Cost Accrued as a Measure of Hospital Quality Improvement- Can Lean Health Make A Difference

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Cost accrued as a measure of hospital quality improvement- Can lean health make a difference.

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Introduction:

The cost of health care spending is growing consistently in the United States. After the implementation of HITECH act, it has become mandatory for the hospital to not deny the service for the patient, pushing up the costs. Adding to it is the lacking number of primary physicians- the supposed gatekeeper pushing the people to emergency services. PPACA is coming into act in 2014, with huge Medicare and Medicaid spending, whose repercussions are not known yet. Arguably the rise of health care costs in the United States in inevitable (OECD ,2009).

Implementation of production driving techniques like Lean, Six Sigma have proved to be improving the production rate in case of automobile industry. As a maverick move with the implementation of these philosophies, Virginia Mason Hospital (at Seattle) took a U-turn and transformed its losses into profits (Virginia Mason, 2009). How ever at the end of the day, hospital and manufacturing industry are two different industries. The patient care is the most important thing by de facto in a health care industry. This paper focuses on analyzing the relation between the care provided by the hospitals with the amount of health care costs incurred on the patients among two different groups of hospitals.

It has been shown that the hospitals certified with The Joint Commission showed a statistically significant improvement in the implementation of patient safety systems over the hospitals that are non accredited (Longon DR et.al 2007). According to the author several factors contribute to the strong association between the accreditation and the patient safety. Since it has become inevitable to spend huge amounts of money on health care sector, the cost of spending can be reduced by cutting down the wastes and reducing the number of steps in doing a job by implementing the lean management and six sigma principles. Assuming that the hospitals with The Joint Commission certification
implement productivity driving measures while keeping up with the patient safety, then the hospitals with The Joint Commission certification are ahead of its peers. This paper compares the cost difference on select procedures that are covered by Medicare, patient satisfaction and readmission rates of hospitals with The Joint Commission’s accreditation to the hospitals without The Joint Commission’s accreditation in the state of Michigan.

**Description:**

The United States health care system has been under scrutiny recently. Despite spending more than any contemporary developed nation, providing health care to the whole population is still a question in the United States. It is estimated that the cost incurred on the tax paying citizens of the United States accounts to over $260 billions. An astonishing 50,000 to 100000 lives are lost in the United States due to missing safety at the hospital. While a 42% of the population experienced unsafe care, a 45% of the population reported to have not been provided any kind of care, regardless of having or not having any kind of insurance. This gives us an insight of the plight of health care system currently in the United States (Bush, 2007).

Virginia Mason is a hospital located in Seattle. Up until 2001 the hospital was laden with losses. On an accidental encounter with an executive of Boeing the then president of Virginia Mason came across the lean principles for the first time and that changed the destiny of the Virginia Mason for good. After implementing the lean management principles inventory wastes have been reduced to 51%, the distances travelled by the staff were reduced to 34 miles while the distances travelled by the inventory has been reduced to 70 miles. A surge in cumulative savings of $12 million is seen and this resulted in funding of the cancer center. Over all Virginia Mason became profitable providing ample patient care at the same time (Weber, 2006).

When a management principle such as lean is implemented it becomes the work philosophy. It impregnates deeply into the personnel and imbibes the values of the institution more clearly. It becomes possible only when every one in the institution is working in the same way. After implementing the lean management philosophies in Virginia Mason it is for the same reason that the offbeat Japanese vocabulary -kaizen,
kanban, jidoka, muda, and heijunka from the Japanese vocabulary have become every day terminology. It shows how much Virginia Mason has changed itself to Toyota Production System in terms of productivity (Weber, 2006).

With the increase in productivity, Virginia Mason also decreased the costs of overall health care. The idea of lean management philosophy is not to decrease the spending, it is to cut down the costs where it is not necessary. This paper illustrates the productivity improvement with the implementation of lean management and Six Sigma principles and how they impact in reducing the health care costs in the United States, while still providing the patient care.

**Six Sigma:**

The history of Six Sigma predates back to the time of Carl Gauss in 18th century. Not until 1920’s did we have the usage of Six Sigma as the measure of the standard, when the three sigma from mean became the point where it required correction. Six Sigma as the management philosophy is focused on the customer satisfaction. Producing goods at the lower costs makes it possible to earn better profits. Six Sigma is aimed producing less than 3 or 4 defects per one million end products made. However not all the companies are able to achieve this, which leaves a room for a lot of improvement. Six Sigma is not essentially a new technique. It involves all the techniques that are part of total quality management.

