Applying Six Sigma concepts by understanding, meeting and exceeding patients' needs and expectations, healthcare organizations can improve patient outcomes, and at the same time can remain competitive by cutting costs and improving quality. Six Sigma is relatively new to the healthcare industry so there are more opportunities that can be explored. Patients or prospective patients could be used as team members on Six Sigma projects. An outside perspective can also be beneficial in determining what patients want and do not want. For example, some Six Sigma projects may look into minimizing patient length of stay in hospitals after a certain procedure. Most patients want to go home as soon as possible; however some patients might not be able to take care of themselves or might be in too critical of a condition to risk leaving the hospital. This is where a patient representative on a Six Sigma team could be beneficial. Six Sigma may also be applied to the triage process in emergency rooms. Patients may be interviewed when they arrive at the emergency room to determine the extent of their illness and their priority to see a doctor. This process could be streamlined by the use of Six Sigma so that critically ill patients can quickly see a doctor and not get stuck in the triage process.

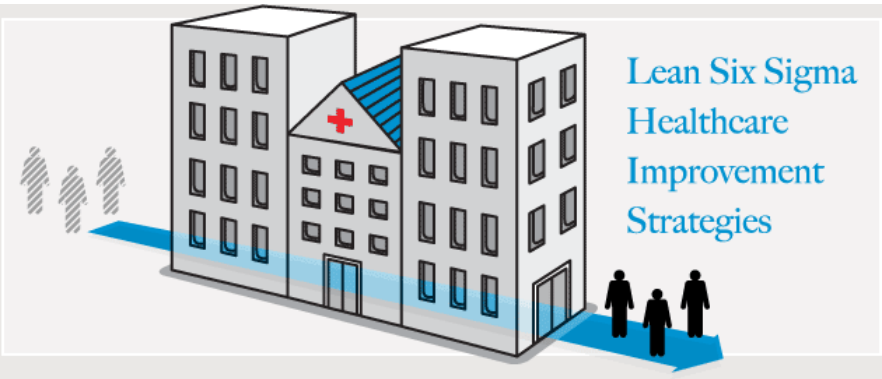
Six Sigma can also be used to decrease the time patients spend in the emergency room by getting patients admitted to hospital rooms or discharged quicker. Patient rooms are more comfortable than the emergency room and it is also very expensive to stay in the emergency room. Also, this could allow emergency rooms to treat more patients. Hospital laboratories are another area of healthcare that could benefit from Six Sigma.

Lean Six Sigma is an industrial managerial system that aims to eliminate process waste in the forms of transportation, inventory, motion, waiting, overproduction, over-processing and defects. Healthcare applications have opened new fields for graduates in systems engineering and nursing who become proficient in applying the system. There are a lot of opportunities for Lean Six Sigma in the service industries, and healthcare is a very big service industry. Using the six sigma system you can show them how to be more efficient while they treat that patient.

Laboratory turnaround times can be lengthy and the workload could be sporadic rather than constant. Six Sigma can be used to help manage these issues by optimizing resources. Laboratory procedures can also be investigated to ensure that unnecessary steps are minimized while still obtaining the desired results.

Six Sigma can also be used to optimize the scheduling of time for the testing equipment such as MRI machines and the resources to operate these equipment. Also, scheduling can be done in such a way those patients most in need of the services can be scheduled giving higher priority The Six Sigma approach can also be used for designing new hospital facilities and also remodelling existing ones.

The flow of patients should be considered for facility planning and layout of operating rooms, laboratories, and waiting rooms, considering factors such as convenient locations for the patients, doctors and visitors. A patient voice of customer study may be done so the décor and layout of patient rooms are comforting and pleasing to patients while remaining functional for doctors and nurses. Operating room layouts may also be optimized for surgical procedures. Thus, Six Sigma approach to quality and productivity improvement can be successfully used in health care industry similar to the ways Six Sigma approach is being used successfully in manufacturing industries.



The challenge for health care industry to benefit from the use of Six Sigma is paramount. Patient care significantly involves human element as compared to machine elements, in which the variability is subtle and very difficult to quantify. Therefore, challenge in adopting Six Sigma approach to healthcare is to find a way to leverage the data from Six Sigma to drive human behaviour. Success will come only when the Six Sigma technical strategy is combined with a cultural strategy for change acceleration and a sound operational mechanism.

