap



Disability and handicap are similar terms, but each has special connotations. There are many related terms associated with these words. The word handicap is not in vogue at this time, being somewhat "politically " incorrect. The highlighted boxes are the definitions for each term that best pertain to SCUBA divers

more comprehensive examination of disabilities as they pertain to scuba divers and is organized by body organ systems considered in alphabetical order. This organization minimizes the assumption that one may assume that the first problems mentioned are the most important.

TABLE 1. Terrestrial versus Aquatic Environments

Items	Terrestrial Manifestations	Aquatic Manifestations	Comment (Benefit of the aquatic environment)
Communications	Unimpeded	Communications by other than verbal means required	Compensates for the ability to communicate, such as those with speech impediments, deafness/muteness and autism
Movement of Extremities	Not affected	Moderates and smoothed-out by the density effect (over 700 times greater than air) of water	Possibly compensates for spasticity, tremors, tics, and athetoid movements
Tactile Experiences	As they exist	Blunted or contraindicated, (i.e. observe but don't touch)	Gives clues to the dive buddy how well the handicapped diver follows instructions
Thermal Comfort	Controlled with clothing and the excellent insulation effects of air	Challenging due to the thermal conductivity (20 times greater than air) and the specific heat (1000 times greater than air) of water	The dive organizer/dive buddy must ensure thermal comfort is achieved so as not to lessen the positive dive experience
Visual Experiences	As viewed	Limited by the density and clarity of water; objects magnified; color expression lost with descents	A new experience for the handicapped diver who had not dove previously
Weight	Direct effect of gravity	Nil due to the buoyancy effect of water	Helps to compensate for muscle weakness, limb losses, balance and coordination problems

In the 1970s there was much activism in the United States regarding making accommodations for those with handicaps. In 1990 the Americans with Disabilities Act was passed as a law. Among other things it required accommodations be made for those with handicaps such as bathroom facilities and entry ramps as well as companies with multiple employees to hire a percentage of them with handicaps.

Public awareness of handicaps is reflected in a variety of ways such as Paralympic Games, handicap parking availability, new and remodeled commercial construction must have bathroom accommodations for handicapped persons and access to work spaces.

The injuries causing disabilities from our current Middle East military activities has brought heightened awareness to the war-injured veteran with major attention being given to Wounded Warrior Programs. Sports activity participation is a major component of the rehabilitation for these groups, and scuba diving is one of the sports activities in which the wounded warrior can participate.

Uniqueness The aquatic environment is so different from the terrestrial environment that it offers those with handicaps a "new world" of experiences (Table 1). The density of water being over 700 times greater than that of air provides buoyancy and helps counter the effects of gravity for those with missing extremities, weakness or traumatic brain injuries. Immersion in the aquatic medium is so different from the air environment that those with post-traumatic stress disorders may well forget their anxieties and depression while submerged. Warm water can add tactile "comfort" unlike any experienced in air. Visualization of the underwater flora and fauna is unique enough that it has the potential for making the handicapped diver feel "special" and something that non-divers are unable to experience.

Accommodations Since the handicapped diver has disabilities, special accommodations need to be made. These include choosing the ideal diving site commensurate with the diver's handicaps. Ideally, warm water with good visibility and optimal diver support services such as trained dive boat personnel and user-friendly entry and exit ramps should be selected for the diving sites. As in all scuba diving activities, but even more important for the handicapped diver, dive planning is essential. The goals are to maximize the experience while minimizing the hazards. Finally, and most importantly, the handicapped diver requires a dive buddy who is aware of and understands the disabled diver's handicaps, is fit and experienced enough to handle emergency situations for the handicapped diver, and who is willing to give full attention to the handicapped diver to maximize the diver's experiences while sublimating his/her own. The buddy must have full control of the situation and know when to "call it quits" or not allow the handicap diver to continue with or even do the dive.

Of all the considerations for the handicapped diver, the dive buddy is undoubtedly the most important. Without a knowledgeable and competent dive buddy, the handicap diver should not engage in scuba diving activities. The buddy needs to be dedicated to make the handicapped diver's experiences as safe and enjoyable as possible. The buddy is also responsible for the decision about when to not dive or to prematurely terminate the dive.

A Tool for Assessing Wellness In managing our wound care patients we use a quick survey to assess their wellness; it was previously described in the older age diver chapter (Table 2).[1] This tool can be easily applied to the handicapped individual who wants to scuba dive. Five assessments related to health and vitality are graded on a 2-point (ideal situation) to 0-point (worst possible situation) scale. The five assessments are: 1) Ability to do activities of daily living, 2) Mobility,

TABLE 2. The Wellness Score and Its Usefulness for Making Recommendations about Diving Disabilities

Assessment	2-Points (Use half points if mixed or intermediate between 2 grades)	1-Point	0-Points
ADL Ability to do activities of daily living	Full	Some	None
Ambulation	Community	Household (Subtract ½ point if aids are used)	None
Comorbidities Except neurological	Normal	Impaired	Decompensated
Smoking / Im-Sup's (Which ever gives the lower score)	None	Past	Current
Neurological Deficits	None	Some	Severe