Following are the names of professional martial arts used in Six Sigma professional roles extracted from [http://isixsigma.com](http://isixsigma.com):

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsor</td>
<td>Senior executive who sponsors the overall Six Sigma initiative.</td>
</tr>
<tr>
<td>Leader</td>
<td>Senior-level executive who is responsible for implementing Six Sigma within the business.</td>
</tr>
<tr>
<td>Champion</td>
<td>Middle- or senior-level executive who sponsors a specific Six Sigma project, ensuring that resources are available and cross-functional issues are resolved.</td>
</tr>
<tr>
<td>Black Belt</td>
<td>Full-time professional who acts as a team leader on Six Sigma projects. Typically has four to five weeks of classroom training in methods, statistical tools and sometimes team skills.</td>
</tr>
<tr>
<td>Master</td>
<td>Highly experienced and successful Black Belt who has managed several projects and is an expert in Six Sigma methods/tools. Responsible for coaching/mentoring/training Black Belts and for helping the Six Sigma leader and Champions keep the initiative on track.</td>
</tr>
</tbody>
</table>
Green Belt | Part-time professional who participates on a Black Belt project team or leads smaller projects. Typically has two weeks of classroom training in methods and basic statistical tools.
---|---
Team Member | Professional who has general awareness of Six Sigma (through no formal training) and who brings relevant experience or expertise to a particular project.
Process Owner | Professional responsible for the business process that is the target of a Six Sigma project.

**Lean Management:**

Lean has its origins in the United States that date back to the colonial era. George Washington orders the armory to manufacture the armory in such a way that each piece is consistent with other in functioning and measurements. It was during the peaks of industrial revolution in the early 1900’s that the principles of lean really made an impact. Henry Ford implemented lean manufacturing by altering the batch processing. He ordered one part be manufactured by a batch unit to be later assembled by another unit. This increased the productivity, decreased the costs and he was able to produce cars with a better profits and give best wages to workers of his time.

In the 1920’s when the Toyota Corporation was established, they implemented the lean management philosophy learnt in the United States. There were differences in how lean philosophy was implemented in the United States and Japan. Total Quality Control was the method followed in the United States while in Japan the method followed was Total Company Wide Quality Control. The difference in Japanese implementation is that, lean is implemented not just in the manufacturing arena. It is extended to every corner of the organization including the office spaces. There are two aspects in the way Japanese achieve this

1. Able to meet the customer specifications.
2. Able to meet the customer desires.

Though tiny a variation, it greatly separates the thinking and implementation of lean philosophy in the United States and Japan. The following are the seven wastes that are
recognized and corrected by the Virginia Mason also known as Taichi Ohno’s seven wastes (Black, 2008):

| Time          | Waiting for the people or services to be provided.  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time when people, processes and machines are idle.</td>
</tr>
<tr>
<td>Processing</td>
<td>Unnecessary processes and operations traditionally accepted as necessary.</td>
</tr>
</tbody>
</table>
| Motion        | Unnecessary movement or the movement that does not add value.  
|               | Movement that is done too quickly or slowly. |
| Defects       | Wastes related to costs for inspection of defects.  
|               | Defects in materials and processes.  
|               | Customer complaints and repairs. |
| Transportation| Conveying, transferring, picking up, setting down, piling up and otherwise moving unnecessary items |
| Inventory     | Maintaining excessive amounts of parts, materials, or information for any length of time.  
|               | Having more than what is needed. |
| Overproduction| Producing what is unnecessary, when it is unnecessary, and in unnecessary amounts. |

**Integration of Lean, Six-Sigma and Quality Standards:**

Though reducing wastes is good for increasing the productivity. It alone is not enough in the long run. To improve the performance consistently it requires a holistic approach in merging the lean, The Joint Commission hospital standards and Six Sigma principles. This kind of a holistic approach will influence the work philosophy not only to a particular arena. This kind of view self extends into other aspects of institution as well.
This approach addresses all the performance issues, inter-relates with all the cultures in an organization and aids in striving for improvement in transaction and management arena. All this cumulatively helps in the institution in gaining momentum among its peers and thereby making it successful.

Below is a suggested workflow merging all three - six sigma, quality standards and lean management.

![Workflow Diagram]

**Figure 1**

**Description of Model:**

- The model is broken down into three major components namely Lean Management, Six Sigma Model and Standards.

- While setting off a project using the Six Sigma principles the project is defined with the minimal requirements. By minimal it means, including the things that are essential and omitting out the unwanted aspects.
• Upon the further stages while the project is improved upon from the brain storming ideas generated thorough the lean philosophy, the flow of the project plan is inspected to make sure that it met the standards.

• While the Six Sigma methods are used to analyze the waste generated, the lean management principles are used to omit out waste or alter them for good. Various belts associated with the Six Sigma perform this activity and there by boost the economic performance of the institution.

• The standards are applied from the vantage point of lean philosophy making sure that they are applied fully and does not create any clutter thereby enabling a seamless work flow.

• Standards are the aspects set up by the Joint Commission organization. The institution upon audit has a wide of certifications to choose from including the ISO 9001 and ISO 14001.

• At the point of value streaming, upon a stringent documentation of the process including the way standards are implemented aligning with the workflow, it will create a smoother work process.

• Lean management philosophy monitors the workflow, thereby nullifying the redundancies caused during the work and studies the outcome of work performed.

