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Despite the many technological advances in Medicine, for many, a trip to the doctor still entails inconvenience and anxiety. Long queues, multiple phone calls, limited information on costs, uncertainty over the quality of care, the list goes on. While the science of Medicine has made quantum leaps in progress over the last 100 years, processes for delivering healthcare certainly have not seen the same development.

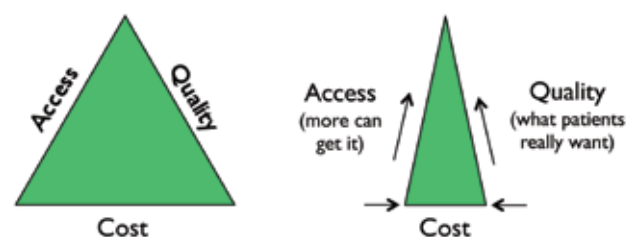
Let's start with the question, "What do patients really want?" Patients certainly do not aspire to come to hospitals to enjoy the nice sofas in the waiting rooms, large LCD TVs playing Mr Bean reruns, nor filling up forms after forms that hospitals consider "necessary". What patients really want is simply: **diagnosis and treatment, without mistakes, and without delays** (Figure 1)! That can be defined as of value to patients. That which is not, can be considered as waste.

Figure 1: what patients really want



In 1994, Dr William Kissick of Yale University introduced the concept of the "iron triangle of healthcare" (Figure 2).¹ The iron triangle depicts the relationship between cost, access, and quality, generally to indicate trade-offs in the healthcare system. For instance, increasing quality or increasing access means increasing costs. Is it possible to break the iron triangle – that is, to increase quality and access while decreasing costs?

Figure 2: the iron triangle of healthcare



Breaking the iron triangle is possible, through good leadership that applies right principles in designing healthcare operating processes at the delivery level. In fact, one could argue it is the job of every healthcare manager to break the iron triangle. To do so, they must eliminate problems in healthcare operations.

There are four big mistakes still prevalent in healthcare operations worldwide. These are:

1. Not seeing value versus waste;
2. Discontinuous flow;
3. Organising work in traditional departments; and
4. Wrong infrastructure design.

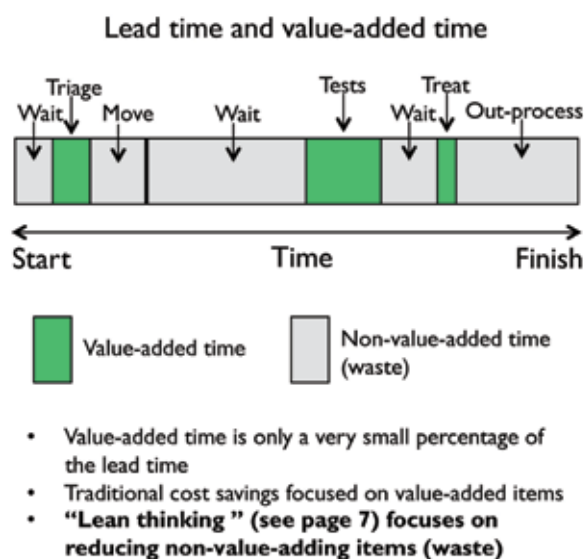
Mistake 1: not seeing value versus waste

Simply put, value is anything that *patients really want*. We have suggested what this is earlier. A lens for which we can define if a process step is of value is to simply ask, "Would a patient be willing to use their own money to pay for it?" If the answer is yes, then the process step is of value, if not it is waste.

The first, and possibly biggest, mistake in the design of traditional healthcare processes is not seeing what value is versus waste. This leads to the wrong focus when improvement efforts are made. For example, in a typical

clinic encounter, we know that the parts of value include seeing the doctor (diagnosis and advice) and collecting medications from the pharmacist (treatment). Most other parts such as filling out forms, waiting, walking from one place to another, answering the same questions again and again, are waste. In Figure 3, note that value-added time is a small proportion of the entire process (lead time). Some managers erroneously believe that to increase productivity, consults should be made shorter and shorter so that more patients can be seen per clinic session. This is a wrong approach because it is actually reducing value. Instead, we should redirect solutions to reducing waste, or non-value-added time.

