



# Lean and Six Sigma Deployments in Hospitals

American Society for Quality



## Lean and Six Sigma

- Many industries and businesses have turned to Lean and/or Six Sigma to improve their organizations
  - Manufacturing
  - Service companies
  - Retailers
- Two distinct approaches, though some use a collective approach called “Lean Six Sigma”
- Lean and Six Sigma both have had staying power beyond previous “hot” improvement methods
  - Reengineering
  - Theory of Constraints
  - Etc.



## Lean improvement method

- Emerged from work of Jim Womack and MIT colleagues studying Toyota and other firms in Japan
- Focus on satisfying customer demand (what they want, and when and how they want it)
- Use of scientific method, specifically PDCA (plan, do, check, adjust/act)
- Minimize waste in satisfying demand:
  - Overproduction - more than demand dictates
  - Waiting - idleness
  - Transport - unnecessary movement of material
  - Processing - unnecessary processing
  - Inventory - more than needed
  - Motion - wasteful or harmful
  - Correction - redo, rework



## Six Sigma improvement method

- Management strategy developed by Motorola
- “Six Sigma” literally defined by quality standard of 3.4 defects per 1 million opportunities
- Statistical emphasis on eliminating errors and reducing product and process variation
- Infrastructure of improvement agents (e.g., black belts)
- Use of DMAIC process (similar to PDCA)
  - Define
  - Measure
  - Analyze
  - Improve
  - Control



## Attention on Lean and/or Six Sigma in healthcare

- Urgency for healthcare improvement coming from various perspectives
  - Government emphasis on improvement
  - Profit and not-for-profit facilities need to manage costs better
  - Quality of care always a concern
- Many early efforts and successes with Lean and/or Six Sigma well-publicized



## Lean and/or Six Sigma successes in healthcare:

- **Virginia Mason, Seattle** — Using lean since 2002 to eliminate wastes (rework); improve quality, productivity and program capacity; and control capital expenses.<sup>1</sup>
- **Massachusetts General, Boston** — Lean increases throughput in proton center, increasing patient access to rare form of radiology oncology therapy.<sup>2</sup>
- **Mayo Clinic, Rochester, MN** — Lean and Six Sigma address multiple processes, including decreasing times to get patients suffering acute ST elevation myocardial infarction to clinic for angioplasty.<sup>2</sup>
- **Clearview Cancer Institute, Huntsville, AL** — Physicians and staff use lean concepts to reengineer processes and patient flow in a new facility, eliminating wasted time (waiting for both patient and physician), and improving capacity to serve cancer patients as well as overall patient experience.<sup>2</sup>

<sup>1</sup> Institute for Healthcare Improvement

<sup>2</sup> Lean Enterprise Institute



## **Difficulty gauging the extent of Lean and Six Sigma**

- Most proof of proliferation of these methods has been anecdotal
- Case studies point to success, but is it the hospital, the inherent traits of improvement methods, or both?
- Need to establish a statistical baseline for examining Lean and Six Sigma deployment in hospitals



## ***ASQ Hospital Study* launched**

- American Society for Quality fields the *ASQ Hospital Study* in 2008
- Attempts to answer what hospital executives and practitioners want to know:
  - Are hospitals deploying Lean and/or Six Sigma?
  - Why do hospitals deploy — or not deploy?
  - In which departments are hospitals deploying Lean and/or Six Sigma?
  - Are Lean and/or Six Sigma efforts generating benefits/success?



