“Impact of 5S on the Productivity of Nursing Staff in Hospitals”

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Abstract:
Now a day’s health care cost has been increasing very rapidly. The healthcare services, hospitals and clinics cost for providing services to their patients have been increased very sharply. Therefore, these organizations are always struggling to cut down the cost so that high quality services can be provided to every segment of the people in less price. By doing this, every patient can get good services from the hospitals or clinics which will be monetarily under their reach. 5S methodology helps to achieve the goal of reduction in time, wastages and non-operative time. Which results in cost savings and good services to their patients. This enhances the productivity of the nursing staff and makes organization effective and efficient. A sample of total 40 nursing staff were selected among the existing hospitals in Nagpur city. The nursing staff comprising males and females were considered for the study. To find out the impact of 5S before and after implementation on the productivity of the nursing staff in hospitals, paired sample t-test was used. The research study has shown the influence of the 5S in enhancing the productivity of the nursing staff in terms of reduction in staff non-operative time, staff overtime, patients waiting time, theatre preparation time and cost involved in the processes.

Keywords: Impact, 5S, Productivity, Nursing, Staff, Hospital

I INTRODUCTION:
Now a day’s health care cost has been increasing very rapidly. The healthcare services, hospitals and clinics cost for providing services to their patients have been increased very sharply. As a result of that these organizations are always struggling to cut down the cost so that very quality services can be provided to every segment of the people in less price. So that every patient can get good services from the hospitals or clinics which should be monetarily under their reach. To satisfy their patients hospitals or clinics are working on activities such as patients’ safety improvement, patients’ waiting time reduction, reduction in errors, elimination of waste, rapid working etc. Hospitals are now measuring and improving the
processes involving from receiving the patients giving services and discharging them (Ahlstrom, 2014).

Toyota manufacturing company adopted the same concept to overcome the problems in automobile (Ikuma and Nahmens, 2014). Takashi Osada in 1980s developed a methodology of implementing 5S (Ho, 1995). Ho (1999) defined 5S as a method of maintaining and improving quality in an organization. For the success of the 5S employees should be aware of it (Kaushik, 2012). The proper implementation and execution of 5S strategy gives rise to upgradation in the quality. It has been applied in the improvement of quality of exhausts of car (Dulhai, 2008). Author Harsha (2013) has focused on the importance of the 5S in workplace. 5S created more space and it has also improved the time required for manufacturing.

5S technique was primarily developed by Hirano and Hiroyuki in Japan. 5S involves the words starts with ‘S’ such as Seiri-Sort, Seiton-Set in order, Seiso-Shine, Seiketsu-Standardize and Shitsuke-Sustain respectively. The 5S method is related with ‘Kaizen’, it means good change. The 5S gives rise to improvement in productivity, effectiveness and efficiency of the organization. The 5S methodology helps in achieving the standardization and quality in the workplace. 5S methodology is the basis of continuous improvement and quality upgradation in the workplace. It is very important for the service and production organizations (Juan Carlos Moreno, Jose H., Ablanedo-Rosas, Javier Urbina, Bahram Alidaee, 2010). The 5S implementation gives rise to structured workplace, well trained staff who are able to reduce the errors and costs and provides safe workplace (Ikuma and Nahmens, 2014). Due to 5S implementation, the nursing staff now able to recognize quality and safety issues. This is the power of 5S and its implementation has generated more time to the staff. Staff are now more aware about the activities taking place in the hospitals and are able to give proper services (Kim, 2009).

5S methods implementation benefits are safe, healthy, error free and productive environment (Sorooshian, Salimi, Bavani & Aminattaher, 2012; Panchal, 2012; Kedkar, Thakare, Mahantare & Gondne, 2012). The different 5S meaning are as follows: Seiri-Sort: It focuses on removing the non-required material from the workplace. All unnecessary stuffs are removed and space is created. Seiton-Set in order: it focuses on keeping the items quickly in their respective places, so that placing and retrieving of the items becomes easy and efficient. Seiso-Shine: It focuses on keeping the workplace neat and clean. The workplace and every item should shine. Seiketsu-Standardize: It focuses on developing the standards by which measurement of the previous ‘S’ activities can be done. Shitsuke-Sustain: it is the last step of the 5S. It focuses on sustaining the standards, practices and processes in the workplace. In the previous ‘S’ whatever practices, roles and responsibilities adopted by the organization will be sustained and followed lifetime.

