Using Lean Six Sigma to Transform the Quality of Healthcare: A Case study from the UAE

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Agenda

Anatomy of healthcare today and key figures

What is Six Sigma and what is Lean?

UAE Hospital Lean Six Sigma Case study

- Before and after results

Take home tips- Practical and Academic


Let us talk about the Elephant in the room!


To Err is Human or is it?

Key figures

1 in 4

As many as 1 in 4 patients are harmed whilst receiving primary and ambulatory health care

2.6 M

134M adverse events occur each year in hospitals contributing to 2.6 million deaths annually due to unsafe care

$42 Billion

Medication errors cost an estimated 42 billion USD annually (1% of the global expenditure on health)

150M

prescriptions out of 3 billion filled every year are filled with error

Source: WHO 2018- https://www.who.int/patientsafety/en/, Arthur 2011

Have you met the DEMONS

D1

D2

D3

Meet the Demons

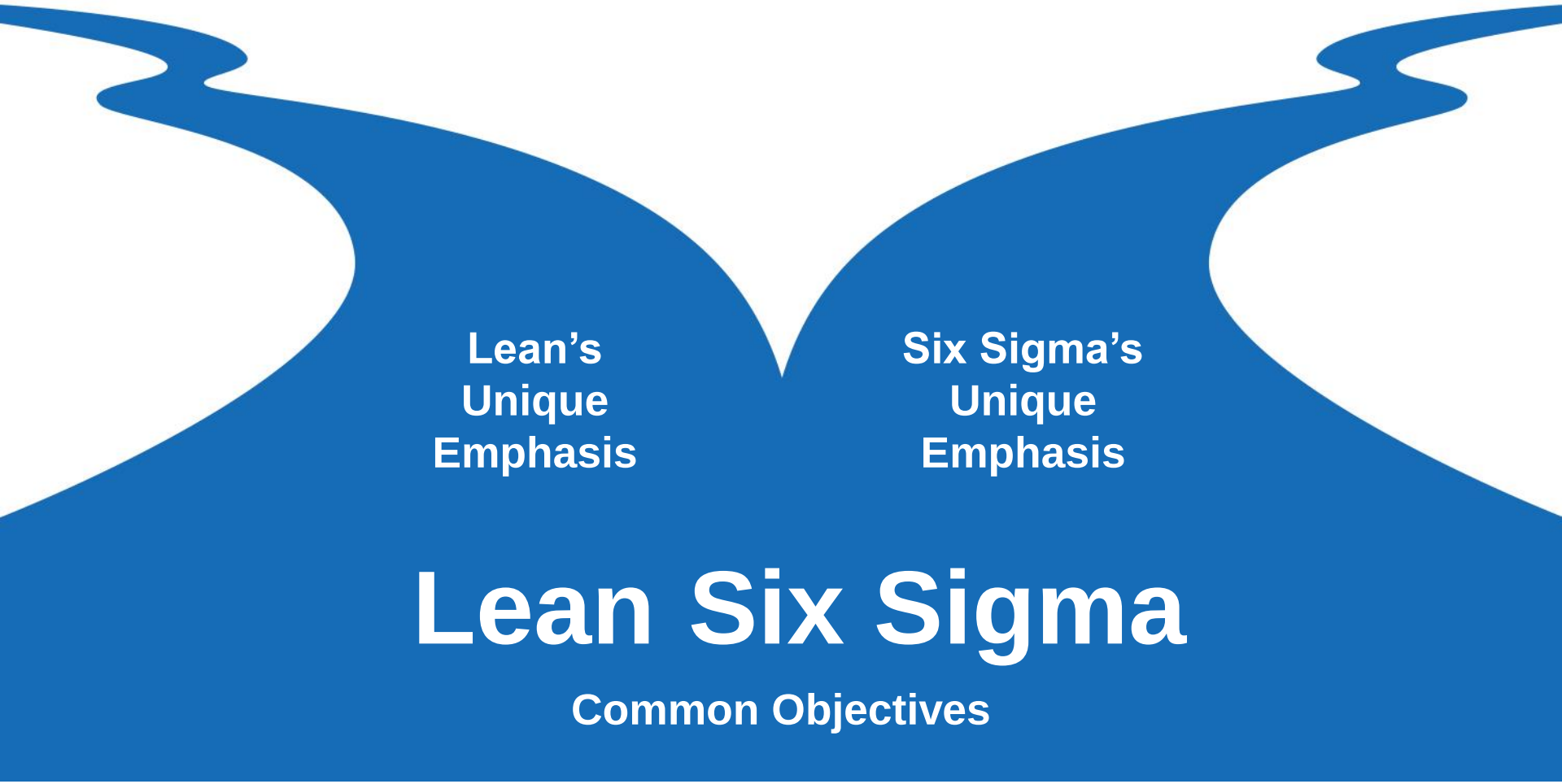
DELAYS:	• ‘What is taking you so long to get my pharmacy order?’
DEVIATIONS:	• ‘This is not the amazing service I received last time, what is wrong?’
DEFECTS:	• ‘You gave me the wrong medication’

Polling Question: Implementation of Continual Improvement methodologies in healthcare

The 2 Guns I Use

Six Sigma and Lean

- Complementary Approaches – Proven Results

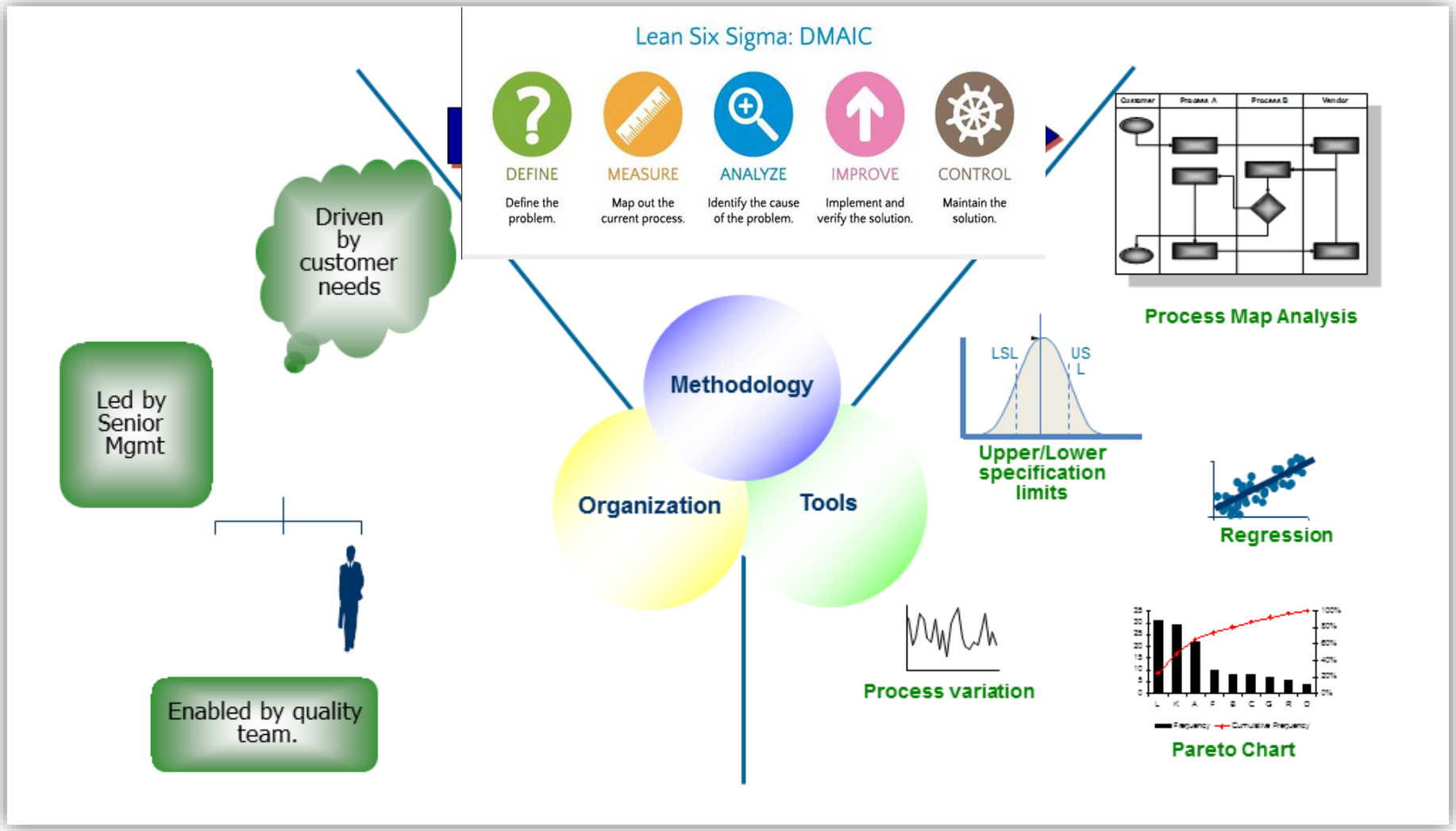


Six Sigma definition

Six Sigma is a structured approach focusing on improving process reliability in order to eliminate the defects in products and services

