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On Creating a Dedicated and Structured Transport System for Harvested Organs and Serious Patients in Indian Conditions in Immediate Future.

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ABSTRACT

The problem of existing traffic system in India is analyzed from the viewpoint of emergency shifting of organs harvested from brain dead donors. Also discussed is the possibility of increasing the speed of transfer of seriously injured patients.

Keywords: dedicated and structured transport, harvested organ.

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INTRODUCTION

Cadaveric organ transplant is the lone way out in certain diseases like dilated cardiomyopathy of heart, chronic renal failure and total liver failure. It is also the biological method of skeletal reconstruction after bone tumor resection. Advances have been happening to retrieve different types of organs that can be harvested from a brain dead donor. Such methods may have resistance in countries in which brain death laws are not in force. Even in countries in which brain death laws are in force ,there are instances where insufficient circulation at the instance the donor operations were begun and cardiac arrest occurred just as the donors were being brought into the operating room [1]. In 1994, Transplantation of Human Organ (THO) Act' legislation was passed by the Indian Parliament causing a potential to start multi-organ transplant activity from brain dead donors. The essential ingredients for a successful cadaver program are

1) Optimistic attitude of community towards organ donation, 2) Successful brain death identification and certification, in the event of brain death, 3) Consent by relatives of the patient for organ donation and 4) Adequate hospital infra-structural and support logistics, successful retrieval and transplantation of organs and reviewing long term graft outcomes are also essential [2]. The organ donors in these circumstances are road accident victims or young individuals who are brain dead due to fall or head injury. In all these situations there is the need for quick and comfortable un-panicky transfer of the organs to the potential and waiting recipients. This means one has to have a previously organized mechanism in place to transport the donor to the site or organ harvesting and transplant.

A swift mechanism is also needed to transport vascular injury patients or spinal injured patients. In organ harvesting and transplant, the time is important because, tissue perfusion is vital. Similarly vascular injured should be transported quickly without any hindrance. Also in transporting spinal injured care should be taken to avoid second injury. This paper is about organizing a good transport system to channelize the transfers of needy patients for treatment and brain dead patients for harvesting or harvested organs for transplanting or producing organized medical effort in Indian conditions which is the main part of the support logistics part of the preconditions.

The Problem

The time required to harvest multiple organs is 30 to 60 minutes [3]. The way in which the organs are removed with multiple graft procurement defines an explicit priority list of heart, liver and kidneys in that order. The heart must function immediately and the liver within a few hours, whereas immediate function of renal grafts is not a prerequisite for recipient survival [3] In general, when the above types of patients or organs need to be transported from one centre to another where they are fitted to waiting patients. These patients already have lot of co-morbid conditions caused by the organ failure or co-morbid conditions itself causing the original organ failure. These waiting cases would have started to have the surgery to transplant the organ which is on the way and usually are halfway in a transplant surgery. Obviously the anesthesia time is a factor which should be minimized in these already compromised patients. In a current situation in India, the transport control has to stop routine commuters including senior citizens children to allow the vehicle with the organ to move faster on road. The current procedure is to communicate to all the traffic police through control rooms and stop other vehicles and allow vehicles transporting the above patients or organs. The factors that will affect this are many. Similar is the need to smoothly transfer the vascular injury patients or spinal injured patients within the golden period of one hour.

Problems include the roads of India which a study points to the already existing problem to be addressed in preventing accidents on road. Indian road network (road density is 1.25 km/sqkm) has improved in the last few decades. It is more than China (0.36 km/sqkm)or Brazil (0.20 km/sqkm) . Still a huge segment in total rural road network is still only has kutcha roads which during rainy season become dangerous. Since physical structure of the country varies, there is the need for greater surfaced road connectivity [4]. Coming to the traffic density, there is a startling 197 times increase in vehicle numbers in the Indian subcontinent from 1951 to 2002 and most of these (71%) are two wheelers. This increased and heterogeneous traffic pattern in Indian subcontinent are accountable for repeated accidents [5] State government like Tamilnadu is moving ahead and is the leader in health facilities in the country. This is especially with government set ups reaching out to poor and needy doing a host of treatment methods including free joint replacement surgeries and cardiac surgeries for all patients. There cannot be a sudden improvement is existing poor road facilities

overnight. Apart from allotting funds to build roads ,the problems of acquiring lands from public can also be a factor. While the need in the near future is to avoid the traffic and also address the problem of safe quick shifting of organs and patients.

Suggested methods

In order to immediately tide over the crisis of transport efficiency, helicopters could be bought by the government and it could be used for transporting the above mentioned categories of patients. Heliport with procurement of a helicopter for transport cadaveric organs for transplants, spinal injury, vascular injury victims. A heliport to be constructed preferably on the building to directly receive the transported patients or organs. Adequate number of helicopters needs to be purchased for this endeavor. . Permission from the local aviation authority needs to be obtained. Enough aerial space must be made available for a helicopter to land at heliport and take-off at different angles in top of the referral hospital building. If there is a concern about safety separate heliport can be constructed in the adjacent area with facilities of landing at ground level and taking off from ground level.