II LITERATURE REVIEW:
5S implementation in Healthcare

Implementation of the 5S needs that the staff should learn how to solve the problems arising in the environment with the help of the resources available with them. 5S is not about organising the people rather facing the problem and solving it in an effective way by following the 5S methodology. By adopting these disciplines, it will create the environment of 5S in workplace area (Ahlstrom, 2014).

We can understand this in a very simple way, for example the surgeons do not thing about organising operation room. Rather, they have standard process of getting ready for the surgery: they sanitise themselves; instruments are kept in a proper manner and are standard one. Every day Before and after surgery instruments are counted and inspected in a disciplined way. The outcome of these standard processes creates 5S environment in workplace area (Ahlstrom, 2014).

Sort

The first step in the 5S methodology is the ‘Sort’. Sort means we do not keep those things that is not at all needed. So, the items that are not required are thrown out of the workplaces. All pending work was identified and completed and if those work was needed then discontinued from the workplace. A team was formed for taking decision regarding the items, whether those items needed or not; or needed replacement or repairs. All the areas of the workplace such as storeroom, lockers, cupboards, trays and drawers were organised, cleaned and contents were labelled (Fairbanks, 2007).

Professionals have described the steps to conduct sorting in the workplace (Graban, 2009; Southern Adelaide Local Health Network, 2012; Liker and Meier, 2007): it is a way of categorising or grouping items in your workplace. Two methods are available for sorting, the first is SORT the available items into three different groups: 1-always needed or used; 2- occasionally needed or used; 3-seldom needed or used. The second one is forming a product cluster such as Respiratory, IV, Surgery etc. By doing this it becomes easy for the staff to guess about the space required in storeroom for instruments. The main goal is to find out the primary required items that is needed to accomplish the work.

Set in order

The next step in 5S is “Set in order” or it is also called as “Straighten”, means to clear up the things that you want to keep with you. Though, in this step you will keep them in a proper location: proper place is identified for each item or items are identified for each place properly (Ahlstrom, 2014).

Set in order involves arranging the items with respect to the sequence of flow. The working team assured that all the drawers, equipment and cabinets were visibly marked and organized.
nicely. Information panels were formed for managing data so that the success of positive changes could be measured (Fairbanks, 2007).

Professionals have described the steps to conduct Set in order (Graban, 2009; Southern Adelaide Local Health Network, 2012; Liker and Meier, 2007): the concept is to arrange the items in such a way so that sequentially that can be used with respect to the flow of the work. Decisions are taken related to the frequent, moderate and seldom use of the items. At the time of keeping items back in the specific place, items need to be grouped and then placed to the respective area. Always keep frequently used items in the area which is easily accessible and can keep seldom used item in a place faraway. The other important things to be considered while keeping items are the height of the storage area, it should be comfortable to keep the things or take the things. The items that are frequently used should be kept at the level of shoulder and seldom used items can be kept at the level of feet. The very weighty items should not be kept much down or much high. Keep only that number of items that is required for example keep only 4 to 5 bundles of blank papers rim instead of keeping 15 to 20 bundles of rim. or contrary to this it should not happen that you don’t find IV because of its scarcity. Keep that much what is needed? The main intention is to find the items easily and speedily without much wastage of time and stress.

**Shine**

The next step is shine; it is also called as scrub. Now it’s time to shine. In this step you need to clean everything that you are using in your workplace. The things should always be up to date. There should not be any fault or damage to the things. Otherwise, it will hamper staff perform.

Scrubbing the part of the shine process. All the working areas of the department were shined. This was a great task because the hidden part of the hospitals is always ignored and got less attention. All the dust, used things and garbage were eradicated and sent for recycle or destroyed permanently. The workplace was checked for shining table, chairs, cupboards, monitors and different tools. The workplace was also checked for proper air ventilation, proper lighting, proper window for sunrays and windows with proper glasses so that dust and fumes can be stopped outside (Fairbanks, 2007).