Interpretations & Recommendations

7 ½ to 10 points = **Healthy Host**; No medical contraindications for diving

3 ½ to 7 points = **Impaired Host**; Relative contraindications for diving

0 to 3 points = **Decompensated Host**; Absolute contraindications for diving

Key: ADL = Activities of dialing living, Im-Sups = Immunosuppressors (e.g. steroids, anti-metabolites, anti-rejection meds)

3) Comorbidities, 4) Smoking/immunosuppressor history and 5) Neurological deficits. When summated, they generate a 0 to 10-point Wellness Score. Low (0 to 3 point) scores justify absolute contraindications for scuba diving. Intermediate scores (3½ to 7 points) are relative contraindications to diving and require medical evaluation and clearance for diving. High score (7½ to 10 points) quantify the diver as "healthy" and generally quantify them as able to scuba dive without restrictions. The remainder of this chapter describes how disabilities as occurring in body systems impose handicaps on divers.

Cardiovascular Disabilities

Conditions Cardiovascular disabilities are associated with the heart muscle blood supply, heart muscle function, heart rhythms and circulation to other parts of the body (Figure 2, Table 3). If one or more of these conditions are present, scuba diving becomes a relative or an absolute contraindication for diving depending on the severity. If any are present, the potential diver requires a cardiac clearance before scuba diving. Invariably, this group of potential scuba divers would have Wellness Scores in the impaired range (3 ½ to 7 points) range. Those with decompensating conditions (Wellness Scores in the 0- to 3-point range) would probably not seek to scuba dive because of the severity of their medical problems.

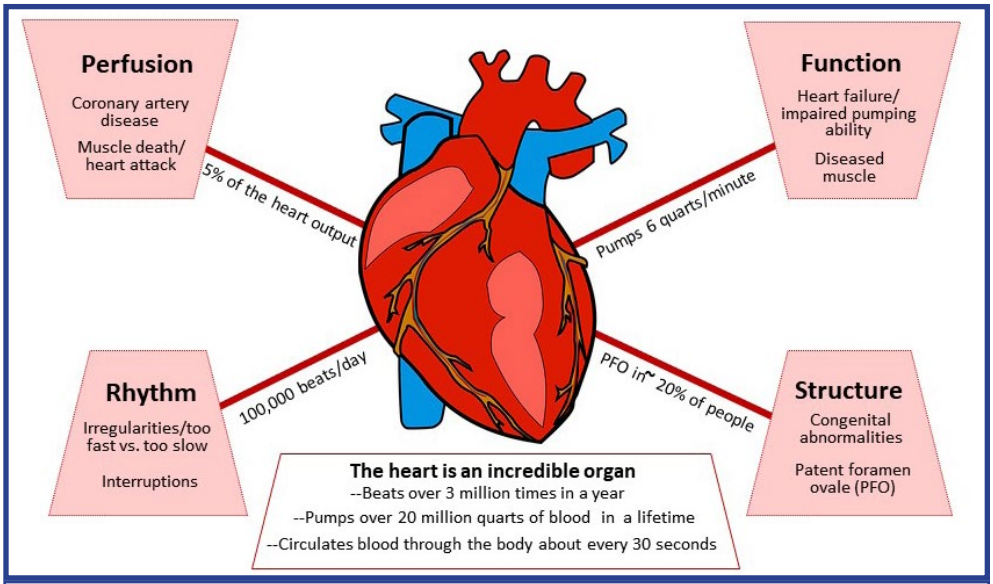
Evaluations and Clearances Tests such as electrocardiograms (ECGs), echo cardiograms, stress EKGs and/or coronary angiography may be required to ascertain the severity of the heart disease and make the best possible decision whether or not to "clear" the

Metabolic equivalents (METS) is a measure that can be used to quantify fitness. It reflects the amount of oxygen uptake per kilogram of body weight per minute. This is equivalent to utilizing 1 calorie per kilogram (2.2 pounds) of body weight per minute. While sitting, the value is 3.5 METS.

For usual and customary diving activities 7.5 METS are needed.[3] This value is about equal to walking at a comfortable pace. However, during emergencies this value may double and accounts for Bove's recommendation for divers to be able to perform at 14 METS of activity.[4] This would be equivalent to running 8-minute miles (1.6 kilometers).

Bove's recommendations are probably unrealistic for almost all diving activities and probably unobtainable in those with cardiovascular disease. To mitigate this discrepancy the cardiac handicapped diver needs to dive in "ideal" conditions where the METs activity can be kept in the 7 range.

FIGURE 2. Heart considerations that can have ramifications for divers



Four considerations are the most frequent that raise questions about heart disabilities and diving. Often combinations of these are present in the patient. All have interventions that can help in their management and contribute to making decisions about diving.

individual for scuba diving. As part of the cardiac clearance, recommendations should be made for an exercise/fitness program. If OK'd for diving, then the potential diver should be referred to a diving medicine physician for a secondary clearance and advice for diving with the disability. The advice is mostly common sense but should include recommendations for maximum depths of diving, how to choose "ideal" diving sites and conditions, the selection of conservative dive settings on the computer, reinforcement of ascent rates and necessity of the rest stop, and importance of maintaining fitness/cardiac conditioning.