This approach was developed in 1986 by Motorola and popularized by GE

6σ- The Three Dimensions



Lean definition

Lean is a structured approach focusing on simplifying processes
by eliminating the tasks that don't bring value for the end customer

This approach was mostly derived from the Toyota Production System (TPS) in the beginning of the 20th century and identified as "lean" only in the 1990s

Lean 8 types of waste (DOWNTIME)

Defects

Making mistakes that cause products to fail customer requirements

Transport

Unnecessary movements of products and materials

Over production

Making more than is immediately required

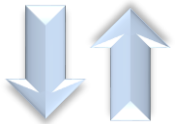
Inventory

Storing parts, pieces, documentation ahead of requirements

Waiting

Waiting for the previous step in the process to complete

Motion

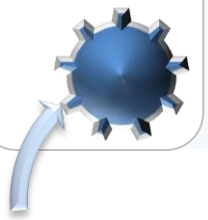


Unnecessary movements by people

Non-utilized talent

Not recognizing and utilizing human talent and creativity available within the workforce

Extra processing



Performing any activity that is not necessary to produce a functioning product or service

Lean Six Sigma definition

Lean		Six Sigma		Lean Six Sigma
A structured approach focusing on **simplifying processes**	+	A structured approach focusing on **improving process reliability** in order to eliminate the defects in products and services	=	A performance improvement methodology focusing on **simplifying processes and improving process reliability**

Confidentiality Compliance

Due to confidentiality requirements I will refer to the hospital in this case study as Hospital A.

Note: This project was submitted as part of the ASQ certificate requirements for the Lean Six Sigma Greet belt and was coached by Fawzi Bawab

Using Lean Six Sigma to Reduce Patient Waiting Time

Situation

- Recurrent complaints and dissatisfaction shown by patients about prolonged waiting time before being seen by physician
- **37%** of the written ED patients' complaints were related to prolonged WT. Similarly, **23%** of the complaints were related to prolonged WT. A high number of patients (1,068) left the ED without being seen by a physician or complete the required care. In addition, the monthly patient satisfaction survey conducted revealed that 59% of patients surveyed, expressed their dissatisfaction with the prolonged ED waiting time.

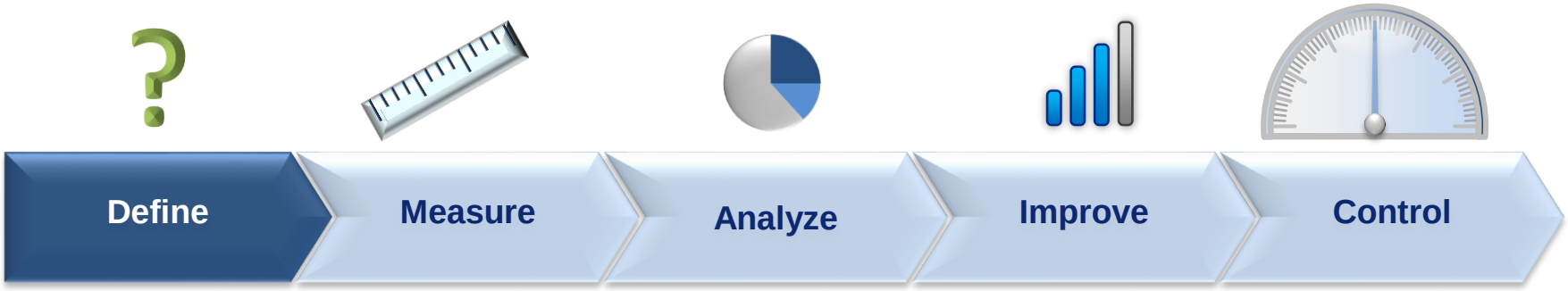
Objectives

- Reduce WT for triage category 3, 4 and 5 and improve the percentage of patients seen within the timeframe recommended by SEHA by 25%
- Key Performance Indicators targets requiring that 90% of triage category 3 patients be seen by a physician within 30 minutes, and triage category 4 and 5 within 45 minutes of registration time, showed a trend of low compliance.

Hospital A:

- 460+ bed Hospital located in the Eastern Region of the Abu Dhabi Emirate. It is a tertiary referral hospital managed by Johns Hopkins Medicine International and overseen by SEHA Corporate.

Lean Six Sigma DMAIC Methodology – Step 1



Definition

Define the problem and set your improvement targets

Key Steps

1. Define your customer and their requirements
2. Define the current process
3. Define the problem
4. Define your improvement goals and ensure alignment with overall company strategy
5. Develop a plan of actions


SHOW
ME THE
MONEY!

Voice of the Customer (VOC) and Voice of Business (VOB)

In 2009, the Emirate of Abu Dhabi introduced the mandatory medical insurance scheme thus, giving the patients the choice to be treated at any healthcare facility. This might have contributed to the leakage of hospital A patients and consequent revenue loss.

WT improvement in ED is one of the strategic initiatives identified by the Senior Management to meet the strategic goals. Its ED is one of the busiest in the region with an average of 6,500 visits per month.

The comparison between actual and budgeted data for ED visits showed a drop of 8.8% in the volume (from 115,193 to 105,094) leading to an estimated direct loss of 5.7M AED per year and an indirect loss of about 11.4M AED per year considering that 11.3% of ED visits were admitted to the hospital.

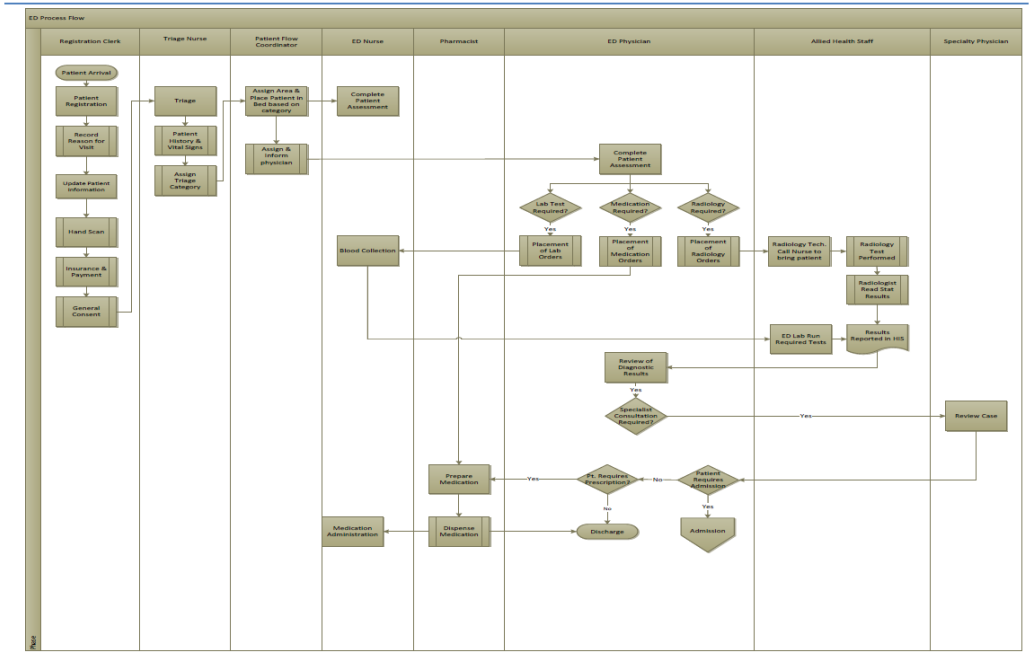
Based on the Voice of Customer (VOC) a significant proportion of the estimated loss could be related to the prolonged waiting time.