• In a nutshell this model integrates the best of lean philosophy and Six Sigma aligned with standards create a holistic approach increasing productivity and decreasing the costs in a hospital.

**Analysis:**

The Joint Commission also known as Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and previously as Joint Commission on Accreditation of Hospitals (JCAH) is non-profit organization in the United States providing accreditations for over 19000 health care organizations in the United States. The State governments across the United States are pushing together to make the Joint Commission a mandatory organization for the claim of Medicare reimbursements(The Joint Commission , 2010).
The fig.2 below shows the distribution of the resources of the organization across various aspects of the health care.

Figure 2

Assuming that the hospitals emphasizing on the standards and other quality improvement parameters as the primary concern to provide a good care to the patients, then the hospital organizations that are certified with the Joint Commission represent a group of better care providers compared to its peers. By implementing these measures the hospitals should be able to reduce the costs and thereby increase their profit margins, cumulatively aiding in reducing the overall health care spending across the nation. Analyzed are costs of four primary procedures, which are covered by the Medicare, along with the hospital-acquired conditions in alignment with patient satisfaction survey implying care provided at the hospital. A study conducted showed that “Like” of the Facebook in regards to a particular hospital indicated quality, therefore a survey which is more pragmatic should indicate the quality of care received by the patient from a hospital. The above-mentioned aspects were compared among the hospitals with The Joint Commission organization accreditation and without Joint Commission organization accreditation across the State of Michigan (Timian A et.al, 2013).

A set of acute health care hospitals and general hospitals which totaled for 110 are compared with the data of cost and readmission rate into hospitals from the Medicare
website of the Federal government. A total of 27 hospitals whose data for the above mentioned aspects is available in the Medicare website ,but are not accredited by The Joint Commission.

**Table 1: Sources of Parameters analyzed.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-admission into hospital</td>
<td>Medicare Claims, 2012</td>
</tr>
<tr>
<td>Cost of the cases</td>
<td>Healthcarebluebook, NewChoiceHealth</td>
</tr>
<tr>
<td>Patient Satisfaction Survey</td>
<td>US News</td>
</tr>
<tr>
<td>Hospital Standards</td>
<td>The Joint Commission</td>
</tr>
</tbody>
</table>

**Figure 3: Endoscopy Cost Comparision**

The boxplot above shows the cost of prices of the hospitals where GI endoscopy is performed. Though there isn’t much difference among the median prices in the hospitals in both the categories, there is a noticeable difference in the outliers.
Figure 4 Laparoscopy Cost Comparison
Like the previous box plot this also almost similar in prices in both the groups, however a price difference is seen in the outliers. The graph represents the costs of laparoscopy.

Figure 5 Knee Arthroscopy Cost Comparison (above)
Unlike the previously parameters though this does not differ from the other ones, since the outliers are almost close enough, but on larger this could make a difference. The above-mentioned graph represents the costs of knee arthroscopy.

![Boxplot of costs for Appendectomy](image)

**Figure 6 Appendectomy Cost Comparison**

This also follows the same pattern as the former boxplots indicating the costs of the appendectomy in the accredited hospital lower than the costs in unaccredited hospitals. Though the differences aren’t high, the distribution of costs is higher in unaccredited hospitals than in the accredited hospitals.

Of all the parametres shown the significant difference is seen in the above boxplot regarding the cost differences in the laparoscopy among the accredited and unaccredited hospitals. Not only are cost differences but also are the huge outlying differences. On the X-axis indicated on all the boxplots are the costs of each individual procedure.

**Customer Satisfaction:**

When looked at responses that rated a hospital low, the mean of the unaccredited hospitals seemed to better. But by looking at the spread of the consumer ratings, again the hospitals with the accreditations indicate better patient satisfaction.
Readmission rates of hospitals:

Out of 137 hospitals in the state of Michigan, only 129 hospitals were analyzed which recorded the readmission rates and deaths of patients. Of these 129 hospitals 57 hospitals did not have enough data to analyze the results.

According to the Medicare website the state of Michigan has two hospitals have the better readmission rates than the national average in the re-admission rates. The hospitals accredited with The Joint Commission had two hospitals whose ratings of readmission are better than the national average in re-admission rates. Which means 100 percentage of the hospitals which have better readmission rates of national average are accredited by The Joint Commission.

Of the 68 hospitals whose readmission rates are same as the national average, 60 of them are accredited by The Joint Commission and 8 are not.
Conclusion:

The Study resulted in the following conclusions

1. The cost of treatment in the hospitals accredited with Joint Commission is lesser than the hospitals that are not accredited with the Joint Commission.
2. The patient satisfaction is higher in the case of hospitals accredited with Joint Commission than the hospitals that are not accredited with the Joint Commission.
3. The readmission rates of hospitals are slightly lower in the hospitals that are accredited with Joint Commission than those not accredited with Joint Commission.

This study proves that the hospitals with some form of accreditation not only does implement quality standards in providing care but also implement good patient care and good management principles.
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