Professionals have given guidelines for performing shine (Graban, 2009; Southern Adelaide Local Health Network, 2012; Liker and Meier, 2007): Inspect and shine the workplace. Remove faulty equipment, notices, displays and posters and keep the area unsoiled. The main idea behind this is that broken or faulty tools, hazardous materials are very risky to the safety of the people and these kinds of things should be rapidly identified.

**Standardize**

Up till now whatever you have done you can have a look into that. You need to check what have you done and in which manner. You should adopt a standard way of doing the task. It
should be disciplined. There should be proper practices for using sort, set in order and shine and when these three S are practiced regularly and seriously then it is called as ‘Standardised’.

In standardisation the focus is on forming a group consisting of few staffs and assuring their roles and responsibilities related to cleaning the area systematically and sequentially. Visuals are used to keep the track of the work and other people will also be aware about the status of the work. these tasks can be completed without any extra load of paperwork or other documentations (Fairbanks, 2007).

According to the various professionals’ guidelines (Graban, 2009; Southern Adelaide Local Health Network, 2012; Liker and Meier, 2007): The main goal of the standardization is doing the tasks in a well-structured manner. Visual methods can be used for storing the items in a particular product groups such as labels, signs, colours etc, can be used. Products can be placed into their respective drawers or racks in their product groups with a colourful box for example yellow colour-IV; Red colour-surgery tools;Brown colour-Respiratory; Green colour-wound related products; Purple colour-mixed products. The reason behind this is that the work area should look similar whenever it will be seen at any moment of time so that any unstructured changes can be clearly found out. The arrangement helps the staff to find the desired equipment quickly and easily. this standard work helps the new staff to know where to find which things and where to keep which things without getting any assistance.

**Sustain**

Whatever procedures or methods that has been adopted in the standardization, now it’s time to make it permanent. Sustain focuses on the continuity of the previous four S in disciplined manner and without any interruptions. It is the last S of the five S. It is not very easy to Sustain. Now the team has a methods and procedures to follow. Now the information portals are used that act as a storage for real and valuable data. now the supervisor forms documents of relevant tasks and instructions. Furthermore, areas are checked for cleanliness, orderly management and risk-free environment (Fairbanks, 2007).

Professionals’ guidelines for sustain (Graban, 2009; Southern Adelaide Local Health Network, 2012; Liker and Meier, 2007): The basic principle is what have been done in the previous ‘S’, all those activities should be maintained in the workplace for the coming long time. Standard work should be built to make it assure that tasks or processes should be sustained and make staffs accountable for the sustainability of those tasks or processes. Standard procedures should be formed with clear responsibilities of the staff and their roles. Standard development measurements should be used to check the progress. By this positive changes a new method of working in the workplace was introduced. There are various advantages of the 5S in long term after successful implementation of the 5S methodology in the workplace. The location or place of each item should be recorded in a proper manner. Creating sign for the family items can create a good impact in searching and placing the
items. Once such positive changes are done, this information should also be circulated to stakeholders. All the finished work should be recorded in the form of photos.

III OBJECTIVES:

➢ To study about 5S and it’s working.
➢ To study about productivity of nursing staff in hospitals such as staff non operative time, staff overtime, patients waiting time, preparedness for theatre and equipment planning process, and cost savings.
➢ To study about the role of 5S in improving the productivity of hospital’s nursing staff.

IV RESEARCH MODEL:

The research model of the study is as follows (Fig.1):

![Research Model Diagram]

Fig.1 Research Model

V HYPOTHESIS:

The hypotheses of the research study are as follows:

H1: 5S Affects Productivity of Nursing Staff.