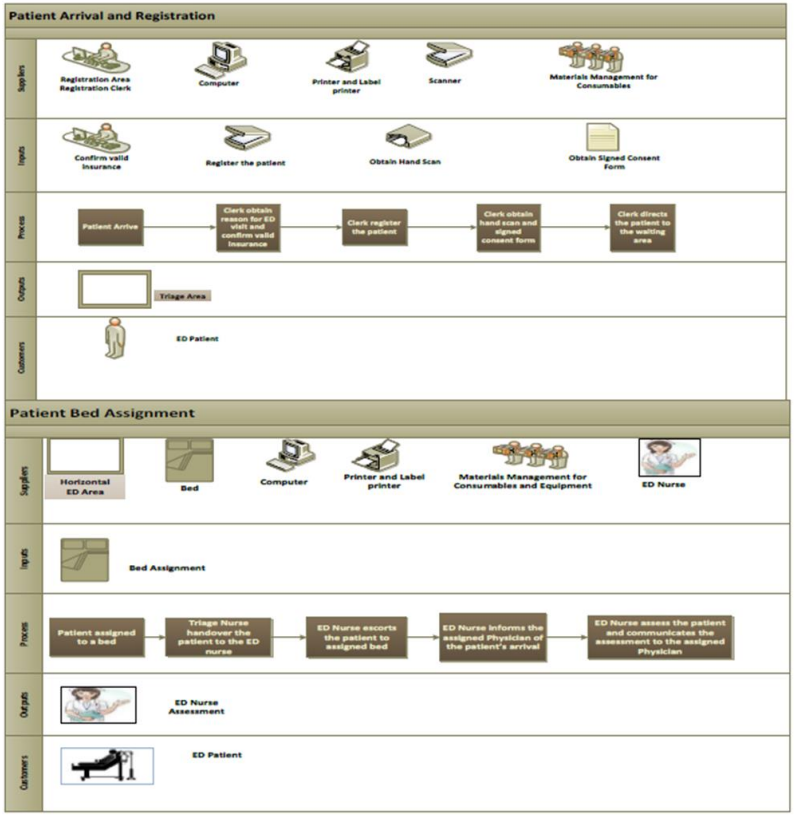
Base line Summary

A Capability histogram	The pain	The process metrics
• Process capability was very low (Z bench 0.13) producing 44.8% defects	• Only 55.2% of 3,832 adult patients (Sample data), who attended the ED, were seen within the timeframe recommended by SEHA.	• Performing at sigma -0.02, 0.14 and 0.65 in patients with triage category 3, 4 and 5, producing 44.4%, 35.1% and 28.9% defects respectively.

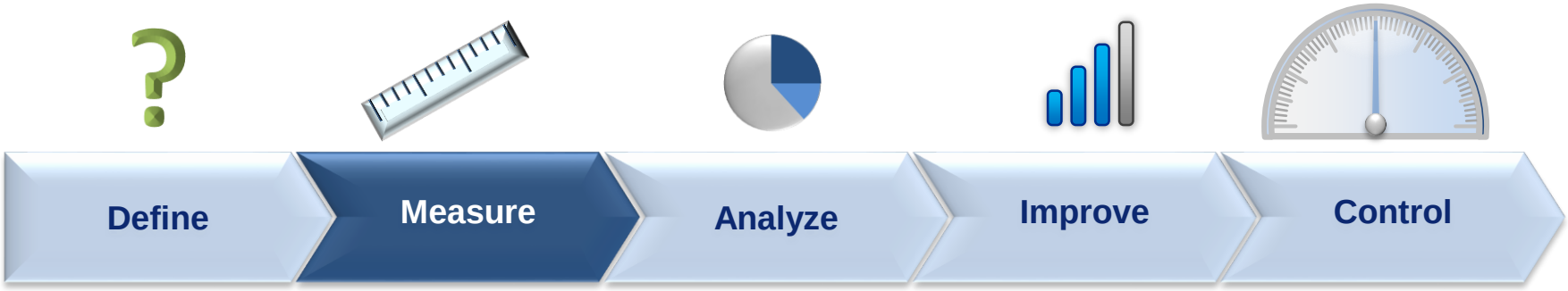
Process Maps

ED Process Swim Lane Flowchart





Lean Six Sigma DMAIC Methodology – Step 2



Definition

Measure current state performance and brainstorm potential cause(s) of the problem

Key Steps

1. Measure the current process performance
2. Create assumptions for what might be causing problems
3. Create a plan to collect the data
4. Collect the data
5. Ensure your data is reliable

Measurement Plan

Table 3: Data Measurement Plan

Performance Measure	Operational Definition	Data Source & Location	Sample Size	Who will collect Data	When will Data be Collected	Data Collection Method	Other Data Collected
Category 3 Waiting Time Compliance Rate	% of category 3 patients seen within 30 min from registration time to first contact with physician	HIS (Malafi), Info View Report	100% Adult Category 3 Patients	Quality Manager to run the report	Monthly	Electronic Report	Manual Data Collection with Patient tracer
Category 4 Waiting Time Compliance Rate	% of category 4 patients seen within 45 min from registration time to first contact with physician	HIS (Malafi), Info View Report	100% Adult Category 4 Patients	Quality Manager to run the report	Monthly	Electronic Report	Manual Data Collection with Patient tracer
Category 5 Waiting Time Compliance Rate	% of category 5 patients seen within 45 min from registration time to first contact with physician	HIS (Malafi), Info View Report	100% Adult Category 5 Patients	Quality Manager to run the report	Monthly	Electronic Report	Manual Data Collection with Patient tracer
Average Waiting Time all categories	Average waiting time for all and each category	HIS (Malafi), Info View Report	100% Adult Category 3, 4 and 5 Patients	Quality Manager to run the report	Monthly	Electronic Report	
Patient Satisfaction with Waiting Time	% of patients satisfied with ED waiting Time	Real time hand held data collection	400 patients per month	Patient Experience	Monthly	IPad Survey tool filled by patients	
Patient Complaints related to waiting time	Number of ED patients written complaints related to WT	Complaint Management System	Not Applicable	Patient Experience	Monthly	Manually	

How will the data be used?	How should data be displayed?
1. Quarterly KPI compliance 2. Quality improvement 3. Service planning	1. ED Dashboard 2. SEHA Dashboard 3. ED Quality boards

Graphing

Figure 1: Number of ED visits and the average turnaround time for patients

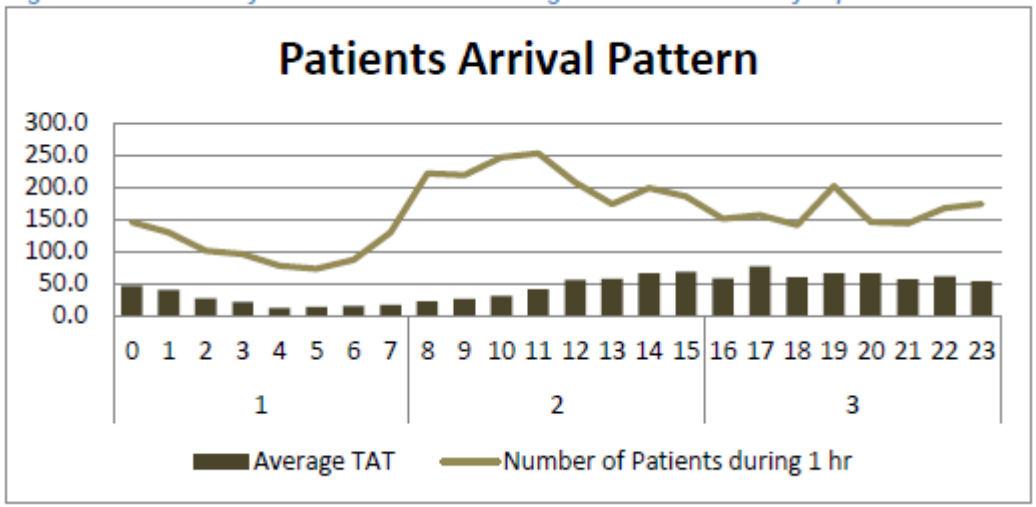


Figure 4: Descriptive statistics of WT for all adults visiting ED in January 2014 (N = 3832)