A guideline for cardiac conditioning (cardio) exercises is to pair the person's age with the pulse rate. This formula for the maximum recommended exertion during cardio exercises is determined by subtracting the person's age from 220. For example, the maximum heart rate limit during peak cardio exercises for a 60-year-old person would be 160 (i.e. 220 - 60 = 160).

Typically during a cardio exercise program, the goal would be to exercise for brief periods (e.g. 1-minute intervals) up to 90% of recommended maximal heart rate and for longer, more sustained cardio exercise periods at a 75% level.

For the interested, the heart rate during exercise activities (as well as stresses) divided by the maximally recommended heart rate for the person's age can be expressed as an easily calculated percentage. For example, walking might push up the 60-year-old's heart rate from 80 to 100. This computes (100/160 = O.625) to exercising at a 62.5% of the maximally recommended exertion (MRE) level. An activity that raises the 60-year-old's heart rate to 120 would represent exercising at the 75% MRE level.

Patent Foramen Ovale The foramen ovale is an opening in the septum between the right and left atria of the heart that is necessary for circulation through the heart of the fetus. It typically closes at birth, but in about 25 percent of the population it remains partially or fully patent.[5] Ordinarily this anomaly goes unnoticed. However, venous gas bubbles that are thought to be a universal finding with ascents from compressed gas diving may bypass the lungs (which filter out the bubbles) and pass into the left side of the heart (Figure 2). The bubbles, in turn, can be carried to the brain and heart as well as other organs and occlude circulation to these structures.

If an apparently "undeserved" case of decompression sickness occurs and involves the brain or heart, a patent foramen ovale (PFO) should be suspected.[6] A bubble study with Doppler can document the presence of a PFO. Options after identification include cessation of scuba diving or using the percutaneous technique to patch the PFO. If successful, as is usually the case, the PFO patient may resume scuba diving.

Anticoagulants, Pacemakers and Scuba Diving Anticoagulants are prescribed for patients with atrial fibrillation (irregular heart rates) and after coronary stenting/angioplasty. Scuba diving per se is not an absolute contraindication for patients using anticoagulants. The major concern is uncontrollable bleeding from injuries from shark bites or other marine animals and lacerations from obstacles in the water or boat propellers. Since these occurrences are extremely rare, the really important considerations are the patient's cardiac function and fitness. This places the diver who is on anticoagulants in the same relative contraindication for scuba diving category as described above for heart disease. Recommendations for medical clearances to dive and selection of "ideal" diving sites are consequently the same.

Similar advice is appropriate for scuba diving with pacemakers. Diving with pacemakers is another relative contraindication. In addition to the reason for the pacemaker and the patient's cardiac function, the pressure/depth limit of the pacemaker needs to be ascertained. Usually pacemaker pressure/depth limit information is available from the manufacturer of the pacemaker. One study showed pacemakers continued to function to 100 FSW/30 MSW depths.[7] Those peacemakers that are implantable cardioverter defibrillators (ICDs) are in our opinion an absolute contraindication for scuba diving. Typically, they have a low voltage electrical discharge for mitigating slowed heart rhythms and a high voltage shock for life threatening rhythms such as ventricular fibrillation (VF).

TABLE 3. Cardiovascular Disabilities and Diving

Problem	Effect	Scuba Diving Ramifications
Blood Supply (Coronary Artery Disease)	Interferes with heart muscle oxygenation, carbon dioxide removal and nutrition	Heart attack with death of cardiac muscle limits cardiac output
Heart Muscle Function (Cardiomyopathies such as hypertrophic, restrictive, dilated from alcohol, cocaine, amyloidosis, hemochromatosis, coronary artery disease, heavy metals, etc.)	Loss of heart contractile power and/or ability	Impaired cardiac output makes patient unable to meet demands of exercise
Heart Rhythm Irregularities (Atrial fibrillation, atrial flutter, bradycardia, tachycardia, ventricular fibrillation)	Interferes with heart filling and blood outflow	Water immersion, especially if cold precipitates arrhythmias, specifically bradycardia (*Ref. 2*)
Circulation to Body Parts (Peripheral artery disease)	Inadequate perfusion to supply oxygen and metabolites to muscles and other body organs	Pain, weakness, and/or cramping with muscle ability. Limited ability to increase muscle activity for responses to emergencies

