
CONFERENCE ABSTRACT

Literatures Review of Telemedicine Services in Maritime and Extreme Weather

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Purpose: The objective of this review is to assess and analyse the current status of tele-medicine services in the context of offshore, Arctic and extreme weather and its use within the search and rescue scenarios. Moreover, it presents state of the art systems for implementing successful telemedicine services in the Arctic (extreme weather and remote) regions and also indicates the extent of the challenge imposed by the existing geographical problems.

Method: Literature search was conducted, between September 7 and October 28, 2015, through various databases, such as Google Scholar, PubMed/Medline, Science direct, ACM Digital Library, IEEE Xplore, Onepetro, Journal of American Medical Informatics Association (JAMIA), Journal of Telemedicine and Telecare and Journal of international maritime health. Furthermore, additional articles were also extracted from reference lists of the selected papers. Peer reviewed journals and articles were considered. The inclusion and exclusion criteria were setup through rigorous discussion and brainstorming among the authors. Several combination of the term “Arctic”, “oil and gas”, “shipping”, “telemedicine”, “search and rescue”, “maritime medicine”, “offshore”, “extreme weather”, and “telehealth” were used during the search. The search strings were combined using “AND” and “OR” for a better searching strategy. Relevant articles were first identified by reviewing the titles, keywords and abstract for a preliminary filter with our selection criteria, and then we reviewed full texts for articles that seemed relevant. Information was extracted based on some predefined categories, including Communication link, Telemedicine modalities and Telemedicine services, which were based on previous research and further elaborated upon via iterative brainstorming.

Result: The first Author (AZW) vetted the first hit using the title, abstract and keywords, and retrieved a total of 471 papers. After removing duplicates, 422 records were remained. Then the authors did independent assessment of the articles based on the inclusion and exclusion criteria, which eliminated another 219 papers, leaving 203 relevant papers. After a full text assessment, 36 articles were left, which were critically analysed. The inter-rater agreement was measured using the Cohen's Kappa test, and disagreements were resolved through discussion. According to the result, most of the studies have implemented various telemedicine services such as teleconsultation (24%), teleradiology (22%), telecardiology (5,5%), tele-ENT (5,5%), teledermatology (8,2%) and teleeducation (8,2%) and others (19%, incl. teleinterpretation, teleambulance, clinical decision making and others). Most of these studies also demonstrated the use of various means of communication links including satellite (29%), mobile (GSM, GPRS, CDMA, etc) (25%), radio, LAN & dialup (28%), ISDN (8%), broadband

(6%) and VPN (5%). Moreover, all these studies have shown the use of various telemedicine modalities such as video (27%), still images (25%), audio (19%) and other medical data (18%).

Discussion: Despite the increasing number of fishermen and other seafarers, maritime working conditions are mainly characterized by absence of access to health care facilities. The condition is further aggravated to fishermen and seafarers who are working in the Arctic regions. Even if onshore tele-medicine has been a success, its success on offshore is limited. This is due to various reasons such as the absence of good communication network, bad weather condition, long distances and longer time periods out of reach of search and rescue (SAR) helicopters, which reduces the possibility of medical evacuation (MEDEVAC). Technology adoption from onshore to offshore might seem a fast remedy for the case. However, this remains to be a challenge for various reasons. The main reason is the convergent and divergent nature of maritime and onshore telemedicine with respect to structural, practical and policy differences. Therefore, it requires to identify these differences and to carefully review them before the transfer of technology and research results to offshore situations. However, irrespective of these limitations, offshore and maritime telemedicine have recently been successful in delivering telemedicine services in the Arctic, Antarctica and other areas with extreme weather conditions. However, the use of telemedicine in relation to search and rescue (SAR) services is not yet fully exploited. Therefore, we foresee that these implemented and evaluated telemedicine services will serve as underlying models for successful implementation of future search and rescue (SAR) services.

Keywords: tele-medicine, tele-health, Arctic, extreme weather, and search and rescue (SAR)