1. H1a: 5S Affects Staff Non-Operative Time.
2. H1b: 5S Affects Staff Overtime.
3. H1c: 5S Affects Patients Waiting Time.
5. H1e: 5S Affects Cost Savings.
VI RESEARCH METHODOLOGY:

Data Collection Method
Hypothesis rejection or acceptance are done using a quantitative design. For collecting primary data of nursing staff of the hospitals, structured questionnaire was designed. The hospitals selected were those hospitals, which had worked without 5S implementation and after 5S implementation. The primary data were collected from the nursing staff when they were working without 5S implementation and after 5S implementation. The primary data collected using the factors such as staff nonoperative time, staff over time, patients waiting time, preparedness for theatre and equipment planning process and cost savings, so that the impact of the 5S on the productivity of the nursing staff can be compared with their previous work of without 5S implementation.

Sampling Method
A sample of total 40 nursing staff from 5 different hospitals were selected among the existing hospitals in Nagpur city. The nursing staff comprising males and females were considered for the study. Purposive sampling technique was used for sampling design. The hospitals whose nursing staff worked with and without 5S implementation were selected for the study. The purpose of the research has been explained to the hospital’s nursing staff.

Inclusion Criteria
All the hospitals and nursing staff who have worked with 5S and without 5S implementation have been included in the study. The same samples before 5S implementation and after 5S implementation have been included in the research study.

Statistical Tools
The main purpose of the study was to know the productivity of the nursing staff working with 5S methodology. A comparison of their work is done with respect to before 5S and after 5S implementation, so that the influence of the 5S methodology on the nursing staff can be evaluated. For doing so, paired sample t-test was conducted. The five-point rating scale is used with 1- strongly disagree to 5-strongly agree.

VII DATA ANALYSIS AND INTERPRETATION:
Dependent t-test was applied on the different factors of the nursing staff before and after 5S implementation in the hospitals.

Dependent T-Test Statistics
Comparing Staff Nonoperative Time (SNT)
The comparison of the staff nonoperative time before 5S and after 5S was done using paired sample t-test.
TABLE 1

PAIRED SAMPLES STATISTICS

<table>
<thead>
<tr>
<th>Pair</th>
<th>SNT</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SNT</td>
<td>4.2911</td>
<td>40</td>
<td>3.16423</td>
<td>.50031</td>
</tr>
<tr>
<td></td>
<td>SNT</td>
<td>2.2432</td>
<td>40</td>
<td>1.61151</td>
<td>.25480</td>
</tr>
</tbody>
</table>

Paired sample t-test was applied to compare the staff nonoperative time before and after 5S implementation. From the above TABLE 1, the nonoperative time (mean = 4.29, SD = 3.164) of the staff before 5S implementation was higher than the nonoperative time (mean = 2.24, SD = 1.612) after 5S implementation in the hospitals. So, there was a reduction of nonoperative time of the staff after 5S implementation. The difference between before and after scores was 2.05, with this value the nonoperative time of staff before 5S exceeds the nonoperative time of staff after 5S. It was observed that the nonoperative time of the staff before 5S implementation had more variations as compared to the nonoperative time of the staff after 5S implementation as standard deviation for nonoperative time of the staff before 5S implementation was higher than the nonoperative time of the staff after 5S implementation.

TABLE 2

PAIRED SAMPLES TEST

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Paired Differences Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 1</td>
<td>SNT1-SNT2</td>
<td>2.0479</td>
<td>2.48834</td>
<td>.39344</td>
<td>1.26102</td>
<td>2.83478</td>
<td>5.205</td>
</tr>
</tbody>
</table>

Paired sample t-test was given in the above TABLE 2. The mean difference between staff nonoperative time before 5S implementation and staff nonoperative time after implementation was observed as 2.0479, where staff nonoperative time before 5S implementation was higher than the staff nonoperative time after 5S implementation. Here H1a hypothesis is accepted which is ‘5S affects staff non-operative time’. To find out the difference between before and after 5S implementation, paired sample t-test was applied. The value of t-test ($t_{39} = 5.205$, $p < 0.5$) with significance value 0.000 which was less than 0.05. From the result it can be observed that the staff nonoperative time after 5S implementation was lowered than staff nonoperative time before 5S and was significant at 5% (level of significance).
TABLE 3
COHEN’S D EFFECT SIZE