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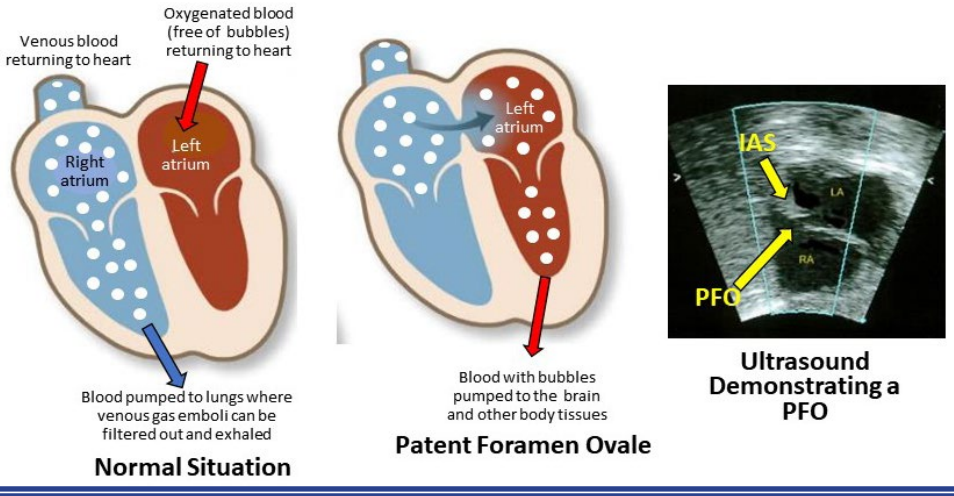
If the patient is at risk for VF and associated loss of consciousness in the water, even if only temporary, the consequences can be disastrous with water aspiration, near-drowning and drowning. Other absolute contraindications for scuba diving with pacemakers exist for commercial, scientific and military activities.

Other considerations are whether the high voltage of the ICD will be influenced by the electrical conductivity of the surrounding sea water and whether or not the electrical discharge will shock other divers who are in contact with or close vicinity of the diver receiving the ICD shock. The answers to these provocative considerations are not known to the authors.

Peripheral Artery Disease It is unusual for this problem to be a consideration for scuba diving. If severe enough, the patient most likely is already limiting his/her activities and scuba diving is not a consideration. If mild, but claudication (i.e. ischemic leg or thigh cramping-like pain) is observed with walking, the patient may be able to swim without symptoms. However, the use of fins, especially if needed for fast swimming and/or emergencies, may precipitate claudication and compound the problem, that is the cramping will cause cessation of swimming activities and compromise extrication from the emergency. Hence, scuba diving is not recommended for such patients. Interventions such as bypass surgery, angioplasties and/or stenting are effective in managing peripheral artery disease and if successful, elevate an absolute to a relative contraindication for diving.

As is typical with peripheral artery disease, other significant comorbidities are likely to co-exist. The Wellness Score can alert those making decisions for diving whether the patient with a peripheral artery disease history, whether treated or not, should be medically cleared for scuba diving. Other assessments such as mobility and neurological impairments of the Wellness Score are likely to be the limiting factors in making decisions about scuba diving.

FIGURE 3. Normal heart anatomy and heart with patent foramen ovale



The foramen ovale is a physiological structure in the IAS that allows oxygen blood from the placenta to be circulated to the fetus. At birth it closes spontaneously in about 75% of the newborns. In the 25% where it remains open, it can be a cause of venous gas emboli bypassing the lungs and moving to the arterial circulation.

KEY: IAS = Inter atrial septum, LA = Left atrium, PFO = Patent foramen ovale, RA = Right atrium

Endocrine and Metabolic Considerations

Diabetes Mellitus and Obesity The two main endocrine metabolic disorders with respect to scuba diving are diabetes mellitus (DM) and obesity. However, other endocrine gland functions also have some relevance to scuba diving (Table 4). The main concerns with DM is that the diver may become hypoglycemic during the scuba dive, become confused and even lose consciousness while underwater. Both are situations that may require emergency ascents and lead to arterial gas embolism or decompression sickness or if consciousness is lost, drowning. However, there are guidelines in the literature that embrace scuba diving in the diabetic even if the patient is insulin dependent.[8,9]

There is a wide spectrum of DM manifestations that range from only borderline blood sugar elevations to very labile cases. The labile diabetic may be confronted with hyperglycemia and ketoacidosis, which can be life threatening, alternating with hypoglycemia that can lead to unconsciousness and death of brain tissues.

Diabetics are classified as Type 1, that is insulin dependent, and Type 2 non-insulin dependent. In Type 1 the pancreas has lost all of its ability to produce insulin, the hormone required for blood sugar (glucose) to be transported into the cell. Without insulin, the fuel source (glucose) for cell metabolism and energy production does not reach these organelles (mitochondria) where these processes occur and the cell stops functioning, just as an automobile stops running after running out of gas.

Medications can modify Type 2 DM by stimulating the pancreas to secrete more insulin, improving the transport of insulin across the cell wall, or combinations of these.

