THE EFFECT OF USING THE LEAN TOOLS IN THE EMERGENCY DEPARTMENT

A STUDY IN A SAUDI HOSPITAL

Poster Prepared by:
Dr. Alber G. Paules, Quality officer at the Quality Improvement Department - The Royal Commission Health Services Program - Yanbu - Saudi Arabia.
Dr. George Abi-Zeid, Chief of the Emergency Medical Services Department - The Royal Commission Health Services Program - Yanbu - Saudi Arabia.

Objective of this study: to identify the effect of using the Lean principles and tools on the staff satisfaction and the turnaround time (TAT) inside the emergency department (ED) of an acute care general Saudi Hospital.

Study period: from December 2011 till May 2012.

Study location: area "A" of the ED which is dedicated for serving the more critical cases received at the ED. (i.e., patients belonging to categories 1-3 of the Australasian Triage Scale).

Hypotheses: this study has one main hypothesis broken down into 10 sub-hypothesis; the first nine sub-hypotheses are based on the nine questions of the questionnaire. The tenth sub-hypothesis is based on effect of Lean implementation on the average TAT of the ED patients.

Methodology: only ED patients admitted to area "A" are included in this study, except Ob/Gyne cases and psychiatric cases. A systematic random sampling technique was used to select the days representing the seven days of the week; the data of the ED patients who visited the ED during the selected seven days were analyzed. A sample of 196 patients was taken before the intervention and a sample of 199 patients was taken after then intervention.

The questionnaire was distributed to a selected group of the ED staff (physicians and nurses) using the convenience sampling technique. Six physicians (50% of ED physicians) and twenty –two nurses (60%) of the ED nurses took the questionnaire.

Procedures:

1. TAT of the ED patients data were collected from the hospital's Health Information System (HIS). TAT is defined as the time difference between the onset the ED patient is registered on the HIS till the time the patient is discharged from the ED on the HIS.
2. A 9-question questionnaire was distributed to the selected ED physicians and nurses both before and after the implementation in order to identify their perception about the workplace from a "Lean" perspective (e.g., questions about wasted time looking for items, wasted time making trips inside the ED , wasted time in communication inquiring about the location of items, and about their perception of the workplace as being an "efficient" and "user-friendly" one|). A five-point Likert-scale was used for the responses format ranging from "Strongly Agree" till "Strongly Disagree".

Results:

a. Average turnaround time (TAT) of patients managed at areas "A" inside the ED decreased from **70.3** to **66.3** minutes (i.e., 5.7% reduction in the TAT). A paired sample *t*-test showed that this reduction is not significant (i.e., only due to chance) with *p*-value greater than 0.05.
b. On the 5-point Likert scale, average score of the ED staff satisfaction increased from **2.9** to **3.5.** The average satisfaction response values for 2/3 of the questionnaire questions improved after the Lean implementation and paired sample *t*-test for each individual question of those questions showed a significant improvement with *p*-value less than 0.05.

Lean Interventions:

I) 5Ss tool:

1. Standardized arrangement of items
2. Store areas
3. Container boxes
4. Images displaying the content
5. Footprinting
6. Floor marking
7. Modifying bed setup between patients
8. Statuses of beds

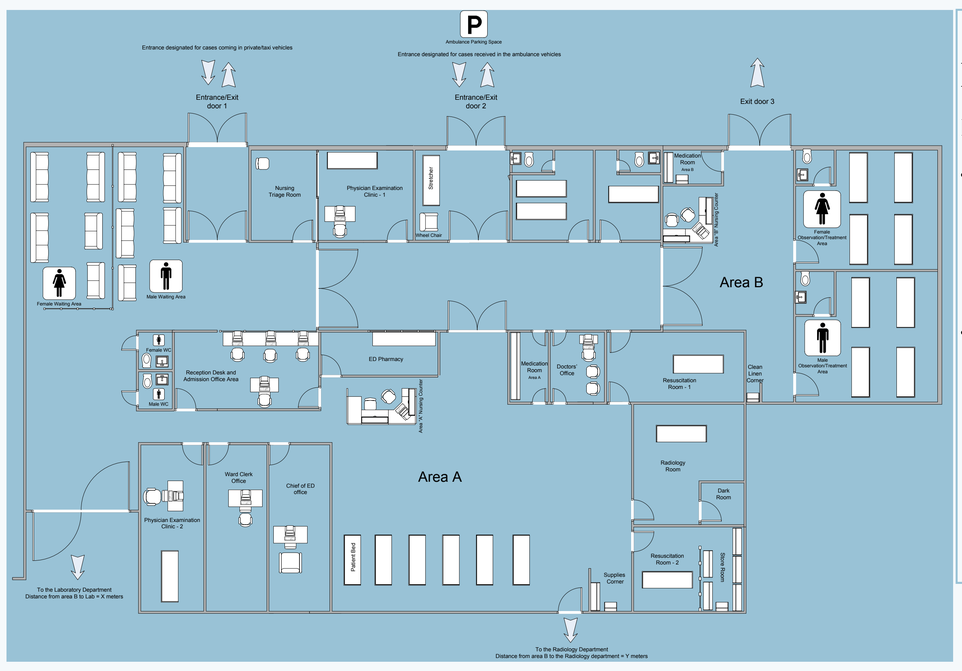
2) Spaghetti diagram: was used to identify the wasted motion inside the ED during care provision to patients. ED floor map was used for this purpose.