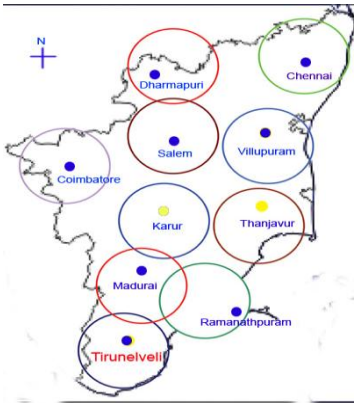

Figure 1: Map of Tamilnadu with 10 designated regions with separate teams of helicopters and a tertiary care centre

The map of Tamilnadu is shown in the figure 1. There can be 10 regions marked in circular areas with the main referral centres in these regions as nodes named and denoted as points. All these points are endowed with tertiary medical care centre's viz medical colleges. Thus these centers can easily be equipped well with organ harvesting and multispecialty organ transplant surgery units. Thus people from entire Tamilnadu will be benefitted for the donated organs and quick care for major injuries like vascular and spinal injuries.

Helicopter service is available to start with in all these ten nodes in Tamilnadu. The corresponding district administration and the medical fraternity in these nodes need to be updated and advertised regarding the flying ambulance facility. These nodes (referral centres) can connect to the local ambulance service in their area marked as circles around them. In case of emergency extrications the ambulance services can call the helicopter service from the central nodes. The patients are picked up and brought within 20 minutes to referral centre for example in places around Thanjavur medical college to Thanjavur medical college .This is well within the golden period of emergency heath attention and care for all practical purposes. Good co ordination and proper planning is needed for the transport of the injured individual from the site of accident. This should be carefully done and needs efficient transport of the patient. From the public side, awareness is essential. To achieve this an structured public awareness programme must be done by news paper advertisements, in all the television channels regarding this facilities. eg regarding the organized transport system which is available . They should know about this and the nature of 24 hour availability of an air ambulance. A well communicating network of ambulances should be accessible to shift the patient to the designated area to be shifted. The public must be given basic first aid instructions especially on resuscitation. A good and effective communication system must be established like wireless and cell phones to bring patients to hospital. Proper equipment of nodes with advanced imaging and resuscitation in lowest floor, operation theatres in first floor, intensive care units in the second floor and regular wards for stable patients are arranged preferably in the third floor. (Figure 2) Further details of the tertiary care centre are not in the scope of this paper.

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DISCUSSION

For Multiple Organ Harvesting and Networking, not only the infra-structure of the hospital along with the support logistics is vital. According to a report there are 35 hospitals with intensivists and enough health care facilities and qualified medical and para-medical staff to begin a cadaver transplant program. There were about 12 organizations in the country working to promote and help out with the cause of organ donation but only three were actively involved and worked as a central co-coordinating agency for allocation and distribution of organs [2]. The vastness of the country and types of roads presently available with diverse vehicles present the real difficulty in achieving a quick transport, according to Gururaj et al [5]. Also there has been a lot of concern over the need to advance the public sector hospitals [6]. The rapidity of transport is crucial in organ harvesting and re-implantations also in patients with brain and spinal and vascular injuries. Stopping at signals will defeat the purpose of such a mission. Arranging a clean passage without difficulty to other commuters is vital. A poorly controlled traffic can spoil the effort to save a life. In the lines of the methods suggested in this paper suitable regions can be made out for the entire country and effective transport can be achieved for health care needs.

The paper concludes that dividing each state into fixed zones with a referral hospital and initial procurement of a helicopter with construction heliport in that referral hospital is the first step of an effective transport of the harvested organs. Further the referral hospital can be planned in a concerted manner to allow for all basic clinical departments and specialties and super specialties in one area.

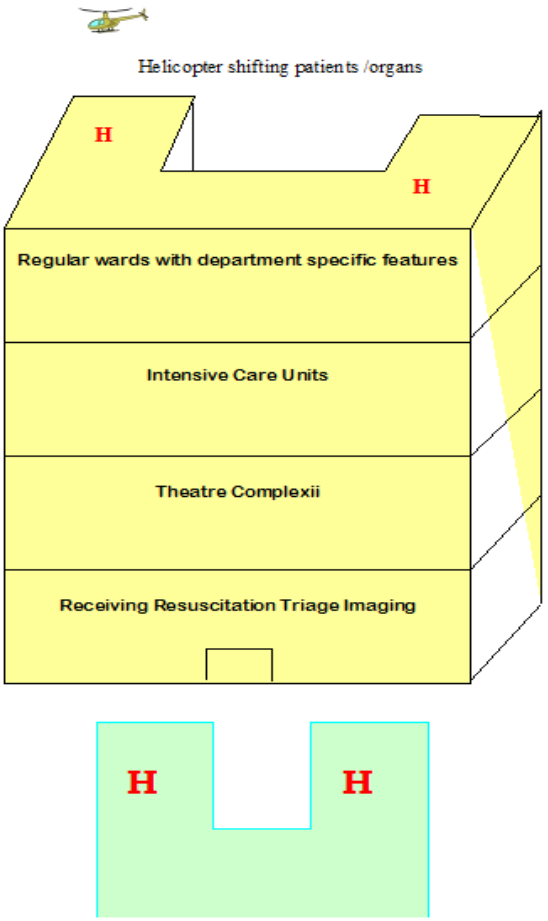

Figure 2: The model of the proposed hospital building to receive the harvested oragans and patients transported by the heli- ambulance.

Shown below is the helipad seen from the top of the building.

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