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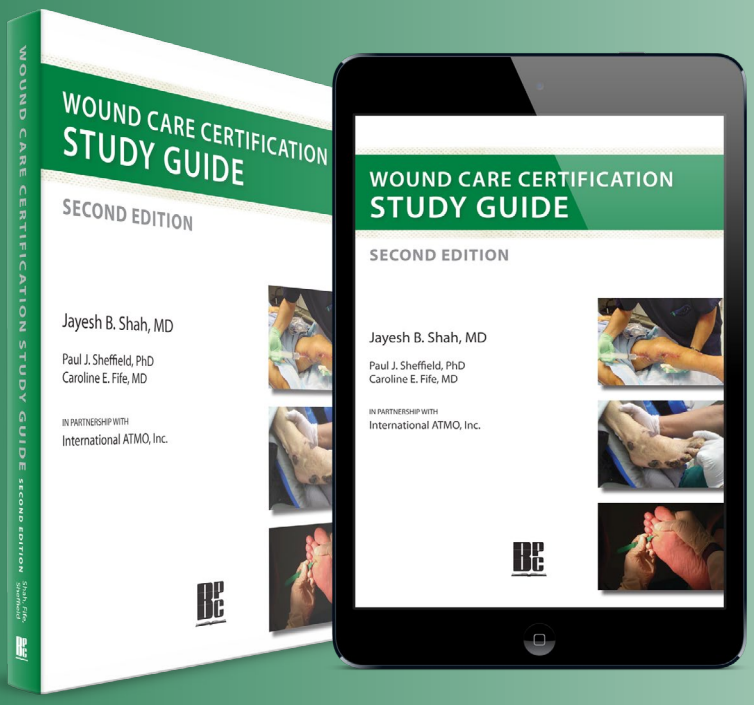

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Considerations for scuba diving with diabetes include that the patient has a history of stable blood sugars and is compliant with his/her diabetes management as reflected in glycosylated hemoglobins (HgA1c) in the six percent or less range. Blood glucoses should be measured immediately before starting the scuba dive and at the dive's termination. This reflects a proactive approach to avoiding hypoglycemia during the course of and immediately after the dive. Emergency glucose sources in a diver's buoyancy compensator pouch should be available in case precursor symptoms of hypoglycemia such as lightheadedness, sweating, or weakness are noted during the dive. Of course the dive should be planned to minimize stresses with the measures mentioned previously.

Obesity Obesity imposes relative contraindications for scuba diving. It is a generic term that represents a spectrum of findings from being mildly overweight to morbid obesity. The body mass index (BMI) is used to gauge obesity. Over weightiness is defined as a BMI greater than 25, obesity greater than 30, and morbid obesity as a BMI greater than 40. Another measure of morbid obesity is a body weight of 100 pounds (45 kilograms) over ideal body weight, that is a body weight in the 20 to 25 BMI range.

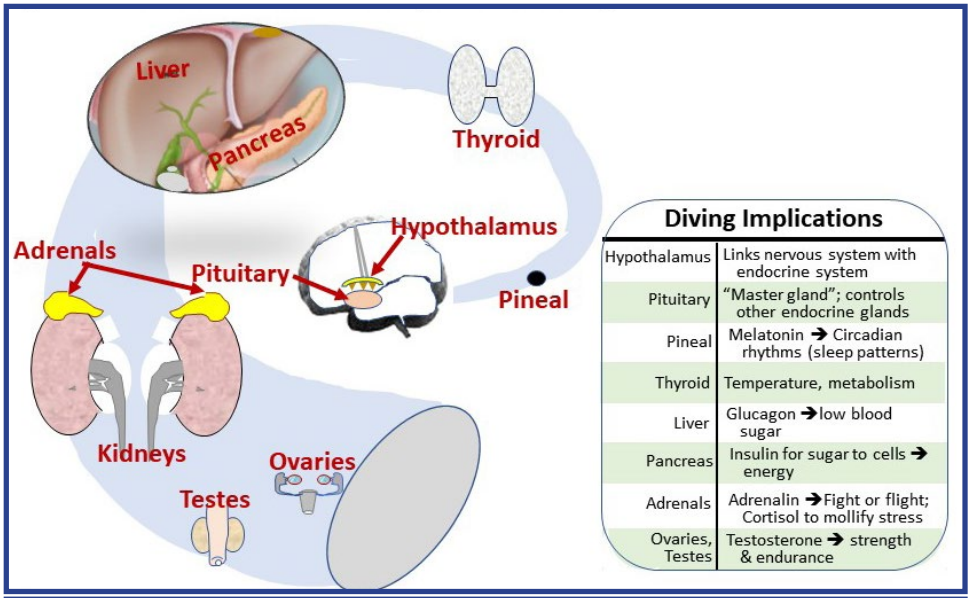
The BMI is a simple ratio calculated by dividing the patient's weight by his/her height. Factors that can confuse the interpretation of the BMI include excessive abdominal fat, extremely well developed musculature as in body builders, and fluid retention in lower extremities secondary to lymphedema.

Two major considerations are associated with obesity and scuba diving. The first is an increased propensity for developing decompression sickness.[10] This is attributed to fat tissues having five times the affinity for nitrogen than the surrounding tissue fluids of the body. Fat is considered an intermediate tissue with respect to ongassing and offgassing due to a highly regulated (by sympathetic nervous system) blood supply. With longer, deeper dives increased ongassing occurs in this tissue. If ascent and offgassing is based on tissues that offload nitrogen faster than the nitrogen saturated fat tissues, sufficient gradients may develop to generate bubbles and lead to decompression sickness symptoms.

