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Perspective article

The first dental clinic on a navy warship of Taiwan

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The main mission of the Taiwan Navy is to maintain the security in the Taiwan Strait and maintain the smooth flow of external shipping. In the peacetime, it performs the reconnaissance patrols in the Taiwan Strait and the tasks of

outer island supply and escort, and appropriately supports the various major disaster prevention and rescue works. During the wartime, it will join with friendly forces to counter enemy naval blockades and conduct naval interceptions to maintain the smooth flow of external shipping across the Taiwan Strait and ensure the national security. Therefore, all types of ships of the Taiwan Navy have military medical officers and military medical soldiers to respond to the medical situation of the entire ship when sailing or docking in port. The main function of the Panshih Fast Combat Support Ship (AOE-532), developed and manufactured by the Taiwan itself, is to carry out the tasks of replenishing oil, ammunition, and supplies. In addition, it

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has complete medical equipment to take the health care for the personnel on board, which can greatly enhance the navy's ability to continue fighting and can also perform humanitarian rescue missions.¹

The AOE-532 was manufactured and delivered to the Taiwan Navy in 2015. The ship belongs to the 151th Fleet of the Navy and is stationed in Tsoying Naval Base. It is currently the ship with the largest displacement in the Navy. It is also the only ship in the Navy with complete professional medical capabilities. It has the medical facilities at the level of a field hospital, equipped with a diagnosis and treatment room, an operation room, a dental room, a disinfection room, and 3 wards with 15 hospital beds in total, including 12 general beds and 3 negative-pressure isolation beds. All wards are equipped with the oxygen supply systems, and the overall equipment is more complete than some district hospitals in Taiwan. It is like a hospital on the sea and can provide better medical services. The dental room is equipped with complete dental equipment and can also be called a dental clinic on the sea. It is the first dental clinic on a navy warship of Taiwan.^{2,3} It aroused our interest. This article attempted to use document analysis method to collect the public information about the dental manpower and equipment on the AOE-532, and further analyze its dental capabilities.

In this study, we collected as much public information as possible about the AOE-532, and extracted the content related to the medical manpower and dental equipment on the AOE-532. Based on the information collected, we obtained the following results. The AOE-532 has the medical facilities internally with a field hospital level, and a medical team is in place to use and maintain these medical facilities (Fig. 1A). The service personnel of the medical team are composed of 5 military medical officers and 3 military medical soldiers. Each medical officer has a qualified physician or dentist license. The specialties of them include orthopedics, anesthesia, dentistry, and so on. Thus, they can handle general medical treatment, surgical wound suturing, and oral diagnosis and treatment to meet various medical and dental needs during the overseas training. Therefore, the medical team includes the dental manpower of at least a dentist. However, the medical soldiers also assist the dental officer with simple assistance and cleaning of instruments during dental procedures, which can be regarded as playing the role of dental assistants.

Furthermore, the dental room is equipped with a dental unit, a dental X-ray machine (including a digital dental X-ray reader), a dental scaling machine, a dental suction machine, a dental reverse osmosis (RO) water purifier, a dental air compressor, an autoclave, an ultraviolet (UV) light sanitizer box, the dental surgical instrument kits, the dental anesthesia syringes, and various other dental instruments and materials (Fig. 1B). Moreover, the consumables and instruments prepared are mainly for emergencies. These devices can be used to perform various dental treatments. The overall equipment is more complete than that of some district hospitals' dental departments. Among them, the digitization of dental images has the advantages of image preservation and avoiding the cost of processing X-ray films. Based on the above dental equipment, we consider that the dental capabilities of the AOE-532 can cover the following various oral and dental