There are usually four metrics (indicators) that can be used by singly or in combination to define level of performance of a healthcare organization. These metrics are **service level, service cost, customer satisfaction, and clinical excellence**. While these metrics are applicable in healthcare organizations, they are also very difficult to apply in a health care setting. Despite the challenges in using Six Sigma in the healthcare industry, many hospitals within the healthcare industry is beginning to use Six Sigma approach to improve patients' satisfaction.

Improving patient satisfaction in health care

In healthcare organizations, patients may be considered as customers. Keeping patients satisfied are considered as a top priority by many healthcare organizations The traditional concept, that people need healthcare and will continue to use the same health care providers out of necessity, even if they are not happy with their services

they receive, has been changing rapidly. A patient can now access more information on healthcare providers and can make more informed choices about their treatment. Quality is now playing a more important role as patients have started choosing healthcare providers based on quality of care and their level of satisfaction with the organization from their previous experiences At the same time many hospital administrators have already started using the views and perceptions of their patients to organize their service and staff and for continuous improvement in the overall organizational performance.

Normally there are three approaches to improve patient satisfaction in the healthcare industry. They are measuring the patient's perspective, improving patient outcomes and using Six Sigma approach. Regardless of which approach or approaches are used, support of senior level management is critical to the success of such programs.

Measuring the patient's perspective

It is important to measure patient's perspective to the health care services. The services that patients receive is intangible, can't be physically viewed or touched like a manufactured product. There are three ways to measure patient perspective.

- First method is to determine patients' preferences. This method involves qualitative measures, such as focus group, interviews, and surveys, to determine patients' desires and expectations about various health care services.
- The second method is patient's evaluation of the services they received This method involves a questionnaire survey given to patients after they have received healthcare services to measure their level of satisfaction to the services received.
- The final method is to measure patient's perspective through reports of objective observations from the patient, such as how many times they were seen by a doctor during their stay in a hospital or how long they waited in the waiting room for seeing a doctor etc.

All three of these methods can provide valuable insight into patients' expectations of healthcare and their evaluations of services received. Patient views can be used to improve quality and gain business for healthcare organizations.

Improving patient outcomes

Improving patient outcomes can also increase patient satisfaction. One example is by a community based approach to improve patient outcomes. In this community, five competing hospitals worked together to determine the best way to treat certain illnesses. The theory is that if many people work together, a better solution can be found than if one hospital works alone.

Six Sigma health care success stories.

The following success stories of Six Sigma implementations.

Six Sigma at Mount Caramel Health System at Columbus, Six Sigma at Mount Caramel Health System in Columbus. In the spring of 2000, Mount Carmel Health System, a three hospital system in Columbus, Ohio with 7300 employees and a medical staff of 1200 physicians was experiencing significant financial challenges and began implementing Six Sigma with a two day training session for senior management to gain their support. Next, a new role was established in the organization, Vice President for Six Sigma. Six Sigma champions were selected from the senior management team to be trained to identify and oversee Six Sigma projects.

A cross functional Six Sigma core team was established to manage issues such as training, communication, and compensation for Six Sigma in the Mount Caramel Health System. After the Six Sigma infrastructure was in place, 44 black belts and 4 brown belts went through four weeks of training on Six Sigma methodology. The black belts worked on Six Sigma projects full time while the brown belts assist as needed. All functions within the Mount Caramel Health System are expected to use Six Sigma to solve problems that decrease financial performance and act as a source of patient, employee, and physician dissatisfaction.

The first year, Six Sigma projects at Mount Caramel Health System focused on projects that were the biggest operational headaches. The next year, projects focused on six key business themes: revenue enhancement, bad debt reduction, patient throughput in all operational units, labor/right staffing, labor retention and recruitment, and patient safety. To date, financial savings of $3.1 million have been realized through Six Sigma projects, with more savings expected. Also, employee and physician satisfaction has improved and is shown by improved employee retention rates. Six Sigma is now the established methodology in Mount Caramel Health System's Performance Improvement

Six Sigma at Red Cross hospital at Beverwijk, Netherlands recorded the successful implementation of Six Sigma in Red Cross Hospital at Beverwijk, Netherlands .. The Red Cross Hospital at Beverwijk is a 384 bed general with a staff of 930 and a annual budget of $70 million.It also runs a 25 bed burn care center. In 2002 the hospital admitted 11,630 patients, performed 8269 out patient treatments and received 190,218 visits to its outpatient units.