The other major consideration for the obese diver is fitting of equipment. The obese diver will require substantially more weights for buoyancy control. This coupled with the buoyancy of ¾-inch (7 mil) thick neoprene wetsuit can result in requiring 40 to 50 pounds (18 to 23 kilograms) of weights to achieve neutral buoyancy. This added weight makes water entries and exits as well as rescue efforts if an emergency develops challenging. The extra exertion required could subject the obese diver to cardiac events. Other medical problems are frequent in the obese diver including the metabolic syndrome (hypertension, hyperlipidemia [increased triglycerides—i.e. bad cholesterol], increased blood glucose, increased abdominal girth, and low levels of high density lipoproteins [i.e. good cholesterol]; arthritis from overloading joints from the added body weight; obstructive sleep apnea; gastrointestinal reflux disease; depression; infertility; and incontinence). If the obese diver is determined to scuba dive, he/she should be motivated enough to lose weight and optimize the medical management of existing comorbidities. Over weightiness is a reason for disqualification of military divers.

Alcohol The social use of alcohol is not a contraindication for scuba diving. However, it should not be consumed before a scuba dive. It can blunt judgment and may compound the effects of nitrogen narcosis and can occur in situations where it ordinarily would not. Those with alcohol dependence (i.e. alcoholics) should not scuba dive until they have been detoxed and can be labeled as recovered. Another consideration about immediate alcohol use before a scuba dive is that it is a diuretic (stimulates

FIGURE 4. Endocrine Glands and Their Implications for Diving



Although endocrine gland functions are rarely associated with diving, their "silent" functions contribute much to making the dive safe and comfortable. When their functions are hampered or absent, they can be absolute contraindications for diving.

TABLE 4. Endocrine Disorders and Diving

Endocrine Glands	Function	Possible Ramifications for Diving	Comment
Pituitary	"Master" control gland; sends hormonal signals to other glands to increase or decrease their activity; regulates growth	Management can be challenging and requires medications for loss of function of all the pituitary target glands	Absent function is an absolute contraindication for diving – if insufficient function it becomes a relative contraindication
Thyroid	Regulates metabolism	If hypofunctioning it can lead to poor cold-water tolerance, weight gain, and delayed responsiveness (e.g. excessive tiredness). If hyperfunctioning it can lead to hyperexcitability, tachycardia, weight loss, and heat intolerance	Thyroid problems when well controlled with medications do not present a contraindication for diving
Islets Cells of Pancreas	Generate insulin and control its release (with signals from blood glucose and pituitary gland)	See previous discussion on diabetes in this section	Diabetes imposes relative contraindications for diving
Adrenal	Releases "flight or fight" hormones (adrenalin and noradrenalin) as well as cortisol, which affects blood pressure, glucose, growth, and sexual characteristics	If non-functional, ability for a diver to response to a crisis may be impaired	If function is impaired, medial clearance for diving needed from an endocrinologist as well as a diving medicine physician. If cleared, diving should be done in "ideal" conditions
Ovaries and Testes	Both produce testosterone (a third more in males) plus regulate reproductive tissues	Over production may contribute to "macho" action of the diver, underactivity may lead to lethargy, depression, and muscle weakness	Malfunction or absence probably present no contraindications for scuba diving

Because of the durations and intensities of commercial divers' underwater activities, they often develop joint pain presentations of decompression sickness.

In attempts to stop the divers drinking alcohol to mitigate their symptoms after the dive, they were told to report their symptoms immediately and then undergo hyperbaric oxygen recompression. With this protocol after becoming asymptomatic, they could resume diving activities the next day.[11]

Prior to implementing this, the divers were taken "off station" which resulted in substantial losses of income and explained why they were reluctant to complain about their joint pain symptoms — and used drinking alcohol to mask them.

The immediate treatment had twofold benefits. It relieved symptoms and allowed the immediate resumption of diving activities. Possible long-term benefits may include prevention of delayed bone necrosis of the hips and shoulders and multiple sclerosis plaques in the brain and spinal cord tissues, both of which are thought to be related to omitted decompression and/or repeated episodes of decompression sickness.

the production of urine). This can contribute to dehydration and, in turn, interfere with the circulation system's ability to offload nitrogen during the ascent phase of the dive. These events may be precursors to decompression sickness.

Other Metabolic Considerations

Almost all endocrine disorders have ramifications for scuba diving (Table 4). However, if mild or easily controlled with medications, they do not impose contraindications to scuba diving. If severe, they provide absolute contraindications for diving. Thyroid disease is the most controllable of all endocrine disorders. When properly managed, it imposes no restrictions for scuba diving. Steroids and other immune suppressors have ramifications for divers. Their use is a relative contraction for scuba diving. They blunt the body's inflammatory responses and weaken the immune system. A short course of steroids (e.g. Medrol DosPak®) to control an acute inflammatory condition imposes only a temporary contraindication to diving. Chronic use of steroids for asthma, colitis, or collagen vascular diseases is a contraindication for scuba diving. The steroids blunt the adrenal response to stress; however, probably more importantly the reason chronic steroid use is required is the stronger reason for not scuba diving. Although pregnancy is a temporary contraindication for scuba diving, lactation in the female diver is not. Viagra® and related medications do not seem to interfere with diving. Some information, anecdotal at this time, suggest it may lessen the chances of decompression sickness occurring. ■

Reference

1. Strauss MB, Aksenov IV, Miller SS. Making the scoring of wounds objective: adding rhyme and reason to wound evaluation and management. Wound Care Hyperbaric Med. 2012;3(1):21-37.
2. Schipke JD, Pelzer M. Effect of immersion, submersion, and scuba diving on heart rate variability. Br J Sports Med. 2001 Jun;35(3):174-80.
3. Pollock NW, Natoli MJ. Aerobic fitness of certified divers volunteering for laboratory diving research studies. Undersea Hyperb Med. 2009; July/Aug; 303-304; abstract.