## **ASQ Hospital Study completed**

- Responses provided on 77 hospitals from March to October 2008
- Primarily senior-level responses — 70% of responses came from CEO, COO, CFO, VP, Chief Medical Officer, Chief Quality Officer, or Lean/Six Sigma leader
- Overall study responses provide a confidence interval of approximately  $\pm 11$  at 95% confidence level; subquestions for only Lean and/or Sigma deployers less statistically significant ...
- But all Study analysis provides a range of excellent benchmarks for hospitals considering Lean and/or Six Sigma



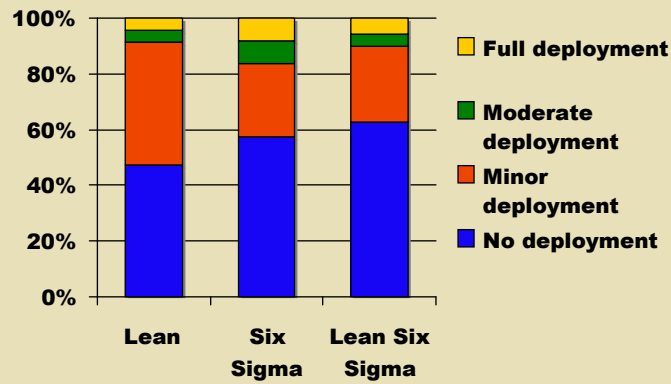
## **ASQ Hospital Study participating hospitals**

• For-profit or non-profit		• Days of patient care	
– Profit	5%	– Median	38,691
– Non-profit	95%	– Average	59,936
• Independent hospital		• Gross revenue	
– Independent	49%	– Less than \$100 M	24%
– Part of system	51%	– \$101 M to \$250 M	32%
• Teaching hospital		– \$251 M to \$500 M	29%
– Yes	24%	– More than \$500 M	15%
– No	76%	• Payer mix (averages)	
• Staffed beds		– Private payers	28%
– Median	161	– Government payers	60%
– Average	231	– Self-pay	7%
• Admissions		– Other	6%
– Median	8,402		
– Average	11,441		



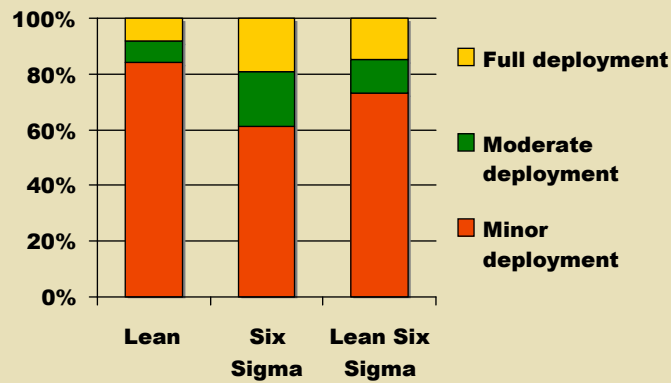
## Level of deployment — All hospitals

Level of hospital wide deployment:



## Level of deployment — Among deploying hospitals only

Level of hospital wide deployment:





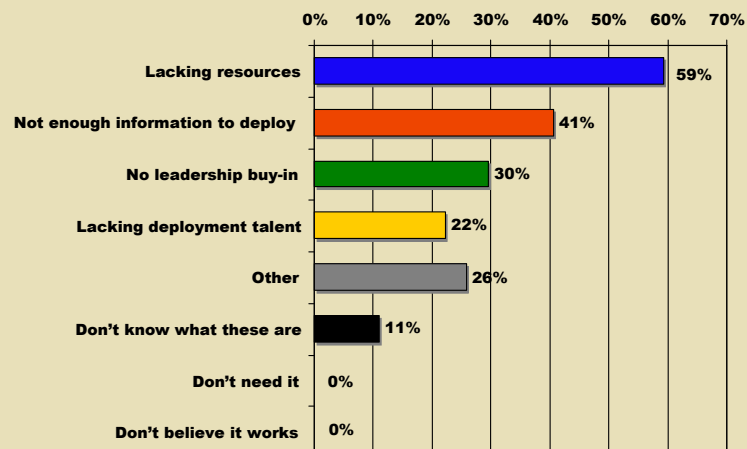
## Have hospitals deployed Lean and/or Six Sigma?