Figure 3: recognising what adds value in lead time



The concept of waste is not limited to only time. “DOWNTIME” is a useful mnemonic to identify common instances of waste in healthcare (Figure 4).

Figure 4: the mnemonic DOWNTIME and examples of waste in healthcare

- **D**efects and rework: repeating blood tests due to mislabelling
- **O**verproduction: doing X-rays every day at the intensive care unit
- **W**aiting: doctors waiting for mobile X-rays at the operating theatres
- **N**ot using staff talents: supervisors giving solutions and not leveraging on creativity of staff, letting staff resources idle

- **T**ransportation: patients moving between locations that are far from each other for different services in one visit
- **I**nventory: patients waiting or queuing, and stocking of inadequate supplies
- **M**otion: doctors walking back and forth to type on computers, and nurses looking for case notes
- **E**xcessive processing: asking patients repeatedly for same information

Mistake 2: discontinuous flow

The objective in healthcare operations should be to enable value (diagnosis, treatment and advice) to flow continuously to patients (without delays and mistakes). There are several common reasons why we make the mistake of not allowing this to happen.

One common reason is “batching”. Batching is a time management technique where similar tasks are done in groups with the premise that it increases efficiency and productivity. For example, a laboratory manager who waits for 20 laboratory tests specimens of the same type to accumulate before doing one run of the test is doing a batch of 20. The more managers of individual departments batch their work, the more “efficient” they may seem. However, optimising each part of a system in such a fashion actually makes it worse for the system whole. Let’s take a look at a typical process of discharging patients in a large, tertiary teaching hospital. We know that even if the doctor in charge gives a discharge order for a patient to be discharged at 8 am, the patient often waits till past 12 pm to actually be discharged from hospital. Why does it take so long?

Doctors batch their discharge orders during the ward rounds and only start writing up discharge orders for patients who need to be discharged after the ward round (which may take two hours). Likewise, the porter may batch the prescriptions that need to be sent down from the wards to the pharmacy. In a batch of 30 prescriptions, this really means that the first prescription written by the doctor will arrive at the pharmacy at the same time as the 30th prescription! Meanwhile, the pharmacy has no work till they are suddenly hit by an avalanche of prescriptions in the late morning, which exceeds their processing capability. Thus, while batching seemingly makes the most efficient use of the time of individual staff or each department, it creates huge bottlenecks and long waits further down in the system.

The other common reason for discontinuous flow is when a particular process step takes longer to perform

(cycle time) than the interval between patients arriving (takt time). Suppose the time taken for each patient's consultation with the doctor at a particular clinic takes 20 minutes each (cycle time). But say this same clinic has one patient arriving every ten minutes exactly (takt time). The first patient would not wait at all. The second patient arriving would wait for ten minutes to see the doctor. The third patient would wait for 20 minutes, the fourth patient would wait for 30 minutes, and so on. While this is somewhat an oversimplification, it is illustrative of the huge snowball effect which occurs when cycle time exceeds takt time, resulting in subsequent patients waiting longer and longer for their consultation. One would then react and say: of course, the solution is to simply have more doctors. In reality though, the "20 minutes" of consultation may well contain ten minutes of wasted time, such as the doctor waiting for the right case notes to arrive, looking for forms, calling for a translator, wrangling ink out of a ballpoint pen and rebooting the computer that just hung on him!

The solution therefore is to look for the waste in the process and remove them, thereby bringing cycle time much closer, or equal to takt time. If so, then patients would be able to get the value they want (diagnosis, treatment and advice) without delays.