4. Bove AA. Cardiovascular disorders and diving. In: Bove and Davis' Diving Medicine. 2004; Elsevier Inc.:493.
5. Moon RE, Rorem J. Patent Foramen Ovale. DiversAlertNetwork.org. Copyright March/April 1995.
6. Strauss MB, Miller SS, Lu LQ. Part 2: Disordered Decompression and the Gradient Perfusion Model. Undersea and Hyperbaric Medicine. In press.
7. Lafay V, Trigano JA, Gardette B, Micoli C, Carre F. Effects of hyperbaric exposures on cardiac pacemakers. Br J Sports Med. 2008 Mar;42(3):212-6; discussion 216. Epub 2007 Sep 3.
8. Pollock NW, Uguccioni DM, Dear GdeL. Diabetes and recreational diving: guidelines for the future. Diving Hyperb Med. 2006; 36(1): 29-34.
9. Dear GL, Pollock NW, Uguccioni DM, Dovenbarger J, Feinglos MN, Moon RE. Plasma glucose response to recreational diving in divers with insulin-requiring diabetes. Undersea Hyperb Med. 2004; 31(3): 291-301).
10. Dembert ML, Jekel JF, Mooney LW. Weight/height indices and percent body fat among U.S. Navy divers. Aviat Space Environ Med 1984 May;55(5):391-5).
11. Davis JC (ed). The Return to Active Diving After Decompression Sickness or Arterial Gas Embolism. Proceedings of a Symposium held 28 May 1980. UHMS Publication Number 41(CW)11-13-80. Bethesda: Undersea and Hyperbaric Medical Society; 1980; 42 pages.
12. Vezzani G, Bosco G, Camporesi EM. Hyperbaric oxygen treatment of avascular bone necrosis of the femoral head. In: Hyperbaric Oxygen Therapy, 863-880.
13. Butler Jr. FK. Diving and hyperbaric ophthalmology. Surv Ophthalmol. 1995 Mar-Apr;39(5):347-66.
14. Zizola F. Blind Scuba Divers. http://noorimages.com/feature/blind-scuba-divers/
15. Kay A. Scuba Diving: A soothing adventure. Autism Parenting Magazine. June 2015. https://www.autismparentingmagazine.com/scuba-diving-a-soothing-adventure/
16. Brook K. 7 amazing benefits of overcoming PTSD with scuba diving. http://www.aquajunkies.com/overcome-ptsd-with-scuba-diving/
17. Asthma PDR Medical Dictionary, 3rd Eds, Lippincott Williams & Wilkins, Baltimore, 2006, p. 170.
18. Chryssanthou C, Teichner F, Antopol W. Studies on dysbarism. IV. Production and prevention of decompression sickness in non-susceptible" animals. 1971. Aerosp Med; 42(8):864-867.
19. Thom, S. R., Bennett, M., Banham, N. D., Chin, W., Blake, D. F., Rosen, A., et al. (2015). Association of microparticles and neutrophil activation with decompression sickness. J. Appl. Physiol. 119, 427–434. doi: 10.1152/japplphysiol.00380.2015
20. Strauss MB, Miller SS, Lu LQ. Part 1: The Gradient Perfusion Model. Undersea and Hyperbaric Medicine. In press.
21. Davis C. Scuba Diving with a Disability. Deeper Blue. September 2016. https://www.deeperblue.com/scuba-diving-disability/
22. Handicapped Scuba Association. https://www.hsascuba.com/

23. De Lisle Dear G. Asthma & Diving. Divers Alert Network. Accessed February 2018. https://www.diversalertnetwork.org/medical/articles/Asthma_Diving

24. Novak B. Scuba Diving with Type 1 Diabetes – You can do it! Beyond Type 1. July 2015. https://beyondtype1.org/scuba-diving-with-type-1-diabetes-you-can-do-it/

25. Sawatzky D. Epilepsy/Seizures and Diving. Diver Magazine. January 2012. http://divermag.com/epilepsyseizures-and-diving/

26. Cronje F. Epilepsy and Diving: why it is not a good idea to combine the two. Divers Alert Network. Accessed February 2018. https://www.diversalertnetwork.org/medical/articles/Epilepsy_and_Diving_Why_It39s_Not_A_Good_Idea_to_Combine_the_Two

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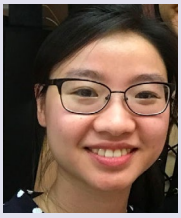
Michael Strauss, M.D., an orthopaedic surgeon, is the retired medical director of the Hyperbaric Medicine Program at Long Beach Memorial Medical Center in Long Beach, California. He continues to be clinically active in the program and focuses his orthopaedic surgical practice on evaluation, management and prevention of challenging wounds. Dr. Strauss is a clinical professor of orthopaedic surgery at the University of California, Irvine, and the orthopaedic consultant for the Prevention-Amputation Veterans Everywhere (PAVE) Problem Wound Clinic at the VA Medical Center in Long Beach. He is well known to readers of *WCHM* from his multiple articles related to wounds and diving medicine published in previous editions of the journal. In addition, he has authored two highly acclaimed texts, *Diving Science* and *MasterMinding Wounds*. Dr. Strauss is actively studying the reliability and validity of the innovative, user-friendly Long Beach Wound Score, for which he already has authored a number of publications.



