THE DIFFICULTY IN EFFECTIVELY MANAGING THE ORGAN DONATION PROCESS

3E10 Coursework

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"Each potential organ donor overlooked by the system represents a personal tragedy for somebody"[1]. Organ donation can be looked at from an operations management point of view in the simplest form of a problem of balancing supply and demand. It is important to examine the process through some key objectives, both internal and external such as quality, speed, and flexibility. It is very difficult to manage the donation process efficiently due to shortcomings in the information flow within systems, but predominantly for the key reason that if the entire process were to be summarised as a supply chain, Demand for organs greatly outweighs the Supply available. There are some improvements that can be made to the process to make it more efficient, but in many cases other issues such as ethics and family intervention reduces the effectiveness of the current system.

From an Operations Management perspective one of the key internal performance objectives that should be satisfied is the full use of resources at hand. The current system is not performing at its full capability. "Specialist teams tasked with maximising the organs available are still not automatically notified when a potential donor reaches intensive care". This signifies an issue with the internal information flow structure which could easily be resolved at some minor expense. It was also found that most hospitals "do not yet have a sytem to identify potential donors in accident and emergency units." This is a very important example of underuse of resources as the system considers only the intensive care part of hospitals and not other parts of the hospitals where other potential donors could have been found. Technology can also be used to optimise the organ donation process as in some hospitals, "a fast-track system used to alert hospitals to the availability of donor organs has been relying on [unnoticed] faxes". By improving the way information flows in the hospital the number of potential donors increases.

The external performance objectives should also be achieved. Quality of organs is one of the issues that make this a difficult problem. An organ recipient is at risk from disease from the donor organ, or is equally at risk from his or her body rejecting the incoming organ. The risk of rejection is due to many factors including the age of the donor and the type of death (in the case of a deceased donor). "An average-risk recipient of a liver transplant will have a twenty percent risk of graft failure with a high-quality organ, and a forty-percent risk of graft failure with a low-quality organ."[2] In most cases re-transplantation is not possible so organ rejection can be fatal. However many organs can come from one donor and this is often overlooked in the process. For example, the heart and lungs of an old person who is on the donor list may not be in prime condition, whereas their kidneys may be.

An important objective is flexibility of the hospitals. "The number of hospitals equipped to respond is too small. There is an acute shortage of beds across NHS hospitals"[3]. In the current system, the intensive care unit of the hospital is the focus

of the process as it is here that potential donors are determined. However although this makes it easier to allocate specialist care to one section of the overall process for procurement of donors, it can be improved. If a patient is admitted into the hospital through a different pathway, for example through Accident and Emergency, then he or she is not likely to be considered a potential donor and notified to the organ donation team. This is partly due to the compartmentalisation of different groups within a hospital, as each 'department' is busy with its own duties. Once again here the use of technology could be implemented to automatically check whether an admitted patient is a potential donor or not.

Speed is also an important issue in the process of an organ transplant. As organs are effectively perishable goods, they must be delivered quickly from the donor to the patient. This imposes an additional distance constraint on the waiting lists. A donor who is the prefect match for a patient may be ready for operating on, however if the donor lives in Scotland whilst the patient is in the south of England this transplant is very unlikely to occur. Even if the organ could be moved quickly between hospitals, this would require extra cost for transport, logistics and cool storage to be taken into account which is difficult due to the budgets held by the NHS trusts. The NHS is composed of numerous Trusts which work best for their own surrounding region, and liasing with other trusts across the country would generate additional paperwork and take up more of the Trust's resources.

In terms of Inventory management, a key point is that demand is much larger than supply so there is never enough inventory stock to allow as a buffer against uncertainty of demand as is the case for commodities. Storage of organs is also expensive due to the equipment needed. As technology improves the "shelf life" of organs can be increased, relieving some of the pressure on the transplant process. This could be shown by an increase in an outward shift on the performance frontier of this process. The inflow of new organs can be modelled as fixed order quantities - the time between "orders" varies due to the uncertainty of the next suitable donor, but the order quantity remains constant. It is necessary to consider which other organs can be used when a deceased donor is found. The Economic order quantity (the quantity that minimises total cost) would be if many organs could be used from the same donor at once. Due to the varying demand for different organs this is difficult to always achieve.

Scheduling is an important aspect of Operations Management and deals with the allocation of resources to tasks.
To take the example of kidney transplants, patients can be treated with dialysis for many years, even whilst still on the waiting list for donors. This can be thought of as a queueing system from a management point of view.

The question that needs to be asked is how to allocate resources (in this case organs) efficiently. Whether the organs be given to patients on a first-come first-served basis with regards to the national waiting list, or younger patients are prioritised over older patients to receive organs. A large part here is played by ethics, as many times "some potential donations will be blocked by grieving families, even if their deceased relative carries a donor card"[4]. To answer the allocation question would ideally need consideration of many other factors such as the patient's potential contribution to society in general, any past convictions and other salient features differentiating that patient from the others. However to discuss this is a very objective approach and cannot be used to judge whether a person is "more worthy" of a transplant.
It is also not possible to accurately forecast when the next suitable donor will die. From an operations management point of view this makes the organ donation process very difficult to manage.

One way to reduce the difficulties encountered in organ donation is to tackle the main problem - the lack of donors. Many ways have been suggested[5] including spending government money on advertising for potential donors, or devoting a specialised committee in each NHS trust tasked with managing the process. However the most effective strategy seems to be changing the law to make organ donation an opt-out process as is the case in many European countries. In the United Kingdom currently organ donation consent is in the form of an opt-in system. This is one of the primary reasons for the low numbers of donors as most of the population will choose the default option of doing nothing. The differences between the two systems are clear to see. "For example Germany which uses an opt-in system has an organ donation consent rate of 12% among its population while Austria, a country with a very similar culture and economic development but which uses an opt-out system has a consent rate of 99.98%."[6]

In conclusion organ donation is a complex process which although shares many elements with a supply and demand process, cannot be investigated purely from an operations management perspective. The biggest problem is that of lack of supply in the form of suitable donors, outweighed by an overwhelmingly large demand for transplants and organs. This problem is exacerbated by the inefficient flow of information in hospitals represented by the hospitals' operating well inside their performance frontiers. The process could greatly by improved by the use of improved technology combined with a greater drive to encourage people to donate organs. The latter could be made possible by legislative changes to an opt-out system.

[1] Barrow, (2012). The Times p6 - "Organ donor target out of reach with NHS in turmoil".

[2] Volk, (2014). "*Organ quality as a complicating factor in proposed systems of inducements for organ donation.*"
[3] Barrow, (2012). The Times p6 - "Organ donor target out of reach with NHS in turmoil".
[4] Barrow, (2012). *The times front page - "Patients die waiting for organs that go to waste."*
[5] http://www.nhsbt.nhs.uk/to2020/resources/nhsbt˙organ˙donor˙strategy˙summary.pdf
[6] Thaler, RH. (2009). "Opting in vs. Opting Out."