Discussion:

Lean manufacturing tools can be successfully implemented in Saudi healthcare settings. They could improve the organization of the workplace, provide visual aids and cues, and minimize verbal communication among the ED staff. Staff satisfaction and knowledge of their workplace generally improves. All these outcomes could be achieved with minimal cost and non-technological interventions.

1 Standardized arrangement of items: the items kept inside the IV trolley drawers were organized in a standardized manner. The new arrangement was standardized across all drawers in IV trolleys present in area "A", including the drawers in the resuscitation rooms.

LEFT: Before arrangement **RIGHT:** After arrangement



ED floor map:

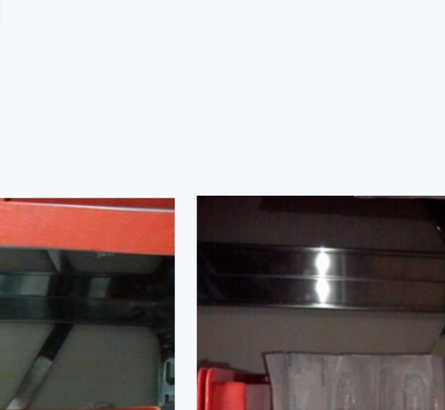
. shows the distribution of different areas/rooms.
. was used to identify the wasted movement inside the ED.

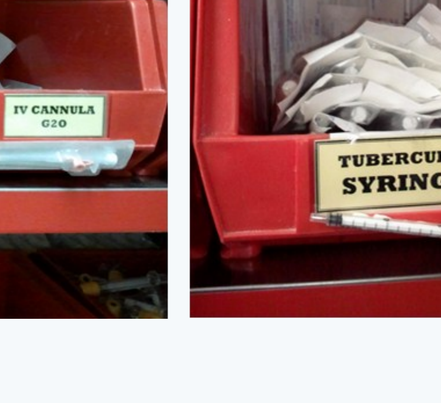
2 Stores areas: the supplies corner of area "A" after:

. color-coding the shelves according to the body systems.
. color-coding included the container boxes of the items.
. standardized labeling of all items has been implemented.

3 Container boxes: a sample of the contained item in each box was attached to the front side of the box to visually help the person searching among the boxes on the shelves to reach the needed item in the shortest time possible.

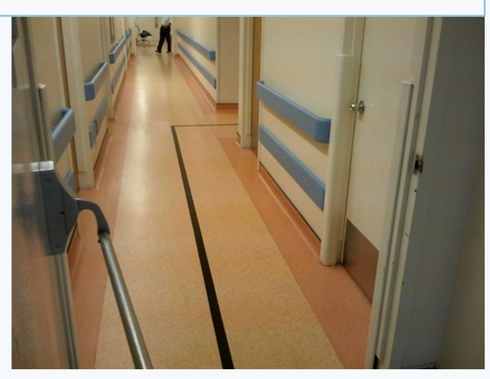
4 Images displaying the content: many images were attached to the plaster trolley to display the content (e.g., dressings, casts, and splints with their different sizes).





5 Footprinting: a tape was placed around the default storage/parking area for each trolley. An initial for the name of the trolley was taped on the floor inside this area (e.g., "D" stands for dressing & "E" stands for ECG). A pad of stick notes was posted on the wall just above each trolley.

6 Floor marking: a black line extending on the floor from the main reception in area "A" (left photo) to the nearby Radiology department (right photo).



7 Modifying bed setup between patients: 4 different IV fluids bags were hanged on the IV stand as a part of the setup of the bed before receiving a new ED patient.

8 Statuses of beds: a wall-mounted magnetic white board which was hanged on the wall at the nursing station of area "A":

. The leftmost column shows the list of the beds at area "A" of the ED.
. The middle column shows the color-coded magnets which indicate the different statuses of the beds.
. The rightmost column shows the space left for the sticky notes.