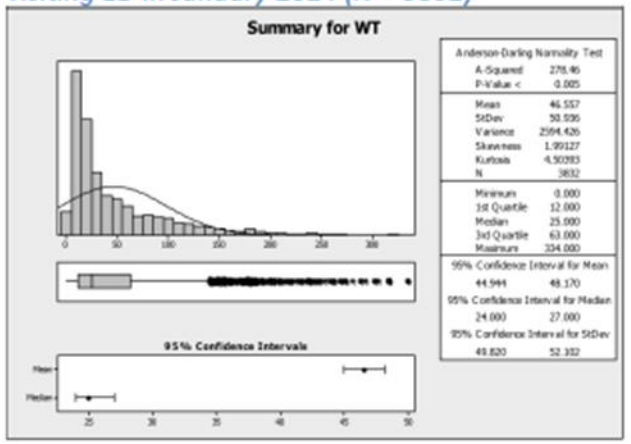


Figure 2: Scatter plot of average WT per hour vs. the total number of ED visits

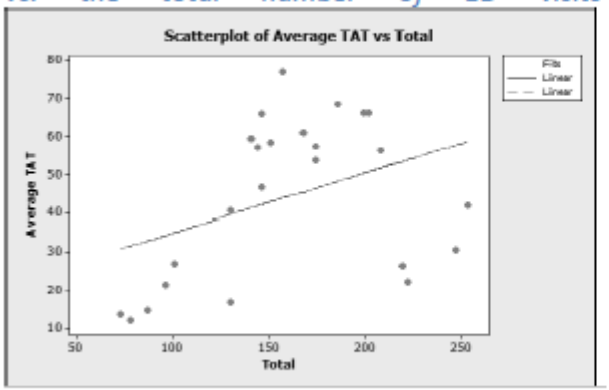
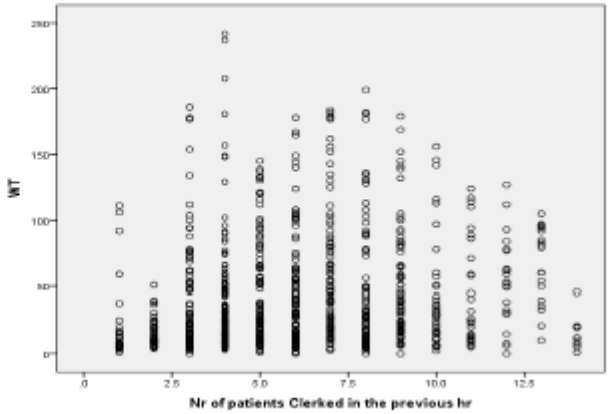
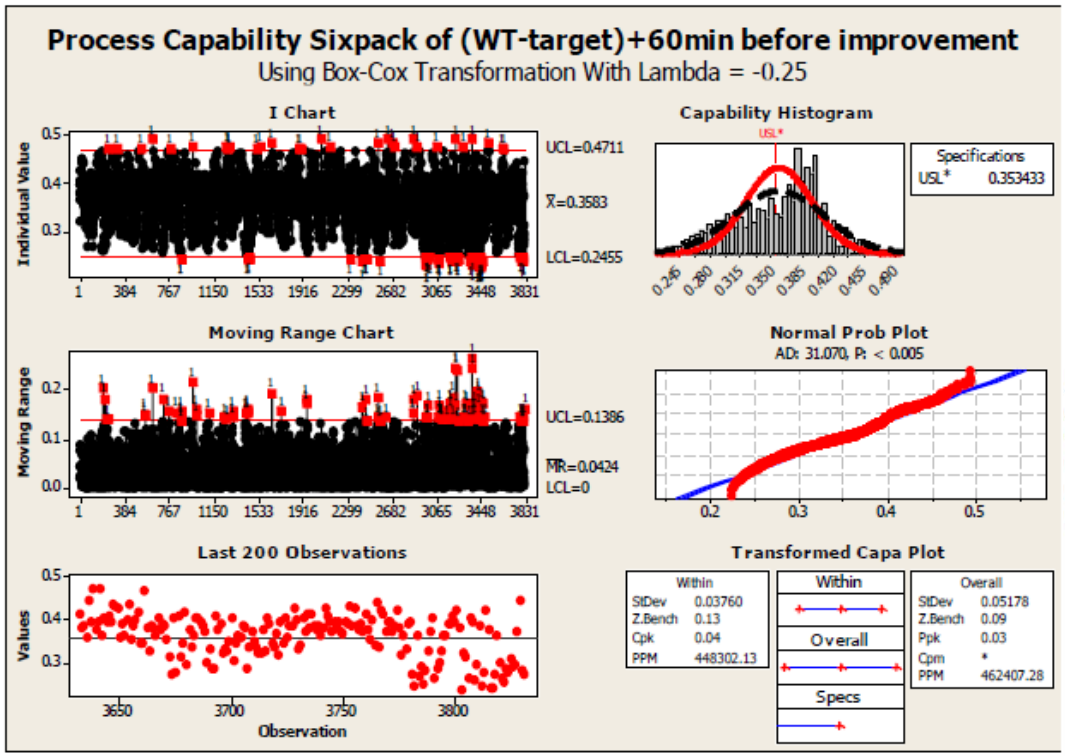


Figure 3: WT vs. number of patients admitted in the preceding hour (N = 1013, January, 2014).



Charts are worth a…….

Figure 14: I-MR Control chart of WT in adult patients attending the ED (N 3832)



Process Capability

Appropriate distributions were used and a transformation was applied when necessary to measure the process capability. Z bench score for triage categories 3, 4 and 5 were -0.02, 0.14, and 0.65 respectively, producing a 44.4%, 35.1% and 28.9% defects (Figures 21 - 24).

Figure 21: Capability histogram all patients (difference from their respective targets)

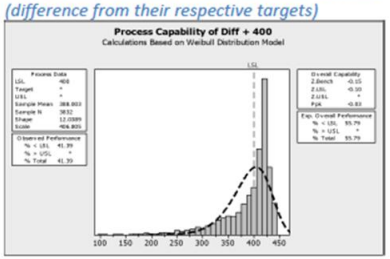


Figure 22: Capability histogram of category 3 patients (target WT of 30 minutes)

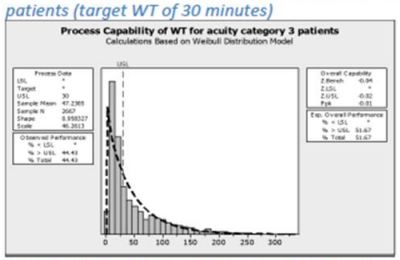


Figure 23: Capability histogram of category 4 patients (target WT of 45 minutes)

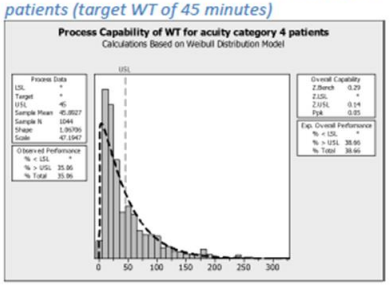
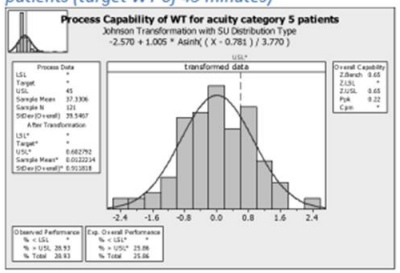


Figure 24: Capability histogram of category 5 patients (target WT of 45 minutes)



Measure stage summary

Number of visits	Correlation between ED WT and number of ED visits	The process
• **Peaked between 08 AM and 12 noon, followed by increased WT, which persisted throughout the afternoon until midnight.** • A low rate of visits was noted between 01:00 and 06:00 AM corresponding to low WT.	• **Very low (R2 0.08) meaning that the volume of patients visiting ED accounts for less than 10% of the variation in WT and indicating that other factors should be addressed since they explain more than 90% of the variation in WT**	• **Was unstable and unable to support accurate predictions in the long term.**

Conclusions were as follows:

Early data suggests that a higher number of staff is required to cover the morning shift.

Intervention aimed to solely reduce the number of patients by referring those of lower acuity to UCC is not expected to have a significant effect on the WT.

The frequency distribution with Histogram and box plot revealed right skewed data, high variation and a large number of outliers and extremes. WT of patients in triage category 3, 4 and 5 patients was not statistically different.

Control Charts revealed that 36% of cases were out of control and confirmed the high variation in WT that was previously noted.

