

## **UNDERSEA MEDICINE**

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*Note: The views expressed in this chapter are those of the author(s) and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the United States Government.*

### **INTRODUCTION TO UNDERSEA MEDICAL OFFICER (UMO):**

Undersea Medicine is a small community within Navy Medicine, which primarily performs special duty physicals for divers, submariners, special operators, and nuclear-trained personnel. The Undersea Medical Officer (UMO) community, and those specialized communities that utilize UMOs, are high-tempo, actively deploying units ranging from Naval Special Warfare (NSW) to submarine squadrons. The role of the UMO is a mix of the general operational medicine that is expected of all General Medical Officers tailored to the specific duty concerns germane to the communities served. UMOs receive specialized training in these two key areas to ensure that they can adequately screen service members for conditions that could jeopardize the mission or lead to harm in diving, submarine or radiation health environments.

Medical administration (medical readiness, waivers/disqualifications, and the Independent Duty Corpsman (IDC) Program) takes up the majority of your time working as a UMO. UMOs train IDCs to tackle the challenging role of independent practice in austere environments with abbreviated training. UMOs must screen service members for illness that could overwhelm an IDC's ability, as well as prepare IDCs to take care of those illnesses that arise with minimal access to MEDEVAC or specialty care. The key to success for a UMO will hinge directly on their ability to train those Dive Medical Technicians (DMTs) and IDCs who will ultimately perform patient care in the field.

### **UMO STRUCTURE AND JOB OPPORTUNITIES:**

The UMO Community, as noted above, is a mix of submarine and diving support, organized by TYCOM-level leadership. UMOs fill billets assigned to the Marine Corps, Submarine Squadrons, Navy Special Warfare, Navy Expeditionary Combat Command (NECC), training commands, research commands, and Military Treatment Facilities as well as shipyard clinics. Most UMO roles are clinic-based. Completion of special duty physicals and leadership/mentorship of IDCs are the primary facets of the job. Some jobs incorporate diving into their role, while others have no associated diving. The many types of UMO billets are represented by categories, below.



The UMO Specialty Leader (M-95, Head Undersea Medicine) is located at the Bureau of Medicine and Surgery (BUMED) in Falls Church, Virginia, and oversees all of Radiation Health and Undersea Medicine. He/she makes recommendations to the waiver authority on all waivers and disqualifications of special duty standards. While all UMOs function under the oversight of the Specialty Leader, each has an operational chain of command. They either have a senior medical officer, or directly report as special staff to line officers in their daily duties. The above outline includes billets that are designated as senior officer billets, including some who are selected from the career milestone board, such as the Naval Undersea Medical Institute Officer-in-Charge (NUMI OIC) and Naval Submarine Medical Research Laboratory Commanding Officer and Executive Officer (NSMRL CO/XO), whereas others are open to any applicant. Second tour UMOs or senior UMOs will often have more opportunity to request billets, while those billets going to first tour UMOs will be chosen by the Detailer and Specialty Leader based upon their operational status, requirements, and “needs of the Navy.”

### **UMO APPLICATION:**

UMO applications must be completed by the end of October, and selectees will be notified in December in parallel with graduate medical education (GME) selection. In order to prepare a successful application, UMO applicants must complete: a physical examination by a UMO (MANMED 15-102, 15-106), a passing Diver Candidate Physical Screening Test (PST) (MILPERSMAN 1220-410), two letters of recommendation, and a command letter of endorsement. A complete list of requirements can be found at the NUMI Website. Notably, these requirements represent minimum standards for training, but physical fitness well in excess of the minimums should be sought for a competitive application.

<https://www.med.navy.mil/sites/nmotc/numi/UMOApply/Pages/default.aspx>

Prospective UMOs historically have had the most difficulty with preparation for, and successful execution of the PST with a diver, as well as a letter of recommendation from

qualified UMOs. The best resources for interns are nearby fleet UMOs or prior UMOs currently in GME training at your local MTF. These individuals can help you navigate the process, offer a recommendation letter, and administer your PST. If they can't help you, the community is often small enough that they will know others that can. If no returning UMOs are within your intern class, ask upper level residents if they know any fleet returnees. Ultimately, the website above contains the contact information for the NUMI-POC, UMOC Mailbox, and the UMO Specialty Leader, each of whom will be willing to help you locate resources if you cannot otherwise. Letters of recommendation are also often difficult to complete. UMO letters of recommendation are designed to ensure you have considered why you are applying to the program, and to offer avenues for advice as you apply. If available during your intern program, scheduling an operational rotation with a local UMO can assist with the application requirements as well as show sustained interest.

