Hospital Ship, Hospital Clinic and Telemedicine for Disaster Medicine Adaptation at Coastal Region

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Abstract Many coastal areas in Indonesia are spread widely and in various groups, which require special preparation and handling in times of disaster related to medical services. With the dean, appropriate adaptations are required for planning, preparation, implementation and post-disaster. This study investigates the medical service system in the form of hospital ships and hospital clinic in boats that are ready to operate in the state of preparation, implementation and post-disaster with the support of telemedicine. Thus, medical services can be used during normal and disaster situations. The study used the materials related to the arrangement of hospital ships and boat clinics that meet optimal standards that are ready for normal and disaster use. Medical equipment, medical support, drugs and operational procedures for both normal and disaster situations. Doctors and other officers in accordance with the required profession, with special training for disasters. The result shows an integrated information system and telemedicine system that uses voice recognition in times of disaster, supported by trained equipment and personnel. The method used is in the form of needs assessment and feasibility studies as well as making proposals for funding, thus trying to attract the participation of related parties, especially BAPPENAS, the Central Government, Regional Governments and BNPB. This study proposes suggestion with the support of a needs assessment and a feasibility study, which fulfills the readiness of facilities, doctors and other health workers who are ready for normal times and during disasters. Thus, it is ready to be discussed and ready to be worked on, because coastal conditions have begun to sink due to extreme climate change today. The recommendation is suggested to be discussed with relevant stakeholders will encourage awareness of the importance of Hospital Ship, Hospital Clinic and Telemedicine for Disaster Medicine Adaptation in Coastal Region, so that climate change that changes the current coastal area in terms of medical services can be prepared.

Keywords Hospital ship · Hospital clinic · Telemedicine · Disaster medicine adaptation · Coastal region

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1 Introduction

As background to the making of Telemedicine for Mobile Hospital During Disaster, such as the following: (1) Disaster, the existence of Mobile hospital complete with Telemedicine and Clinical Decision Support System, will accelerate disaster management effort related to medical service; (2) Health care facilities will be moving easily implemented, it will be able to immediately service the movement of Mobile Hospital and supported by network of Infrared and Communication technology with telemedicine and Clinical Decision Support System; (3) The health care provider will difficult and less, with quality services and the equivalent of face-to-face; (4) The competence of personnel will be limited, the use of telemedicine will help fill this needs; in this case the implementation will be carried out: training, technical guidance, monitoring and evaluation.

The eligible subject includes the followings; (1) Innovation, related to the implementation of medical disaster management, which is needed immediately, quickly and qualified. Related to Clinical Decision Support System innovation implemented in the form of Mobile Hospital on disaster occurrence. The application of innovation is also related to the application of telemedicine in a concrete form that will be one way to improve health, especially in the area that is facing disaster. (2) Impact and outreach, very important for Indonesia and Asia Pacific associated with the Ring of Fire is easy to disaster, and the existence of a large human movement during Eid al-Fitr. The immediate impact will be on people facing disaster with medical treatment, using Mobile Hospital, Clinical Decision Support System, and Telemedicine. Reaches very broadly in large areas of Indonesia with many islands and great potential disasters as they are in the Ring of Fire, and in populations of large human movements during Eid al-Fitr. (3) Mobile hospital and its equipment will be easily replicated, because the system and components are ready. Related systems and equipment Mobile Hospital, tools, Decision Support System and Telemedicine, will be easy to apply when this product has occurred due to the technology and the existing and prepared component. In Indonesia there are at least 5 major islands such as Sumatra, Java, Kalimantan, Sulawesi and Papua, so need 25 pieces. If every provincial minimum, need 1 set then it takes 35 pieces. (4) Sustainability in Indonesia is ready because there are PNBP and BPBD which is an institution, which has staff and budget. In Indonesia, there are BNPB (National Guard on Disaster) and 35 BPBD (State Guard on Disaster), then operational execution already existing organization and budget, live in linked and socialized and trained to use effectively and efficiently. (5) Business Plan and Market Opportunity, for Indonesia it takes $\pm$100 pieces and In Asia pacific related Ring of Fire $\pm$1000 required.

Based on the above background, the objective of Telemedicine and Clinical Decision Support System for Mobile Hospitals on disasters such as the following. (1) Make Mobile Hospital with the optimum standards so easily moved or transferred at the current location of the disaster area, which support with telemedicine and Clinical Decision Support System. As Hospital Ship, Hospital Clinic or Clinical Boat as means of transportation for medical and health service tools, materials and personnel in costal and marine areas. (2) Provide support telemedicine network telemedicine network are: RSUI DEPOK (Depok Universitas Indonesia Hospital), BNPB (National Guard for Disaster Management) and BPBD (Local Guard for Disaster Management). (3) Create a pattern of service (Clinical Decision Support System Network) to do a wider range of competence and of better quality with Mobile Hospital, Hospital Supervisor and Controller. (4) To make System for Integrated Telemedicine Network [1], national, local and hospitals, the Hospital Mobile, Hospital Supervisor and controller are: RSUI DEPOK (Depok Universitas Indonesia Hospital) and BNPB (National Guard Disaster Management). (5) To make Integrated in Operational Services System using Clinical Decision Support System for getting efficiency and effectivity.