<table>
<thead>
<tr>
<th>Relative Size</th>
<th>Effect Size</th>
<th>% of control group below the mean of experimental group</th>
</tr>
</thead>
<tbody>
<tr>
<td>No change</td>
<td>0</td>
<td>50%</td>
</tr>
<tr>
<td>Trivial</td>
<td>&lt;0.2</td>
<td>58%</td>
</tr>
<tr>
<td>Small</td>
<td>0.21 – 0.5</td>
<td>69%</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.51 – 0.80</td>
<td>79%</td>
</tr>
<tr>
<td>Large</td>
<td>0.81 &gt;</td>
<td>92%</td>
</tr>
</tbody>
</table>

TABLE 4
COHEN’S D VALUE FOR STAFF NONOPERATIVE TIME

<table>
<thead>
<tr>
<th>S. N</th>
<th>Factor</th>
<th>Effect Size</th>
<th>Relative Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Staff Nonoperative Time</td>
<td>0.811</td>
<td>Large</td>
</tr>
</tbody>
</table>

Cohen’s D value for the staff nonoperative time was given in the above TABLE 4. The Cohen’s D value is 0.811 which shows that there was a difference between staff nonoperative time before 5S implementation and staff nonoperative time after implementation. The Cohen’s D value of 0.811 showed that the effect size of staff nonoperative time before and after 5S was relatively large.

Comparing Staff Over Time (SOT)

The comparison of the staff overtime before 5S and after 5S was done using paired sample t-test.

TABLE 5
PAIRED SAMPLES STATISTICS

<table>
<thead>
<tr>
<th>Pair</th>
<th>SOT</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SOT</td>
<td>4.2615</td>
<td>40</td>
<td>3.74516</td>
<td>.59216</td>
</tr>
<tr>
<td></td>
<td>SOT</td>
<td>2.1253</td>
<td>40</td>
<td>1.73462</td>
<td>.27427</td>
</tr>
</tbody>
</table>

From the above TABLE 5, the overtime (mean = 4.26, SD = 3.745) of the staff before 5S implementation was higher than the overtime (mean = 2.13, SD = 1.735) after 5S implementation in the hospitals. So, there was reduction of overtime of the staff after 5S implementation. It was observed that the overtime of the staff before 5S implementation had more variations as compared to the overtime of the staff after 5S implementation.
TABLE 6
PAIRED SAMPLES TEST

<table>
<thead>
<tr>
<th></th>
<th>Paired Differences</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std.</td>
<td>Std.</td>
<td>95%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deviation</td>
<td>Error</td>
<td>Mean</td>
<td>Confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Lower</td>
<td>Upper</td>
<td>Interval of the Difference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t</td>
<td>df</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SOT1-SOT2</td>
<td>2.1362</td>
<td>2.50934</td>
<td>.39676</td>
<td>1.34268</td>
<td>2.92972</td>
<td>5.384</td>
<td>39</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Paired sample t-test is shown in the above TABLE 6. The mean difference between staff overtime before 5S implementation and staff overtime after implementation was observed as 2.1362. The value of t-test ($t_{39} = 5.384$, $p < 0.05$) with significance value 0.000 which was less than 0.05. From the result it can be observed that the staff overtime after 5S implementation has been reduced than staff overtime before 5S and was significant at 5% (level of significance). Here H1b hypothesis is accepted which is ‘5S affects staff overtime’.

TABLE 7
COHEN’S D VALUE FOR STAFF OVERTIME

<table>
<thead>
<tr>
<th>S. N</th>
<th>Factor</th>
<th>Effect Size</th>
<th>Relative Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Staff Over Time</td>
<td>0.851</td>
<td>Large</td>
</tr>
</tbody>
</table>

Cohen’s D value for the staff overtime was given in the above TABLE 7. The Cohen’s D value of 0.851 showed that the effect size of staff overtime before and after 5S was relatively large.

Comparing Patients Waiting Time (PWT)

The comparison of the patients waiting time before 5S and after 5S was done using paired sample t-test.