The deadline for UMO application is in October; an interested applicant should complete the application in June-August to avoid an application being disqualified for missing requirements, including issues with medical standards that take time to process.

### **UMO PREPARATION:**

Six months is a reasonable minimum amount of time to prepare for training prior to transferring to NUMI. Preparation must include learning multiple swim strokes, gaining in-water confidence, preparing to run significant distance, as well as improving calisthenic endurance. Below are outlined some minimum goals for reaching NUMI, though some factors that lead to success in school cannot be quantified. Ultimately, confidence in the water is the most important aspect of preparation for UMO training, and this takes time.

*Be prepared to pass the PST with room to spare.*

The Diver PST is a minimum standard that is used to ensure that candidates are ready to train. If you do not pass this 'test' on day one, you will be dismissed from training. Your swim will be in a cramped pool, with a shirt and UDTs on, and without goggles.

Some suggestions for success include:

1. Train without goggles.
2. Train in a crowded lane where you need to navigate around other swimmers.
3. Swim with shorts and a baggy T-shirt to simulate the drag from the diver uniform.
4. Become proficient, if not excellent, at sidestroke.

You also need to be prepared for the other events. Note that you will do your pull-ups after having just completed swimming, sit-ups, and push-ups. This fatigue causes issues for many people. Ten consecutive pull-ups prior to NUMI is a good minimum preparation for PST to compensate for this fatigue. If you currently can't do any pull-ups, get multiple resistance bands, attach them to a pull-up bar (buy one and put it on your door

– either at work or at home), and use as many bands as are necessary to be able to complete 6-8 pullups per set. When you can do 10 in a set, drop a band (or go to a smaller one). You should do pull-ups every other day, and you should do 50-60 at a minimum, which can be consecutive or broken up. If you do this for a few months, you will gain the required strength to do the pull-ups required for the PST.

Running is an important part of preparation for the PST. Being tired from upper body workouts and the aerobic stress of the pool will set you up to be slower than usual. You should be able to run your 1.5 miles in 11 minutes or under when you are fresh. Preparation can be with daily runs of 2-3 miles with 1 run per week designed to improve speed, and 1 run designed to improve distance. Examples of speed workouts may include Tabata runs or ¼ mile sprints, with a total distance of at least 1.5-2 miles (the length of the run portion of the PST) in sprints (e.g. 8 x ¼ mile sprints at goal pace, or under 1:50 per lap for an 11 minute time).

*Be prepared to run for 5 miles at about an 8 minute mile pace.*

While this may seem quick, you must recognize that you will be yelling cadences, running in formation, and carrying a guide-on flag. They will run you hard. Those who are unprepared for this type of distance often suffer stress injuries (shin splints, knee pain such as patellofemoral pain syndrome, etc.), so being prepared is crucial to making it through training. While at NUMI, they may not make you run this fast, but at NDSTC, some training teams will run significantly faster and farther.

*Spend time doing hypoxia training (on land).*

While breath-hold training in the water without supervision is dangerous, land-based training is very helpful in preparation for UMO training. There are many apps to teach you to hold your breath; STamina Apnea Trainer, iHoldBreath, AIDA Freediving, and others. Having some comfort with a breath-hold allows a trainee to put their focus elsewhere during training. A 1:30 second breath-hold is a great starting place prior to starting at NUMI.

*Get confident in the water.*

You should be able to swim a minimum of 1000 meters in a workout, with mixed in push-ups, sit-ups, and pull-ups on the side of the pool. Callisthenic exercise mixed with swimming increases aerobic stress dramatically, and should be experienced before NUMI. Familiarity with breaststroke and freestyle are also useful, despite sidestroke and breaststroke being the only authorized swim strokes for the PST. Treading water is one of the most challenging factors of aquatic adaptability, and the eggbeater kick will make treading water easier. A trainee will need to be able to tread water with hands and elbows out of the water for a minimum of one minute. While methods other than eggbeater (frog

kicks, flutter kicks, etc.) may seem easier at first, these methods break down when weight is held overhead. Becoming competent and confident while treading water will serve you well in training.