Lean Six Sigma DMAIC Methodology – Step 3

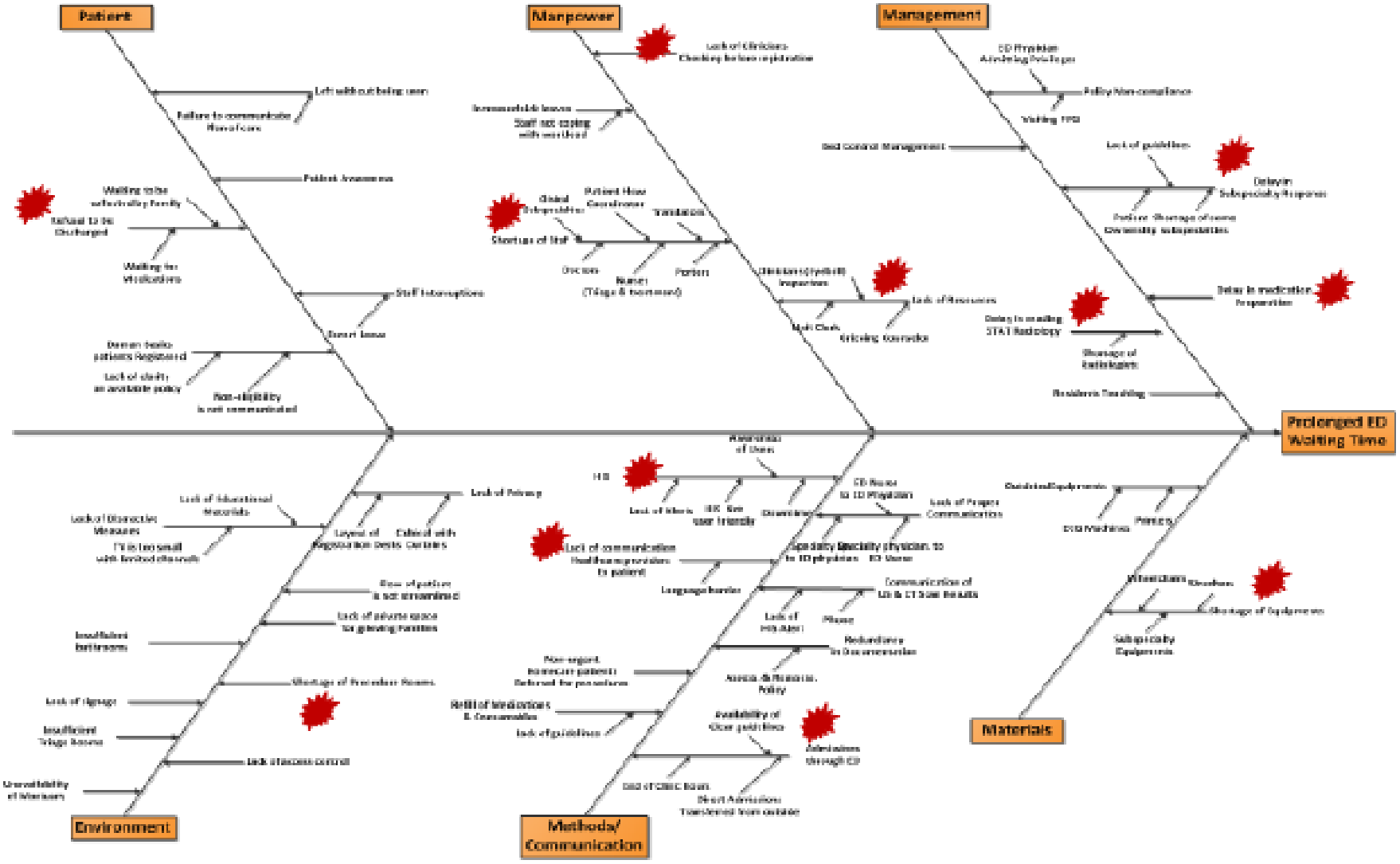
Definition

Analyze the data and identify the root causes of waste

Key Steps

1. Analyze the data in details
2. Verify your assumptions in terms of what might be causing problems
3. Brainstorm solutions that might fix the problem

Figure 26: Cause and Effect Analysis

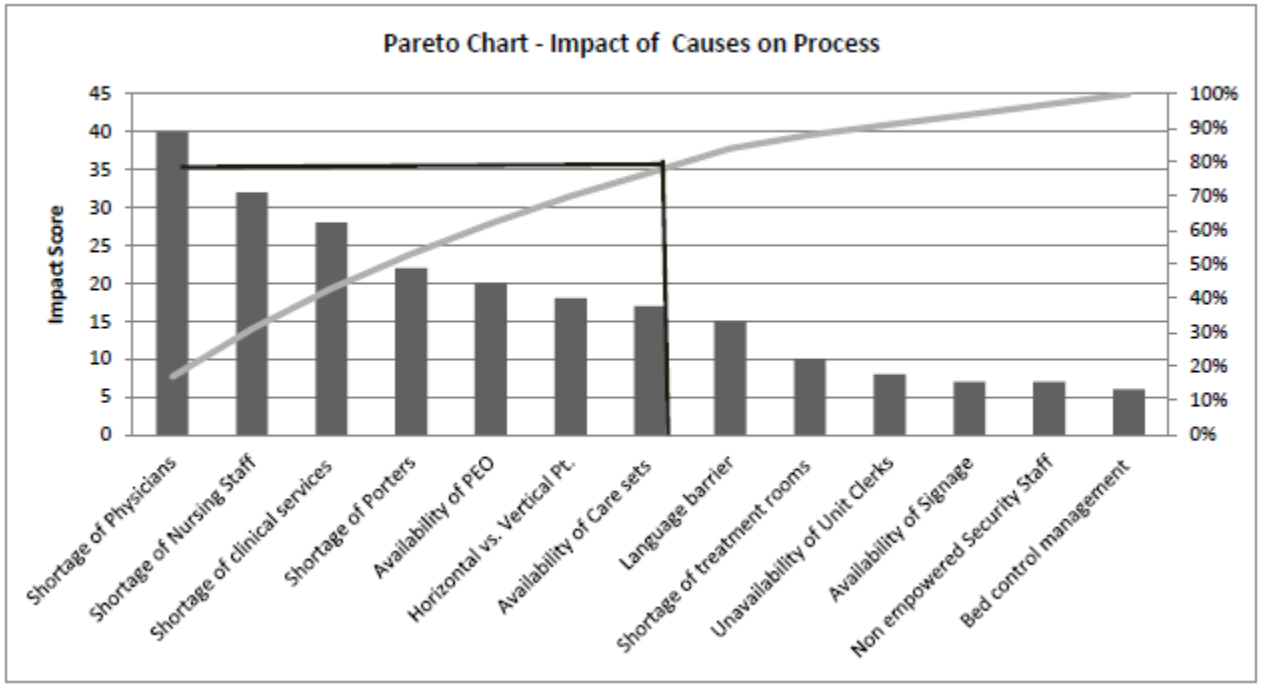


Root Cause Analysis

Table 6: Root Cause Analysis Rating

Potential Root Cause	Impact of Causes: Quality	Financial	Customer Satisfaction	WT	Total Score	% Score	Cumulative %
Shortage of Drs.	10	10	10	10	40	17%	17%
Shortage of Nursing	10	8	6	8	32	14%	31%
Shortage of clinical services	8	7	7	6	28	12%	43%
Horizontal vs. Vertical Pt.	5	5	6	6	22	10%	53%
Availability of Care sets	3	1	8	8	20	9%	62%
Shortage of Porters	3	5	5	5	18	8%	70%
Availability of PRO	3	3	3	8	17	7%	77%
Language barrier	4	1	6	4	15	7%	84%
Availability of Signage	1	1	3				
Shortage of treatment rooms	1	1	5				
Unavailability of Unit Clerks	1	1	4				
Non empowered Security	1	1	3				
Bed control management	1	1	1				
Impact Score Scale: 1-1; 1= lowest impact and 10 = highest impact							

Figure 27: Pareto Chart of the impact of causes on the process



Summary of Analyze stage

The patient tracers and value stream mapping helped the team to understand the patient journey and highlight both value and non-value added steps.

The eight forms of waste – waiting, motion, transportation, overproduction, defects, underutilized people and inventory – slowing the patient flow were identified and kept in mind to be rectified during the development of corrective actions.

The team was able to identify 66 underlying causes and sub-causes leading to the waiting time categorized under five categories.

Lean Six Sigma DMAIC Methodology – Step 4

Definition

Develop solutions to address the root causes

Key Steps

1. Select the best solution(s)
2. Test the solution(s)
3. Deploy the solution(s)
4. Measure improvement
5. Compare results versus improvement goals

Improve Stage

Based on the Cause & Effect analysis, an action plan was put together with the main stakeholders from ED to identify areas for improvements. Four brainstorming sessions two hours each were conducted with representations from Medical, Nursing, Patient Experience, Registration Clerks, Administration and Senior Management along with the Six Sigma team. The actions suggested were categorized under the six identified areas of concern:

- 1. Patient
- 2. Manpower
- 3. Management
- 4. Materials
- 5. Environment
- 6. Methods/Communication

For each identified cause, a corrective action was proposed by the team and was assigned a responsible person or department to implement and report status by a set timeline. Although each identified cause had a proposed corrective action, the team however felt that not all actions can be implemented immediately or that it would have adverse impact on the changes required.

Improve Stage

Subsequently, and to have quick wins, a priority matrix was utilized to prioritize the actions required that would have a high impact and are easy to implement. The development of the priority matrix was conducted over several sessions (at least 6 hours) where each identified cause was measured against the two set criteria. The findings helped the team to stage the actions to get the best outcome desired. Both the Action Plan and Priority Matrix were presented to the Executive Team and received the required support to move forward with the actions as planned.

With reference to table 7, and to distinguish between the quick wins of the actions implemented effective immediately and the long terms ones, the status of the actions were color coded.

