James chats with Commander Chloe Ryan from the Royal Australian Navy about underwater medicine. As a result, you will learn more about diving medicine and what a career working as a medical officer in the Navy can look like.

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### About Commander Chloe Ryan

Commander Chloe Ryan joined the Navy in 2004 as an Undergraduate Medical Officer. Subsequently, she graduated from James Cook University in 2007. Moreover, Chloe has enjoyed a range of postings both at sea and ashore. For instance, she has deployed extensively in both RAN ships at sea and in the joint land environment.

Chloe has served as:
- the Officer in Charge of the Submarine and Underwater Medicine Unit – East, and
- Senior Medical Advisor for Diving Medicine, J07 HQ JTF633.

She is currently the Senior Clinical Advisor to the Director of Navy Health and SO1 Health Policy and Governance.

Furthermore, Chloe’s qualifications include:
- a Bachelor of Medicine and Surgery,  
- Master of Health Administration, and  
- a Master of Military and Defence Studies.

Chloe is a graduate of the Australian Command and Staff College. Further, she is a Fellow of the Royal Australian College of General Practitioners. She is currently working toward attaining Fellowship of the Royal Australasian College of Medical Administrators. Additionally, Chloe has developed deep expertise in Diving Medicine during her career as a Navy Medical Officer. And she also holds qualifications in Aviation Medicine.

In addition, Chloe is a recipient of the following medals:
- the Australian Defence Medal,  
- Australian Operational Service Medal – Border Protection,  
- Australian Operational Service Medal – Greater Middle East, and  
- the Defence Long Service Medal.
With Dr Chloe Ryan, Commander in the Royal Australian Navy, Underwater Medicine specialist and General Practitioner.

**Introduction**

Underwater Medicine is a multifaceted career that involves diving, submarine, and hyperbaric medicine sub-specialties. Whilst diving and submarine medicine are predominantly based in the military landscape, hyperbaric medicine is more accessible in the civilian community. Despite this, the military work closely with civilian specialists to share knowledge and accumulate the understanding required of the multi-faceted underwater medicine specialty.

This podcast discusses the various aspects of underwater medicine, the opportunities and latest innovations that are being led by the Royal Australian Navy.

1. **Why did you join the Navy over the Army or Air Force?**

   - I had grown up spending a lot of time by the water in North Queensland where I was always diving, fishing or boating along the Great Barrier Reef
   - My sister was already in the Navy and so it was a natural progression

2. **How did your career start and lead you up to now?**

   - I joined the undergraduate scheme when I was in the third year of my six year degree at James Cook University
   - After the completion of my resident year I completed the New Entry Officers Course at the Royal Australian Naval College, HMAS Creswell. This was the start of my career in the Navy
   - The first three years I spent travelling the world providing primary health care on ships at sea, ensuring our sailors and officers were fit and healthy. I served on Minehunters, Frigates and Patrol boats to name a few
   - Considering the remote locations of most of the Navy’s ships, the medical team is always on call. We’re always ready (whilst proving primary health care) to be available for medical evacuations and to help out other ships at sea. We participate in a varied amount of work.
   - At sea we often had diving teams on the ships. Whilst I had some basic training in diving medicine in order for me to provide the best care to the Navy divers, I knew I needed to undertake further education in underwater medicine.
   - I requested my next posting be at the Submarine and Underwater Medicine Unit (SUMU) in Sydney. After a few years studying at this unit I became the Officer in Charge and then the Senior Medical Advisor for diving medicine in the Navy.
3. Is there a particular course or diploma for underwater medicine?

- There are multiple ways in the Navy to gain specialist knowledge in diving medicine. The Navy offers a basic course, the Medical Officer's Underwater Medicine course (which is also available to civilian doctors as well).
- There are other avenues you can also go down; you can study for the South Pacific Underwater Medicine Society diploma, studying diving and hyperbaric medicine. The Australian and New Zealand College of Anaesthetists (ANZCA) also provide a certificate and qualification in advanced diving and hyperbaric medicine.
- There are various other courses that are run around the world. Some are in diving medicine, some are in hyperbaric medicine and some are in submarine medicine. However, the courses in diving and submarine medicine are usually run by militaries.

4. What are some of the opportunities the Defence Force career has provided you?

- I've travelled the world which has been one of the greatest opportunities for me so far.
- I had the opportunity to go to Nepal as part of a Women, Peace and Security initiative. I was part of a team of three women who went with a group called Habitat for Humanity as part of their Hand in Hand program.
- We built houses for underprivileged women who were mainly by themselves and had to house their children. This was one of my biggest highlights.

5. What are some of the challenges you've come across in your career?

- You are practicing medicine in a remote environment and often hostile environment. This is pertinent as when you join the Defence Force it is as a junior doctor. So, it can be very confronting to be on your own with limited support (only ever by telephone or satellite phone) and you learn very quickly to be independent.

6. What are some of your responsibilities as a medical professional within the Navy?
As a baseline, our responsibilities are to provide primary health care to the sea-going community within the Navy. We work with Navy medics and nurses and sometimes allied health professionals to provide that health care.

There are occupational medicine requirements to ensure our people are fit to do their jobs. We are also involved in planning to make sure people receive the care they are meant to receive, wherever they may be in the world.

We ensure we continue to develop the health capability that the Navy provides to their personnel.

It’s quite a varied job and on the other side of being a Doctor in the Navy is the military component. As an Officer you are also responsible for managing and looking after the sailors and junior officers.

7. Tell us a bit more about underwater medicine specifically.

Underwater medicine is a specialty area of military medicine and it requires expertise that isn’t generally available in the civilian care community.