### **NUMI/NDSTC TRAINING PIPELINE, WHAT TO EXPECT:**

The Naval Undersea Medicine Institute (NUMI) in Groton, CT is home to training for prospective Undersea Medical Officers. As noted above, preparation for this nearly six month training pipeline is crucial to success in becoming a UMO. The training pipeline is broken into three phases:

#### **PHASE 1:**

The First Phase of UMO Training is built around preparation for U.S. Navy Dive training at NDSTC. While there is a lot to learn to become an effective UMO, candidate failure is most often caused by quitting (drop on request -DOR) or an inability to meet the physical standards. Phase 1 physical preparation includes daily 1.5 hour workouts at 0500 to include running, calisthenics, swimming, in-water confidence training, practicing pool 'hits,' and other drills. The primary goals of UMOC preparation are PST preparation and in-water confidence training. This is where you will be introduced to over-unders, a repetitive under water swimming exercise. Preparation as noted above is highly encouraged to prepare you to start these exercises. While many UMOCs want to do over-unders prior to NUMI, the risk of shallow-water blackout is significant and has led to the death of skilled individuals. It is not recommended to do in water breath hold training before the safe training environment of NUMI. It is sufficient to become a great swimmer and have a good breath-hold prior to NUMI.

The time between workouts is spent learning radiation physics and health topics to complete the Radiation Health Indoctrination (RHI) certification. This certification prepares future UMOs to care for workers in the Radiation Health Program, as it allows UMOs to complete Radiation Medical Examinations (RMEs). This exam is required for Submarine personnel and Navy Divers who perform diving operations near submarines. The RHI Program also prepares UMOs to be the first line of defense in the event of a nuclear/radiologic casualty. Similarly, special duty physicals are introduced, an exam that certifies that specialized forces – including submariners, special warfare personnel, divers, radiation workers, and others – are able to complete their job effectively and safely without risking the safety of the mission or of the other crew.

UMOCs learn submarine medicine topics in phase I. In the submarine force, no person does a single job; it is the role of the entire crew to complete their main task, as well as to be prepared to address casualties, including fighting fires, addressing flooding, and even escaping the submarine. UMOCs complete training in these areas to understand ship systems and to be prepared to assist in these scenarios when/if they are aboard. UMOCs are also introduced to submarine culture and the hazards associated with submarine life.

#### **PHASE 2:**

The Second Phase of UMO training occurs on TAD orders to the Naval Diving and Salvage Training Center at the Center for Explosive Ordnance Disposal and Diving (CEODD). Prospective UMOs train like every other Navy Diver candidate with physical training both on land and in the water. Comfort in the water under extreme conditions is attained by breath-hold diving, treading with and without weights, surface swimming, teamwork drills, and many more activities. Training is built to ensure that candidates are sufficiently comfortable and calm in the water to train with equipment that can be dangerous if a diver were to panic. It should be noted that while traditionally this is where students fail out of the course, proper mental and physical preparation will prepare the vast majority of candidates.

The training includes qualification on the diving equipment used in the U.S. Navy. Competence with each piece of equipment is tested in both classroom and pool settings, to include SCUBA, KM-37 (Hard Hat Diving), and Mk-20 (full face-mask). There are also shorter familiarizations to re-breather equipment used by our forces. Most importantly for medical personnel, the course includes the Recognition and Treatment (R&T) of diving casualties course, which teaches candidates the medical knowledge required for treating diving related injuries. Topics span from basic dive physics to the latest theories on decompression sickness (aka 'The Bends'), oxygen toxicity, and many other illnesses that can be seen in Navy Diving.