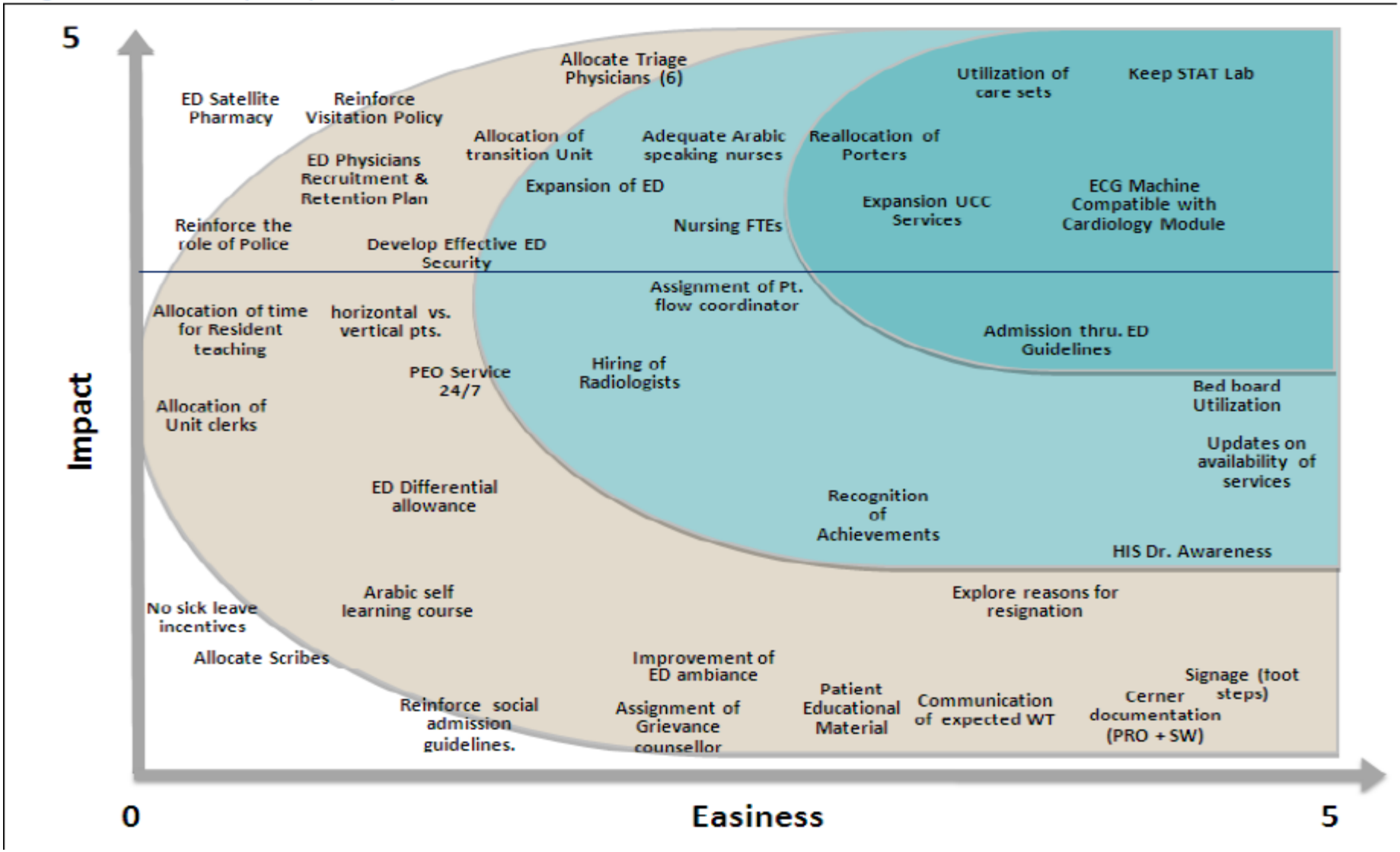
Action plan

Table 7: ED Waiting Time Improvement Action Plan

Identified Causes	Required Actions	BY Whom	By When	Status
Patient				
Left without been seen				
1. Delays are not communicated to patients	1. Communicate expected waiting time a. Allocate a big screen displaying expected waiting time b. Triage nurse to inform patient about expected waiting time c. Team leader updates the expected WT on the screen	Eng.	31st May 2014	Big Screen ordered, meanwhile placed small screen
2. Lack of patient awareness	1. Share the available ED Video with community through Facebook and website 2. Develop a brochure displaying ED roadmap and flow expectations 3. Reinforce the adherence with UCC referral	Portfolio group	31st of May 2014	Pending
3. Availability of Patient Flow Coordinator	1. Assign Patient flow coordinators	with Patient/staff flow portfolio group	31st of May 2014	Pending
Refusal to be discharged				
1. Patients want to be admitted for social reasons	1. In collaboration with other specialties to develop a protocol/guidelines addressing social admissions	discuss with CMO	1st of May 2014	Pending
Interruptions and Staff Assaults				
1. Availability of PEO	1. Assign a PEO 24/7 2. Allocation of police staff in ED	Team	30th of May 2014	Completed
2. Documentation of events and discussions by PEOs & Social workers	1. Reinforce the importance of documentation in Cerner 2. Train Staff on what to document & where to document		April 2014	Implemented & Ongoing
Manpower				
Shortage of Staff				
1. Shortage of Nursing Staff	1. Calculate the required nursing FTEs as per international/SEHA benchmark 2. Allocate patient flow coordinators (6 FTEs)	portfolio group	15th of May 2014	4 arriving in July, 6 in October, & 6 in Nov
2. Shortage of ED physicians	1. Update on the status of budgeted vacancies i. 6 triage GPs– Eyeball inspectors b. 14 consultants & specialists 2. Explore the possibility to allocate scribes in ED (low impact, difficult to implement)		31st December 2014	For triage doctors: 2 in Feb, 2 in May & 2 in June (all arrived)
3. Unavailability of Unit Clerks	1. Allocate positions for unit clerks (6-8 FTEs)		TBD	Pending
4. Shortage of Porters	1. Reassess the current porter responsibilities 2. Map the distribution amongst the hospital		Mid June 2014	Taskforce, started assessment, trial period for the new process in July
5. Unavailability of grievance counselor	1. Assign and train current staff (PEO) to assume this responsibility		TBD	Pending
6. Manpower utilization for category 4 & 5	2. Expansion of UCC to cover 16 hours per day	transferred during morning shift	Starting April 2014	Patients are offloaded to Family medicine clinics
Staff Morale				
1. No structured staff recognition	1. Staff recognition through the assignment of ED special & shift allowance/incentives 2. Regular ED staff gatherings 3. Celebrate wins and achievements	with	June 2014	Pending
2. Increased number of resignations and sick calls	1. Explore reasons for resignation through auditing the exit interviews a. Sick & Exit interviews conducted with all nursing staff b. Provide incentives for staff not utilizing their SL days c. Exit interviews for medical staff conducted by medical executive.	A & ED Nurse Manager c by CMO Office	May 2014	a & b implemented c in process

Actions Prioritization

Figure 28: Action plan priority matrix



Pilot Run Results

Since the employment of Triage physician in ED was identified as a quick win solution and in order to evaluate the benefit of its implementation. Two physicians were assigned in the triage area to assess patients, assist in assigning triage category, initiate an order care set or triage out patients with lower triage acuity to urgent care service.

Waiting Time data retrieved from the HIS for one of the assigned physicians was analyzed to show significant improvement in the WT in all categories where 94% of category 3 patients were seen in 30 min and 100% of category 4 & 5 were seen in 45 min.

Lean Six Sigma DMAIC Methodology – Step 5

Definition

Monitor and continuously improve

Key Steps

1. Ensure the process is being managed and monitored properly
2. Continuously improve the process
3. Share and celebrate your success
4. Apply new knowledge to other processes in your organization

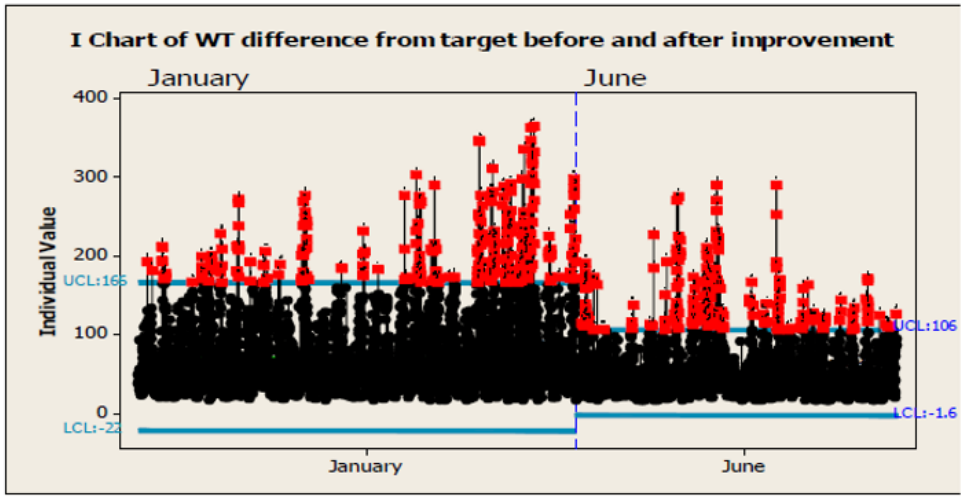
Control Stage

The plan of actions, priority matrix and pilot results were presented to the main stakeholders and Senior Management granting approval and financial support. A decision was made to implement the high impact, easy to implement actions including the following:

- 1. Expedite the process of recruiting five additional triage physicians for 24 hours coverage
- 2. Complete the development and implementation of diagnosis specific order care sets
- 3. Reverse the decision of closing the STAT Laboratory in the ED
- 4. Expansion of ED
- 5. Expansion of UCC Services
- 6. Assignment of PEOs for 24 hours coverage

In addition the Six Sigma team decided to quantify the improved process capability, implement the process control, develop a control plan and close the project.