During the past four years, the .hospital invested significant resources to build a quality assurance system and in 2000 they received ISO 9002 certification. Employees of the hospital were good at solving quality problems.

Problems in project management at Red Cross Hospital included issues such as misalignment of project goals with strategic goals, lack of a process to determine project relevance, lack of a procedure for evaluating project cost effectiveness, poor project decision making, lack of ability to access potential savings of other projects, and lack of project monitoring and project comparison tools. All of these issues led to wasted time and money in project planning and execution.

Good Samaritan Health Systems in Kearney, Nebraska Lazarus, reported the successful implementation of Six Sigma in Good Samaritan Health System in Kearney, Nebraska, a 287 bed regional medical centre. To improve patient throughput in their operating room, where there were many cancelled or delayed surgeries. After reviewing data, the Good Samaritan found that most cancelled surgeries were cancelled within 48 hours of the scheduled time. This makes it difficult to schedule other surgeries in the available time. The Six Sigma project was to define the causes for the delays and cancellations, so that throughput through operating room can be improved. The hospital has been collecting cancellation data for years and is now finally able to use it. for improved scheduling and improved throughput through operating room.

Using Data to improve the Quality of life:

Big data seem to be all the rage in healthcare, but from the perspective of a frontline clinician, they miss the mark. The clinical enterprise is also the realm of small data. That's because small data are directly related to patient care. Examples of small data include:

- Missed clinic appointments
- Allergic reactions to drugs
- Operating room turnover times
- Timeliness of blood cultures for septic patients
- Correct diagnosis of AHD in teenagers

Big data can't tell you that a person was admitted to the ER twice last week, but small data can. Small data reside in hospitals, clinics, and communities. The data are stored in electronic medical records (EMR), paper charts, and pharmacy systems.

Fitness centre's, restaurants, churches, and other venues are potential sources of small data. Because small data are local, clinicians can have better access to information they need. These systems might not be optimized yet, but it's logical to assume that locally managed data should be more accurate, accessible, and timely than big data. Doctors tend to believe their own data more than data from government sources. Small data are essential for bottom-up healthcare reform, where healthcare providers and patients work together to improve quality and reduce the cost of care at the clinical level. Frontline workers need actionable data in order to improve. Ownership of the data by the doctors is vitally important. As we learned from W. Edwards Deming, organizations store knowledge in their people. It will be the constant flow of small data to these frontline clinicians that makes healthcare reform work.

Interpreting data through Lean Six Sigma provides a dashboard view to analysis of data that facilitates better systems decision making by administrators and staff. Like gauges on an auto dashboard, the Lean Six Sigma process identifies which data are important to making decisions affecting the system. The dashboard should be able to provide that data after analysis so that the administrative people could apply the concepts and us them. In industry, one of the primary areas where Lean Six Sigma is applied is lead time, which in healthcare equates to patient waiting time. "The shorter that lead time, the more responsive you are in your process,"

The challenges:

Reducing cycle time in service sectors like health is sometimes done within the company. Service based industries usually struggle with Six Sigma approach because of its intense data focus. There are three main challenges to overcome for implementing Six Sigma approach in service industries.

First, it is sometimes difficult for service industries to identify an indicator to measure the performance level of a service in their organization. It may be too quantitative to measure but should always to able to convert to something that is quantifiable like ranks and yes /no etc. Manufacturing plants can use measures such as no of defects per million parts produced. But it does not always translate in the service industries. Customer variability also needs to be considered when using Six Sigma in service industries. A service might be acceptable to one customer but viewed as sub-par by another customer. In this case a overall frequency could be a better measure than a one size fit all. A second issue to overcome in service industries is the difficulty in creating cultural changes for empowering Six Sigma leaders. The final challenge service organizations face in Six Sigma implementation is that it fails to capture the benefits of Six Sigma application immediately. Cost savings from Six Sigma projects may take time to realize, and frequently, managers give up too soon before cost savings are realized.