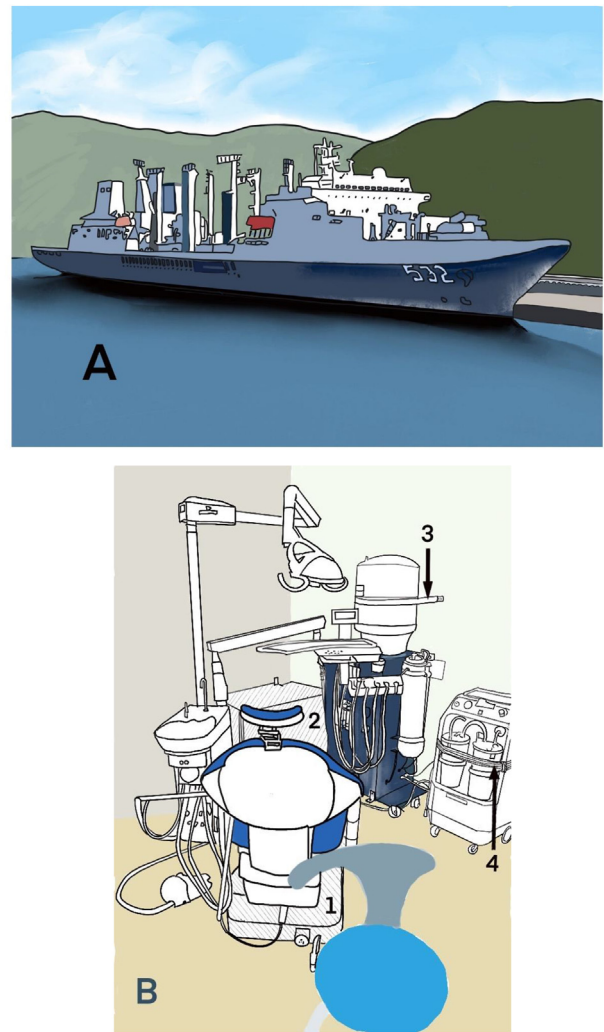


Figure 1 The schematic diagrams of the Panshih Fast Combat Support Ship (AOE-532) and its dental room. (A) The overall appearance of the AOE-532. (B) Placement of main dental equipment in the dental room of the AOE-532. The dental chairs and other peripheral equipment on the navy warships are considered to have to be fixed to the ground or wall when the warships built, in order to cope with the frequent problems caused by bad marine meteorology and climate, and to avoid slipping or toppling. According to the schematic diagram (B), these considerations include (1) the dental unit being fixed to the ground with a designed base, as well as (2) the dental air compressor, (3) the dental reverse osmosis (RO) water purifier, and (4) the dental suction machine being fixed to the wall with a simple steel plate and screws.

health care, such as oral hygiene instruction, dental scaling, general oral and facial trauma treatment, dental trauma treatment, tooth extraction, simple oral surgical treatment, periodontal emergency and treatment, endodontic emergency and treatment, and tooth cavity fillings. Therefore, the dental clinic on the navy warship of the AOE-532 already has the ability to provide most basic dental services. However, it should be noted that this is our judgment based on the dental equipment of the AOE-532 in this study rather than the documented records.

According to the concept of the military dentistry, the mission of the military dentist, as often cited in directives, is usually expressed in somewhat the following manners including offering dental service for the preservation of dento-oral health and the prevention and treatment of dental diseases, injuries, and deficiencies among the people subject to the military control. There is no difference between the military dentistry and the dentistry that is generally or routinely practiced in the nation. The professional quality, techniques, and standards of the dentistry practiced in the military service are the same as those governing the dentistry practiced elsewhere in the country.⁴ Moreover, according to the contemporary concept of the defense dentistry, oral diseases can cause substantial disruptions to the service personnel, causing them to be debilitated and less effective during the military operations. As such, the defense dentistry provides the career-focused dental services that are deployable, flexible, and comprehensive to ensure the service personnel who are dentally suitable for the military operations and have minimum dental morbidity. The key principles of the defense dentistry emphasize the public health values and occupational focus of a patient-centered approach and the flexibility of the uniformed military dental workforce in the capability to provide the responsive and deployable oral health care. Moreover, the defense dentists provide a unique service that balances the needs of the individual while taking into account their operational role requirements. This allows the oral health of the nation's armed forces to be optimized by reducing morbidity and maintaining the military operational capability while deployed.⁵

While the military dentistry is delivered in a military-led model, the military dentists are across the three uniformed services, including the navy, the army, and the air force. However, the special thing about the military dentists of the navy is that in addition to being on duty on land, they may also be on duty on ships (on the sea). Reviewing the history of the navy dentistry, some form of dental care had long been practiced in the U.S. dental services. On August 22, 1912, President William Taft signed into law an act creating a formal corps of uniformed dentists in the U.S. Navy. A separate Navy Dental Corps Reserve was established on March 4, 1913. On March 5, 1913, Harry Harvey was ordered by the Navy Bureau of Medicine and Surgery (BUMED) to the hospital ship USS Solace becoming the first dental officer assigned to a ship or to serve on the sea. The navy dentists demonstrated their skills throughout the 1920s and 1930s in the navy and marine operations in places like Haiti, Nicaragua, and China.⁶ Up to date, the U.S. Navy Dental Corps deploy routinely with Marine Expeditionary Units and aboard ships, where beyond their dental duties, the dental personnel continue to play a significant role in peacekeeping and nation-building through humanitarian assistance and disaster relief missions in the third world countries.⁷

Previous researches have rarely linked the dentistry with the military. This article tried to explore the dental equipment and manpower on a navy warship of Taiwan. We thus revealed that Taiwan set up a fully equipped dental clinic for the first time in a domestically built navy warship in 2015. There is the dental manpower to operate it. This means that Taiwan also has the potential ability to form a

Navy Dental Corps, which represents an important milestone for Taiwan's navy dentistry. However, reviewing the history of Taiwan's dentistry, Taiwan's navy dentistry can be traced back even further. In 1949, the National Defense Medical College moved to Taiwan with the government and became the first and the only institution in Taiwan to train the military dentists, which showed that Taiwan had its own ability to develop the navy dentistry after that.⁸ On the other hand, it is possible that the navy dentistry also existed in Taiwan during the Japanese colonial period (1895–1945). Moreover, the history of Taiwan's navy dentistry needs further in-depth historical research to discover.

With the rapid development of holistic dentistry in Taiwan, Taiwan's navy dentistry may also benefit from it. In addition to providing oral health care to the service personnel, Taiwan has the ability to develop the navy dentistry for investing in international humanitarian rescue cooperation to respond to complex disasters caused by the future non-traditional security threats and the unexpected natural disasters.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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