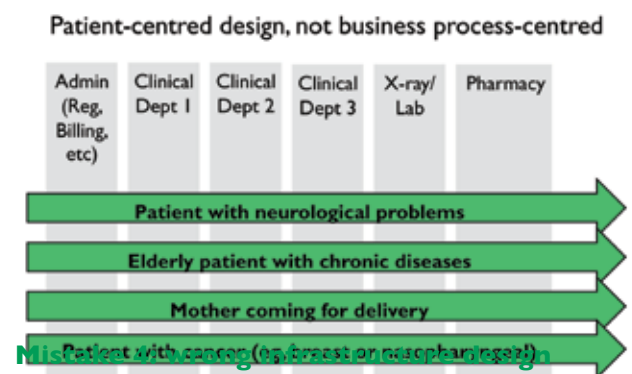
Mistake 3: organising work by traditional departments

The traditional way of organising work in hospitals is by the departments classified by body parts such as "Neurology", "Respiratory" and "Cardiology", and supporting departments such as "Billing", "Pharmacy", "Radiology" and so on. As a result, patients have to navigate a labyrinth at each hospital visit, making the process long and confusing from their viewpoint. Worse, individual department managers are as a result incentivised to optimise at a departmental level. This is usually not the same as optimising the process end to end for the patient. For example, behaviours such as batching at the department level would occur. It is common to see patients having to

register, wait, get a service done, pay and then repeat the entire cycle at the next service stop located, of course, in another department. This way of organisation means a higher chance of misinformation and discoordination from the patients' perspective.

The solution is for work and staff to be organised by common patient conditions. The patient-centred approach, illustrated in Figure 5, is increasingly being used in medical centres worldwide. Hospitals now have multidisciplinary teams for groups of patients, instead of having patients go to multiple providers during each hospital visit.

Figure 5: the patient-centred approach



The traditional hospital's physical layout is similarly based on the "centralised" model. For example, it is quite common for the Radiology department to be one large centralised unit in the basement. It would house all of the hospital's radiological equipment and services. Likewise, in the traditional hospital layout, large centralised pharmacies with ten to 20 queue counters are a common sight. Such a layout makes a hospital look very busy. Many patients are seen scuttling from one point to another; waiting for lifts to bring them up and down. Hallways are crowded with wheelchairs going back and forth, and multiple large waiting areas are created.

But if we think about it, all this is pure waste. There is no value in patients having to move distances from one centralised department to another just to get the entire service they need. This is a mistake and can easily be avoided. For example, instead of a centralised Radiology unit in the hospital basement, each large outpatient clinic in a hospital could have its own X-ray room. This would save patients the obligatory expedition to the basement each time they need an X-ray. Similarly, instead of a large central pharmacy, each clinic should have a small pharmacy which stocks the common drugs required by patients of that particular clinic.

Applying "lean thinking" in healthcare

The four mistakes mentioned above can be overcome through applying a set of principles in process design broadly called "lean thinking" that enables value to be delivered with the least amount of waste. Lean principles are derived from the Japanese manufacturing industry. The term was first coined by John Krafcik in his 1988 article, "Triumph of the Lean Production System";² based on his master's thesis at the Sloan School of Management, Massachusetts Institute of Technology (MIT). Krafcik had been a quality engineer in the Toyota-General Motors joint venture in California, known as New United Motor Manufacturing, Inc, before he went to MIT for his MBA studies. It is tempting to point out that Medicine is very different from manufacturing, and as such, the same principles do not apply in healthcare. But there is already widespread evidence that in fact the same principles do apply. Flinders Medical Centre in Adelaide, Australia uses lean thinking for its Redesigning Care Program, which focuses

on time-urgent complex care, resulting in a safer and more accessible care.³ In Sweden, the use of an Integrated Care Pathway for acute hip fractures has been shown to reduce the number of days for hospital stays by half.⁴

In summary, it is possible to deliver more value to patients with less effort and resources, by eliminating waste. It is possible to break the iron triangle. We just need to avoid these four common mistakes (and some others) by putting on new lenses that help us see value versus waste, and adopt process engineering principles that apply, even to healthcare. **SMA**

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