2 Methods

The concept is described as follows: (1) Mobile Hospital, a hospital with the most important services, with minimal appliance standards, which can move or be moved, supported by telemedicine, the number 1 or more; (2) Telemedicine Network, is a network that is the liaison with the use of telemedicine, so that the unity of operations, both locally and nationally, (3) Hospital Supervisor, the Hospital of class C or class B relative near to the disaster site, which is where referral and include telemedicine network. Hospital supervisor can oversee Engaged 1–10 Hospital; (4) controller, a general national control of BNPB (National Agency for Disaster alleviation) and the hospitals nationwide by the RSCM (Cipto Mangunkusumo Hospital) and RSUI (Universitas Indonesia Hospital); (5) Using Clinical Decision Support System for Operational Services to get effectivity and efficiency. Theory will be related to: (1) Medical Disaster Information System, (2) Medical Information System during Disaster, (3) Telemedicine Network [2], (4) Mobile Hospital, (5) Hospital Supervisor, (6) Control, (7) Integrated Care System, in proportionally supporting the implementation of the service. Telemedicine and Decision Support System, can be seen as Fig. 1 below.

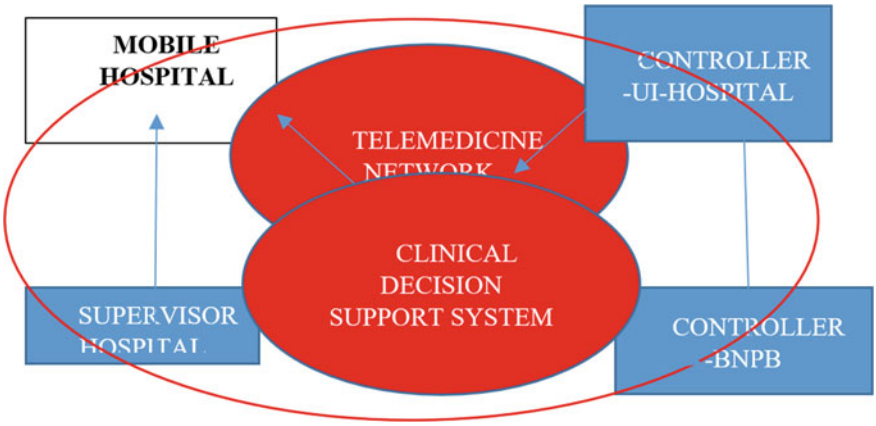

Fig. 1 Telemedicine and decision support system figure of telemedicine and mobile hospital, can be seen at: [3, 4]

Appropriate with focus areas, will be associated with the Good Health related to disaster, the overall interconnected between: (1) telemedicine, (2) Clinical Decision Support System, (3) mobile hospital, (4) disaster that effect to medical problems [5]. Telemedicine, a science related to computer networks, communications and information technology, which can assist in the implementation of medical services in remote conditions; with will be very helpful in order to service existing barriers within. Telemedicine, will be very useful in order to support medical aid during disaster that are limited in terms of distance, included in this trouble competence of experts, especially doctors. Clinical Decision Support System, is the implementation of research results that have 4 patents (2 Granted + 2 Registration) and 14 copyright (3 for Disaster, 3 for ECG, EEG and USG, 8 for Hospital Services) provide direction for the manufacture and operation of Mobile Hospital fast, easy and good quality. Mobile Hospital is a hospital that can move or be moved at certain locations that need because there are communication difficulties and the location of the land and sea.

Thus the use of a vehicle which can be moved it would be easy to service at the time of the disaster, which destroyed communication lines, to be appointed by the truck, and so on by helicopter so the hospital will be ready to use. At the time of the disaster who need medical services, the hospital facilities and communication network not enough, it needs the health personnel especially doctors, telemedicine systems will help: bring experts for consultation, monitoring and through mentoring medical treatment from the hospital supervisor to be a part of hospital delivery system: (1) Clinical Decision Support system; is a software for medical services in hospitals; (2) Telemedicine; will be combined as a network of information systems and service networks in disaster situations that address the medical and health problems of affected people; (3) It will be a mobile hospital that can be used with, fast, easy and quality.

3 Result

Border impacts, which will arise in the field: Medical Services during a disaster, medical information system and telemedicine, Mobile Hospital for times of disaster, such as the following.