TABLE 8
PAIRED SAMPLES STATISTICS

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>PWT</td>
<td>3.6815</td>
<td>40</td>
<td>4.27434</td>
</tr>
<tr>
<td></td>
<td>PWT</td>
<td>1.2856</td>
<td>40</td>
<td>2.03626</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.67583</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.32196</td>
</tr>
</tbody>
</table>
Paired sample t-test was applied to compare the patients waiting time before and after 5S implementation. From the above TABLE 8, the patients waiting time (mean = 3.68, SD = 4.274) of the patients before 5S implementation was higher than the patients waiting time(mean = 1.286, SD = 2.036) after 5S implementation in the hospitals. So, there was reduction of waiting time of the patients after 5S implementation.

**TABLE 9**

**PAIRED SAMPLES TEST**

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 PWT1-PWT2</td>
<td>2.3959</td>
<td>2.74570</td>
<td>.43413</td>
<td>1.52763-3.26417</td>
<td>5.519</td>
<td>39</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Paired sample t-test is shown in the above TABLE 9. The mean difference between patients waiting time before 5S implementation and patients waiting time after implementation was observed as 2.3959. The value of t-test ($t_{39} = 5.519$, $p < 0.5$) with significance value 0.000 which was less than 0.05. From the result it can be observed that the patients waiting time after 5S implementation has been decreased than patients waiting time before 5S and was significant at 5% (level of significance).Here H1c hypothesis is accepted which is ‘5S affects patients waiting time’

**TABLE 10**

**COHEN’S D VALUE FOR PATIENTS WAITING TIME**

<table>
<thead>
<tr>
<th>S. N</th>
<th>Factor</th>
<th>Effect Size</th>
<th>Relative Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patients Waiting Time</td>
<td>0.873</td>
<td>Large</td>
</tr>
</tbody>
</table>

Cohen’s D value for the patients waiting time was shown in the above TABLE 10. The Cohen’s D value of 0.873 showed that the effect size of patients waiting time before and after 5S was relatively large.

**Comparing Preparedness for Theatre and Equipment Planning Process (PTEPP)**

The comparison of the staff preparedness for theatre and equipment planning process before 5S and after 5S was done using paired sample t-test.
TABLE 11
PAIRED SAMPLES STATISTICS

<table>
<thead>
<tr>
<th>Pair</th>
<th>PTEPP 1</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.0831</td>
<td>4.6487</td>
<td>40</td>
<td>0.73498</td>
<td></td>
</tr>
</tbody>
</table>

Paired sample t-test was applied to compare the staff preparedness for theatre and equipment planning process before and after 5S implementation. From the above TABLE 11, the staff preparedness for theatre and equipment planning process (mean = 2.08, SD = 4.648) before 5S implementation was lower than the staff preparedness for theatre and equipment planning process (mean = 4.385, SD = 1.256) after 5S implementation in the hospitals. So, there was an improvement in the staff preparedness for theatre and equipment planning process after 5S implementation.

TABLE 12
PAIRED SAMPLES TEST

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTEPP1 - PTEPP2</td>
<td>2.3023</td>
<td>2.55436</td>
<td>.40388</td>
<td>1.49454 - 3.11006</td>
<td>5.700</td>
<td>39</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Paired sample t-test is shown in the above TABLE 12. The mean difference between the staff preparedness for theatre and equipment planning process (PTEPP) before 5S implementation and the staff preparedness for theatre and equipment planning process after implementation was observed as 2.3023. The value of t-test (t_{39} = 5.70, p < 0.5) with significance value 0.000 which was less than 0.05. Here H1 hypothesis is accepted which is ‘5S affects theatre and equipment planning process’.

TABLE 13
COHEN’S D VALUE FOR PTEPP

<table>
<thead>
<tr>
<th>S. N</th>
<th>Factor</th>
<th>Effect Size</th>
<th>Relative Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PTEPP</td>
<td>0.901</td>
<td>Large</td>
</tr>
</tbody>
</table>
Cohen’s D value for the staff preparedness for theatre and equipment planning process (PTEPP) was shown in the above TABLE 13. The Cohen’s D value of 0.901 showed that the effect size of the staff preparedness for theatre and equipment planning process before and after 5S was relatively large.