### PHASE 3:

UMO training culminates in Groton, CT where comprehensive Oral Boards are performed for each candidate. Overseen by Naval Reactors, the nuclear power leadership of the U.S. Navy, this board includes questions about radiation health examinations, IDC oversight, special duty physicals, and diving related injuries. This phase also includes leadership education, operational medicine lectures, and helpful education in basic medical division officer roles and responsibilities. Most important to UMOs during this phase is assignment to a billet. While the process is variable, ranging from selection based upon course rank (merit-based) to direct assignment by the detailer, the process ultimately requires patience, as most UMOCs are post-intern physicians and have not yet experienced the flexible nature of Navy Orders. Once verbally assigned a billet, there are often multiple changes before final orders are cut. While this can lead to significant angst, it is important to recognize that this occurs all across the Navy. Remember, Navy orders can always be changed until the moment of execution!

### JUNIOR UMO TOUR:

The junior UMO tour is variable based upon the billet location and type. While the specifics of each job will vary, there are a few aspects that are constant.

*Junior UMO tour orders are for 2.5-3 years.*

This means that for those UMO students in the summer class, you are able to complete your entire UMO requirement in 2.5 years and return to residency at that point.

The winter class is only able to complete 2 years of their requirement, and if they wish to return at 3 years, must apply for a waiver of their commitment. Otherwise, they will spend 3 years at their job with a year of training (4 years total). While it is encouraged by BUMED and the Detailer to extend for the purposes of maintaining manning, some residencies are more receptive to extensions than others.

*The Job of a junior UMO is to do Special Duty Physicals, supervise IDCs, and run medical programs.*

There is a wide range among UMO billets in the number of patients, sick call visits, and special duty physicals daily. Being proficient at special duty physicals is what Navy Medicine expects, and will be a significant part of your job as a junior UMO. Similarly, overseeing the IDC program takes up a large proportion of a UMO's time because of the role IDCs play in patient care. You must train them to be as independent as possible, because they work under your license with little oversight on a submarine or during austere operations.

*Decide how operational you wish to be.*

In general, clinic, submarine, and education jobs do not deploy, while Navy Expeditionary Combat Command (NECC), NSW, and Marine Diving billets will deploy. If you wish to do so, however, there are opportunities to be more operational from any billet. The unique training section below covers some opportunities to be operational/underway, and can be a good way to supplement a more clinic-oriented position. Getting involved with the local dive locker can also be a way to supplement a clinic-based role.

### **SUBMARINE WARFARE QUALIFICATION:**

The Submarine Warfare Qualification is the main Additional Qualification Designator (AQD), and the only warfare qualification available solely to UMOs. Completion of a three-part process is required to achieve the Submarine Medical Officer (SMO) qualification. This process is overseen by NUMI instruction 5420.2 (series). Each applicant must complete the SMO Qualification Examination with an 80% or better. It can be requested from the current NUMI Instructor (UMO) at any time during the tour. They must also complete 30 days underway, or 15 days for those at commands without submarine responsibilities. This underway time includes completion of a SMO qualification card, including a formal board while underway. This time can be challenging to complete for some billets, and waivers will be considered for specific reasons outlined in the instruction above.

Finally, a technical paper or thesis is required to complete the SMO qualification. This process can be more challenging and should be started as early as is possible. The

topic must be related to submarine medicine, diving medicine, special operations medicine, or radiation health. Once a topic is devised, approval for the topic should be sought by submitting a brief proposal with a comprehensive bibliography. The ultimate thesis format and substance is explained within NUMIINST 5420.2, however it can be summarized as similar to a scientific paper in length, content, and requirements. Once all of these requirements are met, a final application for recognition of your warfare qualification completes the process.

### **RETURNING TO RESIDENCY:**

There are two schools of thought during the UMO tour. One mindset to have is to read voraciously, seen patients, and maintained your skills in medicine as well as possible. Another method would be to enjoy yourself and the break from training, take care of the sailors at your command, and focus on being an exceptional Naval Officer.

If you want to stay current, there is limited funding from BUMED for physicians stationed at non-BSO-18 commands to attend conferences. There are also opportunities for permissive TAD for the purpose of educational opportunities that are advancing of your skills but not necessarily for your command. Moonlighting is also possible with specific permission from the CO and a state license (see MANMED and your local JAGyou're your moonlighting instruction). Specialty specific resources are available, and you should seek out those from leaders/contacts in your chosen specialty. The UMO tour is a good time to shadow physicians in your specialty, attend academic conference (if feasible), and demonstrate sustained interest. Nearby MTFs can be useful places to stay involved, and there is often command support for maintaining relationships with local MTFs for the purpose of staying current.

