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Maritime telemedicine – state of the art

Consensus

A. Background

1. State maritime telemedical services are a well-established part of the measures taken to minimise the harm to seafarers from illness and injury at sea.

2. TMAS have been the subject of international Conventions, Regulations and associated guidance for several decades.

3. Maritime states are required to provide TMAS services. However only a few developed countries meet these requirements and both developing countries and many of the countries with major open registries for ships fail to do so.

4. The arrangements where services are provided vary widely in terms of objectives, funding and resources for the service.

5. In addition to national TMAS centres providing services for both national and international shipping there are private providers of services, some are a formal part of national requirements. Others offer more sophisticated services than national centres, in particular to the cruise, superyacht and energy sectors.

6. There is a limited amount of data on service use available. It only covers a few providers, and much is unpublished. Studies on the effectiveness of the advice given and on the outcomes of cases on which TMAS services have advised are scanty.

7. Developments in communications technology mean that ships in virtually all parts of the world now have broadband access by maritime satellites. This technology is widely used for ship management and technical functions, but has not been adequately exploited by state maritime telemedical services, although similar technology is widely used in other healthcare settings.

8. Sensors that can relay clinical information through broadband channels are available for a wide range of clinical applications. Some only work with dedicated proprietary systems but other use readily accessible open systems.

9. Maritime telemedicine arrangements need to be compatible with medical supplies, equipment and facilities on board, with the training of officers who have healthcare responsibilities and with other sources of information such as published or web based medical guides for ships. Changes in telemedical systems and practices may lead to

consequential changes in these related systems.

10. There are complex issues of ethics and confidentiality that relate to medical care on board. Telemedical advice needs to align with good ethical practice to ensure that the safety of the ship and the recovery or the individual are paramount and that incidents on board will not unjustifiably affect the future employment prospects of seafarers.

B. Development of TMAS services

11. The competence of crewmembers in working with TMAS to identify symptoms and signs and diagnose and treat seafarers needs to be enhanced. Modifications to training are needed to increase the use of treatment protocols that include obtaining advice from TMAS. More skill-related practical training is needed and this requires regular refreshment and updating to maintain competence. Some aspects of this training could be provided on board using remote training and enhanced TMAS links. A system of credits for courses successfully completed would be advantageous.

12. Standards for TMAS should be developed. The introduction of formal quality standards, and possibly endorsement based on them, should be considered. These will need to cover:
- training and competence of TMAS professional staff, qualifications and experience.
-language skills: international providers will need good English with knowledge of maritime terms and conditions. They should be able to communicate using standard maritime communication phrases (SMCP).
- immediate access to translation services, electronic or personal.
- understanding of telemedical systems as applied to ships – including RCC and SAR services.
- knowledge of shipping routes, living and working condition and their risks, cultures and lines of command on board.
- anticipated medical training and competencies of responsible crewmembers.
- relevant maritime regulations e.g. IHR and infectious disease.
There is scope for developing online training resources to meet these needs, especially for use in developing countries.

13. The use of available technology to enhance current practices in remote diagnosis and treatment needs to be optimised. Aspects to be considered include:
- voice, text with attachments and basic video all have wide-ranging uses in communication about symptoms, diagnosis, treatment and continuing care.
- full video conferencing is better, but is rarely portable to all parts of ship and the cost is higher.
-it should be possible to use equipment in the sick bay and in all other parts of a ship, for instance when there is an injury with entrapment.
- to assist this ship-wide wired or wireless LANs should be the norm for new build ships and installed as far as possible on existing ones.
- cameras and other electronic equipment used for real time transmission need to be robust and simple to use. There are products designed for clinical use that meet these requirements but often off the shelf consumer products are suitable for still and moving image transmission.

- real time transmission of streams of clinical data e.g. audio link with electronic stethoscope can improve diagnosis.
- many other sorts of data e.g. ECG can be sent as images but real time transmission enables trends to be monitored.

14. Different symptoms, diagnostic processes and treatments needs require different modes of communication. e.g. video is useful for neurological assessment and for oversight of abdominal palpation. Still images are needed for skin conditions and injuries.

15. Compatibility of clinical IT applications worldwide needs to be addressed. Open web-based systems have advantages of access and cost. The use of proprietary systems will greatly reduce the scope for use of more than a single TMAS provider.