Before and After



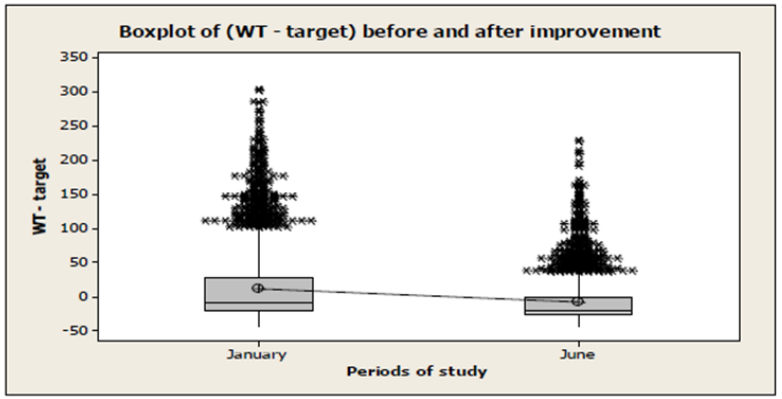
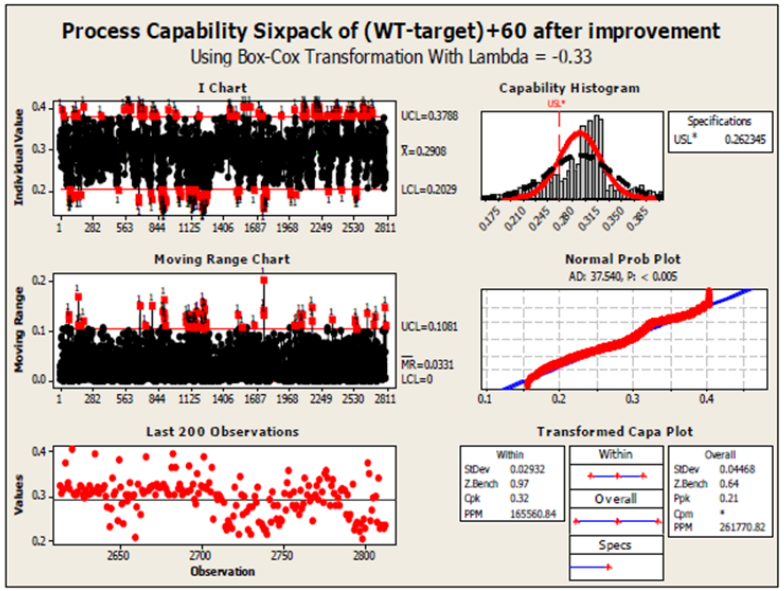


Figure 31: Process capability six pack of WT after improving the process (June 2014). Box and Cox transformation was used to normalize the data.



Results

Overall, the goal of 25% reduction in defects was accomplished as the DPMO decreased by 63% within 6 months.

Level	DPMO	Yield
1σ	691,452	30.8%
2σ	308,539	69.1%
3σ	66,807	93.3%
4σ	6,210	99.38%
5σ	233	99.977%
	3.4	99.999

Short term sigma increased from 0.13 to 0.97. Further improvement is expected with the full implementation of corrective actions and the support of Senior Management.

Estimated savings approached AED 11M ($3M) per year.

Results

SEHA recommends maintaining the WT within the recommended guidelines in 90% of cases thus tolerating 10% defects. The improved process exceeded SEHA tolerance limits by 6.5% only. This compares favorably to baseline data where the limits were exceeded by 34.8% (improvement of 81%). Thus, the Six Sigma goal of 25% improvement has been met.

Reduction in the percentage of the written ED patients' complaints related to prolonged waiting time from 37% to 23%. Similar results were obtained through the M initiative which revealed reduction in complaints related to prolonged WT from 23% to 10% before and after improvement respectively.

Number of patients who left ED without being seen decreased from an average of 89 per month to 41.

Control Measures

Performance Measure	Target	Process Owner	Frequency	Reporting
Category 3, 4 & 5 WT 1. Mean 2. Variability 3. Z bench 4. Control chart	Improve process capability by 25% in 6 months	ED Team with support from Six Sigma team	Monthly	PIC & E Team
Percentage of Patient satisfied with ED WT	90%	ED Team	Monthly	PIC & E Team
Number of written complaints related to ED WT	≈0	ED Team	Monthly	PIC & E Team
Percentage of patients leaving without being seen	≈0%	ED Team	Monthly	PIC & E Team

LSS Tools Used During the Proiect

Tool	Description	Aims
Define Phase		
Stakeholder Analysis	The team gathered and analyzed qualitative information about main process owners	To determine whose interests should be taken into account when developing and implementing plan of actions
Process Swim Lane Flowchart	The sequence of events from patients' arrival until discharge were graphed	To identify the inputs, outputs, activity steps and decision points in the process
SIPOC	A template for defining a process, before mapping, measuring or improving it	To get a high-level understanding of the scope of the process and determine the boundaries to work on
Measure Phase		
Data Measurement Plan	Is a plan to determine what data to collect, how it will be collected and reported	To remind the team members what they want to accomplish
Combined Line Graph & Bar Chart	The number of patients admitted to ED each hour and their respective WT were plotted in parallel on a timeline chart and bar graph	Screening tool reflecting the relation between the number of patients admitted each hour and their WT
Scatter Plot	ED WT was plotted against the number of admissions in each hour of the day and the correlation coefficient was measured	To analyze the association between the WT and the number of admission to ED
Histogram and Box Plot	The frequency distribution of ED WT was analyzed	To locate the center of the data mean and median and visualize the spread of data (variability)

Tool	Description	Aims
Control Chart	I-MR Control chart of WT for all patients & for different subgroups based on the triage category & the time of admission to ED	To look for common cause and special cause variations and check the process stability and behavior
Capability Histogram	Data was first tested for stability & normality. Data distribution identification &/or transformation were done when required to select an optimal distribution & measure sigma level and DPMO	To assess if the process is able to meet the voice of customer (specifications limits set by SEHA)
Analyze Phase		
Value Stream Map	Following patients' tracer (following randomly selected patients as they progressed through their journey in ED from admission to discharge), graph the cycle time for the important steps of the process and specify their value from the customer perspective	To assess the value added time of each step in the process that was traced and identify the activities causing non-value added time that can potentially be improved
Cause & Effect Analysis	Joint brainstorming sessions facilitated by the Six Sigma team leader and key stakeholders to graph causes of long WT in a structured Fishbone Diagram	To identify all possible causes of the long WT and categorize systematically
Root Cause Analysis Rating	The matrix used to assess each potential root cause over impact dimensions and develop a score.	To help ranking the potential root causes with the most impact on the symptom.
Pareto	A technique used for decision-making based on the Pareto Principle, known as the 80/20 rule.	To analyze what problems need attention first because the taller bars on the chart, which represent frequency, clearly illustrate which variables have the greatest cumulative effect on a given system.
Improve phase		
Action Plan	Table describing recommended actions, the allocated responsibilities and the timeline for implementation	To follow on the action plan and ensure its implementation
Priority Matrix	Joint brainstorming sessions of the Six Sigma team and main stakeholders to plot the recommended actions in a priority matrix graph	A subjective method to prioritize the actions for implementation based on the easiness to implement and impact on WT improvement
Control Phase		
Capability Six Pack with Cox & Box Transformation	This included an I-MR chart with Anderson test of normality, a scatter plot, a capability histogram and a summary statistics	To assess the pre-requisites of capability analysis (normality and stability) and measure the capability of the process
I-MR Chart with Historical Control	Individual Control Chart for June 2014 with a historical control from January 2014	To assess the process behavior after improvement (lower mean WT, less variability, more stability)