UMOs tend to match well for competitive specialties as we tend to be motivated, self-starters with "fleet time" that is highly regarded on GME applications. If you are unsure of making the Navy a career, you can complete four years of HPSP obligation with one UMO tour and attempt to match in a civilian residency. You will have military experience and maturity when matching to civilian residencies; however, you will be somewhat older than your classmates and may need to repeat an internship (depending on which specialty you choose). Whether matching civilian or military, you have a lot going for your application, but without displaying interest in some fashion it can be challenging to match.

### **HYPERBARICS FELLOWSHIP:**

If you desire further training in diving and hyperbaric medicine, you can apply for a fellowship in hyperbaric medicine. This gives you more exposure to the hyperbaric side of the specialty (the Navy training weighs more heavily on dive medicine), opens senior UMO billets up to you, and gives you an additional skill for transition to civilian life. The major locations for fellowship are University of California, San Diego, Duke University (Durham,

NC), and Louisiana State University (New Orleans, LA). They typically last for one year and are a good opportunity to get paid a full-time Navy salary while “playing civilian.” If interested, seek out fellowship-trained UMOs for specific details. Of note, in order to qualify for a fellowship, you must be residency trained in a primary specialty. Typical primary specialties for hyperbaric fellowship are Emergency Medicine, Anesthesia, and Primary Care (IM/FP). In order to be competitive for selection by the Navy, you will need to have your Submarine Medical Warfare qualification as well as board certification in your primary specialty.

### **SENIOR UMO TOUR:**

As with all operational medicine tours, there are opportunities to return to the community to serve in a senior UMO role. Group level billets exist for submarines and EOD as well as SMO billets at NSW commands. Some senior jobs require the hyperbaric fellowship (NDSTC, NAMI, NEDU), but most are open to any senior UMO. Most specialties will require a utilization tour in that specialty prior to embarking on a senior UMO tour. You must communicate your desire to leave your primary specialty with your Specialty Leader, be granted authorization to leave the specialty for a tour, and plan on returning to your primary specialty after your UMO tour. These jobs typically involve meetings, medical admin, setting policy for subordinate units, as well as medical oversight of junior medical officers and IDCs. If ultimately interested in this type of role, completing the Submarine Medical Officer Qualification while a junior-UMO is highly encouraged (if not required).

### **UNIQUE TRAINING OPPORTUNITIES:**

- *SAT DIVING/AQUARIUS: While the saturation diving program has not been functioning for some time, there has been an effort to revive the Saturation Fly-Away Diving System (SAT FADS), a mobile saturation diving unit built to sustain 6 divers to depths of 1,000fsw for 21 days with 9 subsequent days of decompression. Similarly, the US Navy has had a relationship with the Florida International University Aquarius program, an underwater habitat for saturation diving that has utility for human physiology studies as well as USN training. Introduction to these fields usually starts with a saturation diving course, which runs intermittently at NEDU; contact the UMO at NEDU for more information.*
- *Dry Deck Shelter (DDS): The US Navy supports Dry Deck Shelter (DDS) operations for launching and recovering of Navy Personnel, SEAL Delivery Vehicles, and Underwater Unmanned Vehicles from Submarines. Training in DDS operations happens intermittently, and can be coordinated with the UMOs at the Seal Delivery Vehicle Team 1 in Pearl Harbor, HI or via Naval Special Warfare Group 3.*
- *BIENNIAL ICEX: The US Navy does biennial ICE Exercises (ICEX) for evaluation of US Navy Submarine readiness in the unique environment of the Arctic. This is a multinational*

*effort, which allows for multiple UMOs to be involved in either ICE Diving or submarine operations in the arctic. These are extremely unique opportunities only offered to UMOs, and more information can be found via the Arctic Submarine Laboratory (ASL) or the Underwater Warfighting Development Center (UWDC). These operations happen on even years.*

- *ICE DIVING: The cold water/ice diving course is a course designed to teach you the basics of setting up a dive side on the ice, diving in cold water environments – including the use of a dry suit – and managing the dive side in this environment. This course is offered by the Coast Guard and attended by Navy personnel.*