LIENTRA LU is a research coordinator at the VA Medical Center in Long Beach, California, under the guidance of Dr. Ian Gordon, a vascular surgeon, and Dr. Michael Strauss. She is also an administrative assistant in the accounting department of the Southern California Institute for Research and Education (SCIRE). She received a bachelor of science degree in chemical biology at the University of California, Berkeley, in 2015 and subsequently has taken medically related courses at the University of California, Los Angeles. Miss Lu is helping with diabetic foot and venous leg ulcer studies at the VA Medical Center while also serving as an assistant in patient care at the PAVE Clinic there. She also works with the American Red Cross in her other interest, disaster preparedness.

Undersea and hyperbaric medicine is a diverse specialty that offers opportunities to practice clinical, academic, research and administrative aspects of hyperbaric and diving medicine. Medical patients are referred from critical care, surgery, plastics, medicine, orthopedics, ophthalmology, podiatry and emergency medicine. Diving patients hail from recreational, commercial, research, scientific, military and technical diving backgrounds. **Your future awaits.**

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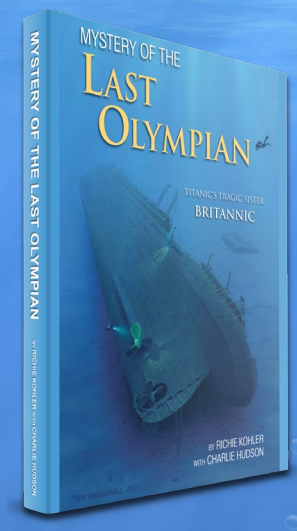

MYSTERY OF THE LAST OLYMPIAN: *Titanic*'s Tragic Sister *Britannic*

by Richie Kohler with Charlie Hudson

For 100 years the mystery surrounding the sinking of *Titanic*'s tragic sister *Britannic* was a riddle waiting to be solved. This book gives you a firsthand account as Richie Kohler takes readers on the intriguing journey from the rise of the magnificent Olympians to the ship's fateful sinking in 1916. He then moves forward in time through multiple expeditions, beginning with the great Jacques Cousteau, who located the wreck of the ocean liner in 1975. Each successive team of divers who risked their lives uncovered new clues, but it was not until 2009 that Kohler and his dive partner definitively pinpointed the secret that had eluded everyone before then.

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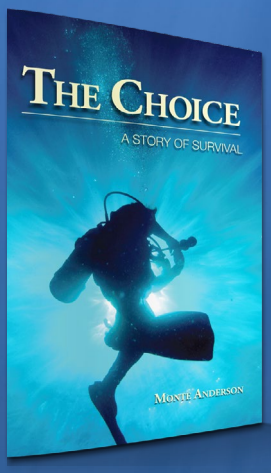


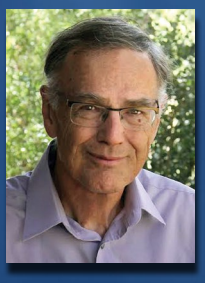
THE CHOICE: *A Story of Survival*

by Monte Anderson

As three friends drove across the Navajo Reservation in northern Arizona after backcountry skiing in Colorado, they talked about their lives. Then one said, "I really shouldn't be alive today."

David Scalia's astounding story occurred in 1982, when a scuba equipment failure caused a devastating accident, but he had a scrapbook documenting everything that happened. He suffered incalculable damage to his body for more than 12 grueling hours. Days later, he was given a profound choice — to live or to die. Almost unbelievable, this is his true story — and it involves some friends and colleagues you may know, including Dr. Gregory Adkisson, Dr. Tom Neuman, and Dr. Paul Phillips.

About the Author: Monte Anderson completed a medical residency at Creighton University and continued his studies with subspecialty training in gastroenterology and hepatology as an army officer at Fort Sam Houston in San Antonio, Texas. After his discharge from the military, most of his career was happily devoted to the Mayo Clinic in Arizona. Feeling that true tales tend to be more compelling than fiction, he has always preferred reading nonfiction, especially since something is always learned in the process. *The Choice: A Story of Survival*, his first effort outside of scientific writing, is nonfiction.



"Dr. Monte Anderson makes his debut in nonmedical writing with The Choice: A Story of Survival and does so with a splash. The nonfiction book relates the fascinating story of his friend's 1982 diving accident near a remote island in Mexico. Dr. Anderson's recounting of the details reflects his tremendous investigative ability, as well as the diver's will to survive."

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