Take Aways for success in future projects

- Engagement of key stakeholders
- Support of Senior Management
- Team collaboration
- Commitment and Clear rules of engagement
- Utilization of systematic approach and quality tools
- Continuous and close follow up

Benefits of LSS in healthcare

Defects

Non Value Activity

Costs

Leads To

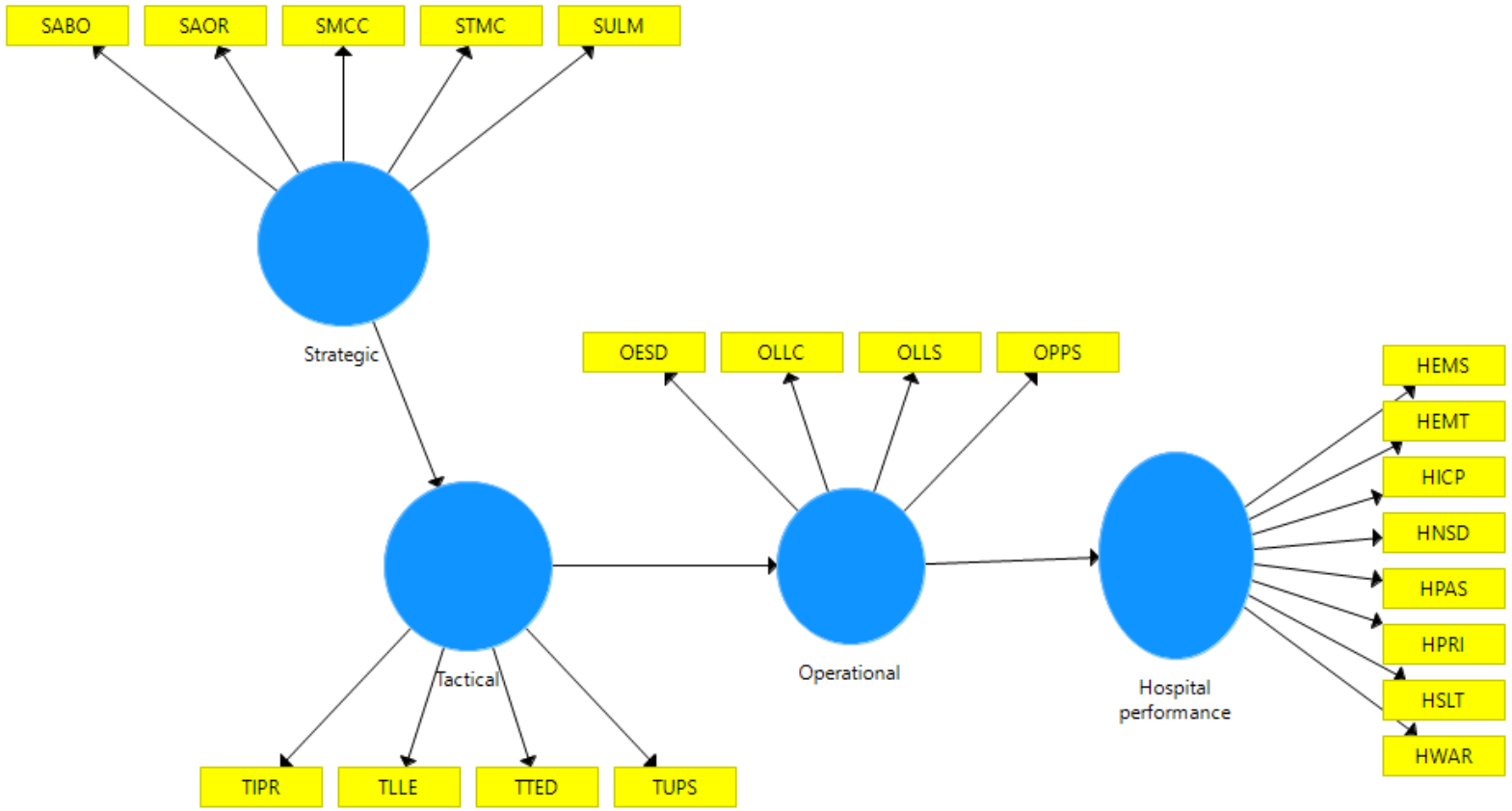
Patient Satisfaction

Patient Safety & Quality

Efficiency and Effectiveness

Reputation & Financials

Bonus Take Away: A Suggested Model to Implement LSS: Findings from Fawzi Bawab PhD research



Bawab,F (2019) The Effects of Lean Six Sigma Critical Success Factors on Organizational Performance: A mixed-methods study on United Arab Emirates Hospitals, Heriot-Watt University

Categories (Theme)	CSF	Code
Strategic	Top Management Commitment	STMC
	Management of cultural change	SMCC
	Aligning LSS projects to business objectives	SABO
	Understanding LSS methodology	SULM
	Availability of resources (financial, time)	SAOR
Tactical	Linking LSS to employees	TLLE
	Incentive programme	TIPR
	Training and education	TTED
	Usage of problem-solving and Statistical thinking and tools	TUPS
Operational	Established Lean Six Sigma dashboard	OESD
	Linking LSS to suppliers	OLLS
	Project Prioritisation selection, management, and tracking	OPPS
	Linking LSS to customers	OLLC
Patient outcomes	Patient satisfaction	HPAS
	Service lead time	HSLT
Staff and work system outcomes	Satisfaction	HEMS
	Turnover	HEMT
Hospital efficiency and effectiveness outcomes	Productivity increase	HPRI
	Number of service defects and errors decrease	HNSD
Flexibility performance outcomes	Waste reduction	HWARHICP
	Increase in competitive profile	

It's all about Value…

"The central goal in health care must be value for patients, not access, volume, convenience or cost containment".

Professor Michael E. Porter
Harvard Business School

"Health care systems need to be redesigned so that they dramatically improve patient value".

Thank you!

Your Presenter Dr. Fawzi A. Bawab: A Brief Bio

Education :Dr. Fawzi Bawab is a partner with Meirc. He holds a bachelor of science in civil engineering and an M.Sc. in industrial engineering with an emphasis on total quality management from University of Jordan. He also holds a postgraduate certificate in Business research methods and a doctor of philosophy (PhD) in Lean Six Sigma from Edinburgh Business School at Heriot Watt University in the UK. Fawzi is a registered professional engineer (P.E.) with the engineering association in Jordan. He is also a senior member of the American Society for Quality (ASQ), the American Institute of Industrial Engineers (IIE) and the American Society for Engineering Management (ASEM). Among the certifications he holds are: certified quality lead assessor with IRCA of England, certified TS16949 automotive assessor, approved ASQ Lean Six Sigma trainer and ASQ certified manager of quality and organizational excellence. Fawzi is a certified Six Sigma Master Black Belt (CSSMBB) and a Kaplan-Norton strategy and KPI qualified practitioner. Fawzi is a certified training practitioner (CTP) from the Institute of Performance and Learning, Canada.

Experience :Prior to joining Meirc, Fawzi held several managerial positions in Canada and the Middle East. He was the training director and a consultant with British Standards Institution (BSI)- Americas based out of Ottawa, Canada. He also was the regional business manager with BSI based in Dubai, UAE. Before that, he was the training director with KPMG Quality Registrar in North America. Fawzi also worked with IBM as the quality manager/specialist for IBM locations in the Gulf region. Earlier in his career, he worked as a quality consultant with Talal Abu Ghazleh consulting firm in Dubai. Fawzi also worked for a leading insurance company in Jordan as an assistant marketing manager and quality coordinator.

Expertise :Fawzi has more than 29 year worth of top management experience in various companies in areas of quality, strategy planning and organizational improvement. At Meirc Training and Consulting, he has been supporting and coaching organizations in achieving their business objectives through training and consulting for business process improvement. His areas of competence include delivery of top-rated public and customized private in-house training in all areas of corporate quality systems. These include: Six Sigma (black belt, green belt, champion), Lean, customer service, ISO, strategic quality planning, Total Quality Management (TQM), process improvement, leadership, Statistical Process Control (SPC), performance management and strategic management. Fawzi has trained and coached thousands of participants in different fields. He is also a frequent keynote speaker at professional conferences and meetings. **Fawzi can be reached at fbawab@Meirc.com**

Fawzi Bawab Aka The Quality Guy

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Over 29 Years Experience

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IBM

BSI

AIG

Lean Six Sigma, ISO

Business Process Improvement

Quality management systems

KPIs and Balanced Scorecards

Leadership & Strategic planning

Join me on my LinkedIn profile