**Comparing Cost Savings (CS)**

The comparison of the cost savings before 5S and after 5S was done using paired sample t-test.

**TABLE 14**

**PAIRED SAMPLES STATISTICS**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 CS</td>
<td>2.0112</td>
<td>40</td>
<td>4.19878</td>
<td>.66389</td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>4.1763</td>
<td>40</td>
<td>2.10945</td>
<td>.33353</td>
<td></td>
</tr>
</tbody>
</table>

Paired sample t-test was applied to compare the cost savings before and after 5S implementation. From the above TABLE 14, the cost savings (mean = 2.01, SD = 4.199) before 5S implementation was less than the cost savings (mean = 4.176, SD = 2.109) after 5S implementation in the hospitals. So, there was more cost savings after 5S implementation.

**TABLE 15**

**PAIRED SAMPLES TEST**

<table>
<thead>
<tr>
<th></th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
</tr>
<tr>
<td>Pair 1</td>
<td>CS1-CS2</td>
<td>2.1651</td>
<td>2.74515</td>
</tr>
</tbody>
</table>

Paired sample t-test is shown in the above TABLE 15. The mean difference between the cost savings before 5S implementation and cost savings after implementation was observed as 2.1651. The value of t-test ($t_{39} = 4.99$, $p < 0.5$) with significance value 0.000 which was less than 0.05. Here H1d hypothesis is accepted which is ‘5S affects cost savings.’
TABLE 16
COHEN’S D VALUE FOR COST SAVINGS

<table>
<thead>
<tr>
<th>S. N</th>
<th>Factor</th>
<th>Effect Size</th>
<th>Relative Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CS</td>
<td>0.788</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Cohen’s D value for the cost savings was shown in the above TABLE 16. The Cohen’s D value of 0.788 showed that the effect size of the cost savings before and after 5S was relatively moderate.

VIII CONCLUSIONS & RECOMMENDATIONS:

The important factors considered for the study was 5S (Sort, Set-in order, Shine, Standardise and Sustain) and productivity of the nursing staff (staff non operative time, staff overtime, patients waiting time, preparedness for theatre and equipment planning process, and cost savings. The main purpose of the study was to find out the impact of 5S on the productivity of the nursing staff of the hospitals. After applying the paired sample t-test on the hospitals nursing staff it has been observed that there was a change in the productivity factors such as staff non operative time, staff overtime, patients waiting time, preparedness for theatre and equipment planning process, and cost savings. 5S has influenced the staff non-operative time to a great extent. According to Cohen’s D, the effect size is large. It has reduced the staff non-operative time and it has helped the staff to focus more on their primary work. Staff overtime has also been influenced by the 5S implementation. The 5S has a big impact on the staff overtime. According to Cohen’s D, the effect size is large. It has reduced the overtime of the staff because now staff is being able to their work on time as all the non-required material and work have been removed. 5S has influenced the patients waiting time in a positive way. The effect size of the change is very large. 5S has reduced the patients waiting time as now things are sorted, shined and set-in order, it has improved the services given to the patients on time. Patients were satisfied and staff was better delivering the services to staff on time. 5S has helped the staff to rapidly prepare the theatre and speedily do equipment planning process. The effect size is very large. Staff was aware about identifying the non-productive and productive things. Unproductive things have already been removed and have got more time for productive work. As after implementing all the 5S successfully in the workplace cost savings has come into picture. 5S has reduced the staff nonoperative time, staff overtime, patients waiting time, theatre preparation time and equipment planning process time. This has given rise to the reduction in the cost involved in the different processes. So, 5S has reduced the cost moderately. From the study it has been shown that 5S has influenced the productivity of the nursing staff of the hospitals. After proper management and implementation of the 5S, it has influenced the productivity of the nursing staff positively.
REFERENCES:


[22] JAIN, A., & LAL, S. FACTORS RETARDING THE EFFICACY OF NURSING COMMUNICATION IN HOSPITALS AND STRATEGIES TO OVERCOME THEM.