16. Access to bandwidth for transmission of information between ship and TMAS is essentially a matter of economics. Except in high Arctic and Antarctic regions it is available. Many ships are already equipped with it for ship management, technical or scientific purposes, and here most of the access costs will already have been paid, hence the additional cost of use for contact with TMAS will be minimal. Only occasional high-priority access to a large bandwidth will be needed for medical emergency use: priority access should be specified in advance of need.
The requirements of the potential medical needs for bandwidth should be stratified by crew size and distance from onshore healthcare. Three categories of access are recommended for medical use in line with the requirements for carrying type A, B and C medicine chests. Guidance on the equipment to be carried should determine the access requirements. Ability to use video equipment has been found advantageous in ocean going ships (type A).
The business case for such provision needs to be developed, based on savings in terms of health benefits and reduced ship operating costs from diversion, medevacs and onshore care/repatriations.

17. Only clinical information is relevant to initial advice on diagnosis, but TMAS also need to be party to location, weather, sea condition information as well as to knowledge of medical facilities available ashore near to the location of the ship when considering case management in terms of decisions on treatment and whether to keep the seafarer on board or recommend they be brought ashore.

18. A database of standardised information on the work of TMAS worldwide is needed to improve the quality of service provision and to evaluate the contribution of services to health risk management at sea. The legal issues of setting up such a database need to be investigated and ownership of the data, with responsibilities for maintenance of the data, medical confidentiality and analysis defined.

19. A standardised set of documentation (electronic with hard copy when needed) is required to simplify both the case by case use of services and the collection and analysis of results:
- pre-call form for onboard assembly of data
- TMAS journal of contacts with details
- ship medical log

- case outcome information, whenever possible.

20. Standardised coding of symptoms, diseases and drugs is essential. There are two widely used codes ICPS 2 (International Classification of Primary Care: good at recording clinical contacts and symptoms) and ICD 10 (International classification of Diseases: records diagnosis). There are translation programmes between them. Agreement is needed on which to use for analysis of internationally collected data. Centres may choose to use the preferred code or to use their own and set up valid arrangements for translation into the preferred code. Medications used on board should be coded using ATC codes.

21. Certain regulatory and legal issues need to be clarified:
    - the relative responsibilities of the TMAS medical adviser, the ship captain and the SAR services for decisions on clinical care, including the use of treatments on board and evacuation or diversion.
    - safeguards for confidentiality of clinical information on seafarers. What to do when this conflicts with maritime safety or the need to engage captain or owner in decisions about actions to be taken
    - the right of seafarers to access to confidential primary health care advice from TMAS under MLC, in addition to advice to the ship on the management of medical emergencies. The implications of this for patterns of TMAS provision are significant.
    - the liability of the TMAS for advice given under its national law and under international law, commercial law and that of other jurisdictions.

22. Currently there are a number of ways in which ships, seafarers and TMAS relate to each other. Some are based on state provision, often linked closely with MRCC and SAR services. Often these focus primarily on emergencies. Company or contractor based private provision now often uses more sophisticated technology and may have a larger primary care component to it. The means of developing partnerships and learning from experience with other models of provision needs to be developed. The concept of a global network of TMAS with common standards and interchange of data should be developed. Links should be similar to those of MRCCs with each other, enabling access to medical skills in native languages, information on locally available care and simple handover of clinical cases and their records.

23. Priorities for development work include (H=high, M=medium, L=low.):
    a. Equipment: evaluation of usage / need M
    b. Data: outcome / standardised coding of TMAS statistics, in particular tracking reasons for evacuation H
    c. Training requirements and their evaluation: TMAS professionals/seafarers H
    d. Specification of standard minimum data sets and their format to aid interchange of information between authorised users. M
    e. Protocols for joint diagnosis and treatment (ship/TMAS) M
    f. Integration, standardisation of electronic equipment M
    g. Ethical and legal issues H
    h. Regulations, e.g. TMAS accreditation criteria L
    i. Harmonisation of medical logs (on board) and data L
    j. Gap analysis on present status of communication equipment and facilities onboard M

k. Language barriers M
l. Ensuring that work on TMAS does not obscure importance of prevention by pre-embarkation medical assessment and by attention to working and living conditions and to lifestyle. M.

Groups such as ship operators, seafarers' organisations, telecom experts and equipment suppliers should be involved in development work to ensure that practical and acceptable solutions are developed.