The field incorporates both diving medicine and submarine medicine and there’s also a link to hyperbaric medicine. Hyperbaric medicine is more generally available in the civilian community and we often leverage off the civilian community to gain our expertise in that field.

Diving medicine broadly studies the physics, physiology and health consequences of exposure to pressure and breathing compressed gasses under water.

Submarine medicine (whilst it includes components of diving medicine) also deals with the environment within the submarine, the habitability as well as the potential risks associated with submarine escape and rescue.

Hyperbaric medicine deals with the physics and physiology of high-pressure oxygen therapy and recompression.

Underwater medicine is quite a complex field of medicine and it requires a deep knowledge in a broad area of medicine.

8. What are the career pathways and opportunities in Underwater medicine in the Navy?

There are two main Submarine and Underwater Medicine Units (SUMU). SUMU East is located in Sydney and this is where we look after the Navy’s diving community. SUMU West, is in Western Australia focuses on submarine medicine.

There are many different courses all over the world that I mentioned before that you can gain experience in, in both of those areas specifically.

Both areas can be very rewarding careers either separately or combined. Many people transition from one to the other and gain experience in both.
9. What would a day in the life of an Underwater Medical Officer look like?

- It depends on what field you’re in, whether it’s diving medicine or submarine medicine, but a typical day would include, seeing an acute clinic, which we call the ‘sick parade.’ This is where people will come in and you determine if they’re fit to go on board a submarine or fit to do their diving.
- Then you might move onto occupational diving medicine or even onto using the recompression chamber to ascertain individual's suitability testing for diving.
- You might also have to deal with diving casualties, or you could be out on the wharf supervising risky diving activities like free ascent training or deep diving activities.
- There is always teaching. We are responsible for teaching our expertise to specialised diving medicine medics to ensure they can provide the best basic care to our divers and submariners in situations where we may not be readily available.

10. What training have you done so far in regard to the career that you’ve had?

- The military provides lots of opportunity for education and I’ve been very lucky. I was sponsored by the military to study my primary medical degree and then I went on to get my fellowship with the Australian College of General Practitioners.
- I’ve also completed a Master of Health Management and Masters in Military and Defence studies.
- I’ve completed courses in diving and underwater medicine and I’ve been to Canada to study a course in submarine medicine.
- All of these courses are deemed part of career progression for a Navy Officer and are fully paid for by the Navy. The military sees continuing professional development as a requirement to provide high quality health care to its members, so it sponsors its officers to continue doing that.

11. How does underwater medicine differ from more conventional, civilian medicine?

- The biggest difference is that underwater medicine is mostly practiced in a military environment and those skills aren’t easy to gain outside of the military.
- The other difference is that it involves pressure and compressed gasses.
12. Since you’ve been in the Navy what are some of the changes you’ve started to see in underwater medicine?

- We’ve come from an era where you just had to do what you had to do without much collaboration and knowledge sharing. Now we are in an era where we really do rely on our military partners around the world and our civilian partners both within Australian and across the South Pacific to increase our knowledge in diving and submarine medicine.
- We work really closely with the Prince of Wales Hospital, Sydney in their hyperbaric medicine chamber and with the Fiona Stanley Hospital in Western Australia. We also work across the world with the US Navy experimental diving unit and lots of specialists throughout the South Pacific.

13. Are there any current innovations in the Navy in underwater medicine where we are leading the way?

- One of the areas is in submarine escape, rescue and abandonment. The 2016 Defence White Paper highlighted the need to support the new Royal Australian Navy submarine fleet. Project C1354 phase 1 is a program that’s mission is to acquire and deliver a fully deployable, completely air transportable submarine rescue and abandonment system. The new system will be able to support both the older Collin’s class submarines and our new attack class submarines.
- Our main concern in deep water rescues is decompression sickness. It is a really debilitating illness that can cause death due to rapid depressurization. If a person transitions too quickly from a deep depth then the dissolved gasses in their blood can bubble and result in death.
- The submarine rescue system we are developing will be pressurized to match whatever pressure the disabled submarine is at so it can safely bring our members to the surface and decompress them at a rate that’s survivable.
- Our underwater specialists are deeply involved with setting the requirements for that system. It’s a really exciting time to be involved in underwater medicine because whilst this system is being developed to deliver a rescue capability for Australia, the system will also be capable of supporting other submarine operations for other nations across the world.

14. You have many qualifications including aviation medicine, what are the similarities between the different areas?

- Both aviation medicine and diving medicine involve pressure, one is high pressure and the other is low pressure and therefore many of the same concepts apply to both settings.
For example, an FA-18 pilot might have an issue with rapid decompression-recompression in their cabin and so, similar to how we would treat a Navy diver, we might be required to treat them in a hyperbaric chamber to deal with the decompression sickness.

Medicine is one of those things that transcends languages and regions because it’s needed everywhere. It doesn’t matter what field you’re in they are all interrelated.

15. What do you see is the future of underwater medicine and where are the opportunities going to be in the future?

- For the Navy in particular we are always interested in improving the safety for our divers and submariners. As our capabilities improve, we will be able to dive deeper and stay in our submarines longer. We need to continue to improve the safety for our people who operate in those environments.
- There’s plenty of opportunity to work with nations across the world in improving those systems.

16. What would you say to young doctors or medical students who are currently considering a career within the Defence Forces?

- If you’re looking for something that is varied, exciting and unique then the military will deliver that for you, but it will take you away from your home and it’s not always that easy with the challenges we discussed.
- It’s something you should consider carefully and talk to your family about.
- Think about where you might be in five or ten years and whether it might suit you then because it’s a very exciting job, but it can be difficult.
- It’s not easy to serve your nation in the military but it is very rewarding, and it is a job you can be proud of.

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