1) Medical Services on During Disaster, require specification specifically: (a) more on emergency services, (b) with limited facilities and personnel, (c) requires a high speed, thus will provide fast service, and meet the minimum quality:
2) Systems Medical Information, such as medical records, medical consultation, up to supervision and mentoring therapy is often a big problem, because of the limitations of the communication, the use of telemedicine will be a solution that provides support for a fast, easy and can be done according to the existing conditions:
3) Mobile Hospital, is required because of limited transport, and difficulties in the field, then the model of the mobile hospital would be a practical way out and ready to use at any time, so as to facilitate the planning and implementation:
4) Lack of competence in the case of referral, to service in the field will be difficult to obtain physical, takes time and effort that is difficult, then their telemedicine [6], for: consultation, monitoring through mentoring therapy can be done, as a general surgeon can be mentored in surgery orthopedic difficult, with the presence of doctors in the orthopedic Hospital Supervisor.

In a wider scale will give more directives: (a) Planning a clearer, services, facilities and personnel of medical services during a disaster, (b) Provide the reference guide that can be prepared Standard Operating Procedures use of telemedicine in the mobile hospital, (c) Provide direction for staff training who are ready to work on the use of telemedicine in the mobile hospital, (d) Develop coordination and control patterns between BNPB and BPBDs, Hospital Controller with Supervisor Hospital. Referrals will be a floating models that will be useful for Indonesia and other countries in the world, because of the disaster that requires medical services is currently a lot going on.

4 Discussion

4.1 Sustainability

Sustainability will be done in two types as follows: (1) Decision Support System and Telemedicine Network and Mobile Hospital and medical services during disaster as a model, will be submitted to the BNPB [7], so that will be used for services. Otherwise it will become a model to be made more numerous; with will provide continuity of development with a more extensive, sophisticated and appropriate to the needs of the disaster area. (2) Models created can now be used as a training center for: (a) Personnel associated with medical services during disaster, (b) Training of personnel working on the mobile hospital, (c) Personnel who operate telemedicine,

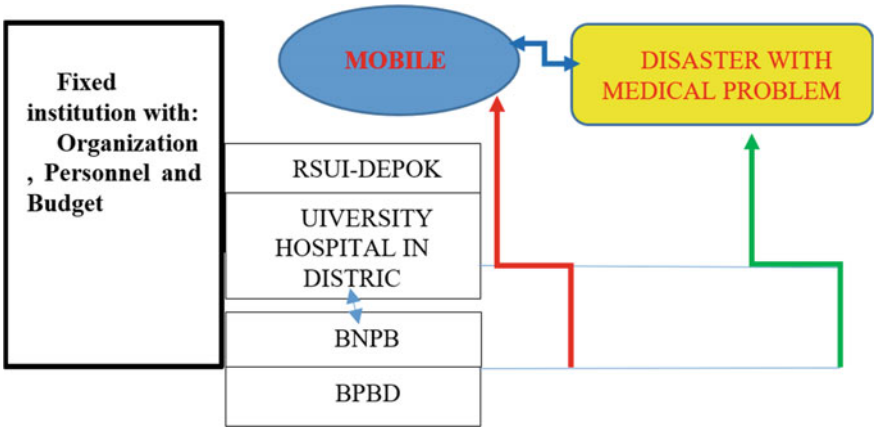

Fig. 2 Sustainability program

(d) Controller in BNPB and BPBDs, RSUI [8] and other Supervisor Hospital. Both of the above will be the center of national development and training ready to develop an international scale (Fig. 2).

4.2 Innovative Approached

Innovative approached, held on four main topics, namely: (1) Making telemedicine system during disaster, is the development of telemedicine that are tailored to the specific needs during disasters, a new application made by design and scientific stage, (2) Clinical Decision Support System, to support service management and resource management for operational daily, (3) Preparation for a mobile hospital during a disaster, a scientific approached which is action research, to create a mobile hospital that is suitable for the time of the disaster who need medical services, will generate the appropriate model, associated layout, appliance and matching telemedicine network, (4) Networking System [9] of controller in Telemedicine between PNBP and BPBDs, RSCM with Supervisor Hospital, which is a scientific study and applied that blends theory with application, resulting in effective and efficient systems, which will be new to the system of control of medical services at the time of disaster require medical care [10, 11].

5 Conclusion

This study highlights the significance of medical equipment, medical support, drugs and operational procedures for both normal and disaster situations. It also suggests

doctors and other officers in accordance with the required profession, with special training for disasters, an integrated information system and telemedicine system using voice recognition in times of disaster, supported by trained equipment and personnel. The study recommends a proposal with some plan framework to be discussed with relevant stakeholders will encourage awareness of the importance of Hospital Ship, Hospital Clinic and Telemedicine for Disaster Medicine Adaptation in Coastal Region, so that climate change that changes the current coastal area in terms of medical services can be prepared. This finding could be used for scenario of strategizing disaster medicine adaptation at coastal region especially in Indonesia context.

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