- Many U.S. hospitals have deployed Lean and/or Six Sigma
  - 53% report some level of deployment of Lean
  - 42% some level of deployment of Six Sigma
  - 37% some level of deployment of Lean Six Sigma)
  - 68% of Lean users also deployed Six Sigma; 86% of Six Sigma also deployed Lean
- Most deployments not extensive:
  - 84% of hospitals that have deployed Lean report “minor deployment”



## Hospitals don't deploy Lean and/or Six Sigma because ...

If no deployments, primary reasons:





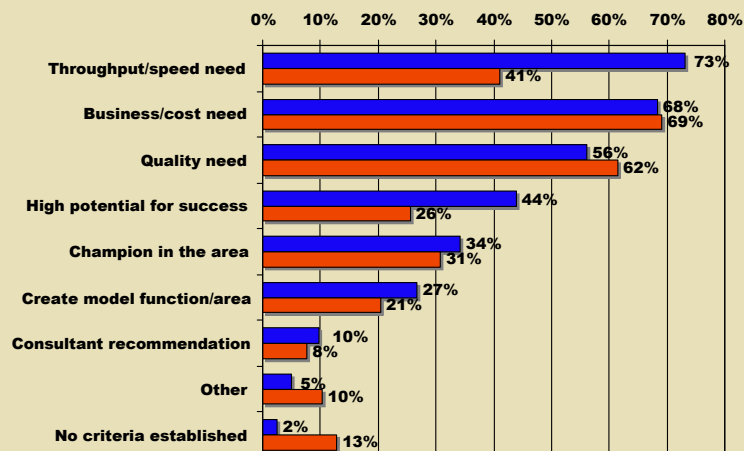
## Do hospitals believe Lean and/or Six Sigma can work?

- None of the hospitals that know what Lean and/or Six Sigma are:
  - Believe they don't need it
  - Doubt the efficacy of the methods
- A need for resources and information tops list of primary reasons for no deployment
- But surprisingly, one in 10 don't know what these methods are — and that's among study participants who were alerted in advance what the study would cover



## Hospitals deploy Lean and Six Sigma because

Most frequent criteria for deploying in an area among hospitals that have deployed Lean and/or Six Sigma:





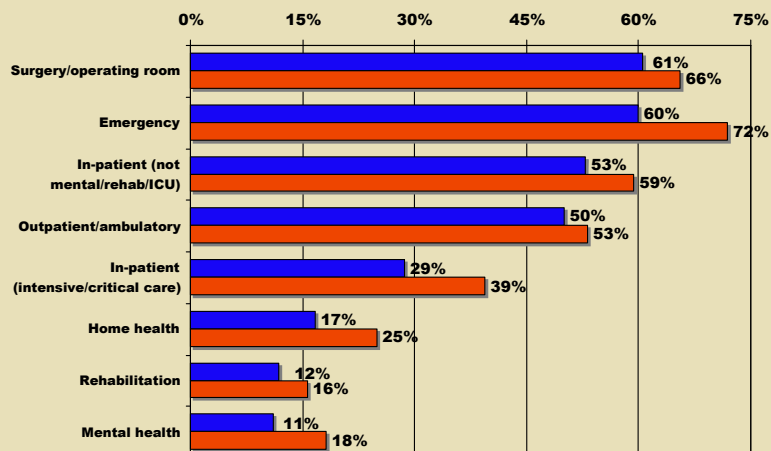
## What are criteria for deploying Lean and/or Six Sigma?

- Three reasons dominate why hospitals are driven to pursue Lean and/or Six Sigma:
  - Throughput need
    - 73% of Lean deployers
    - 41% of Six Sigma deployers
  - Business/cost need
    - 68% of Lean deployers
    - 69% of Six Sigma deployers
  - Quality need
    - 56% of Lean deployers
    - 62% of Six Sigma deployers
- One difference in reasons to deploy between methods — High potential for success



## Lean and Six Sigma deployment targets — Clinical

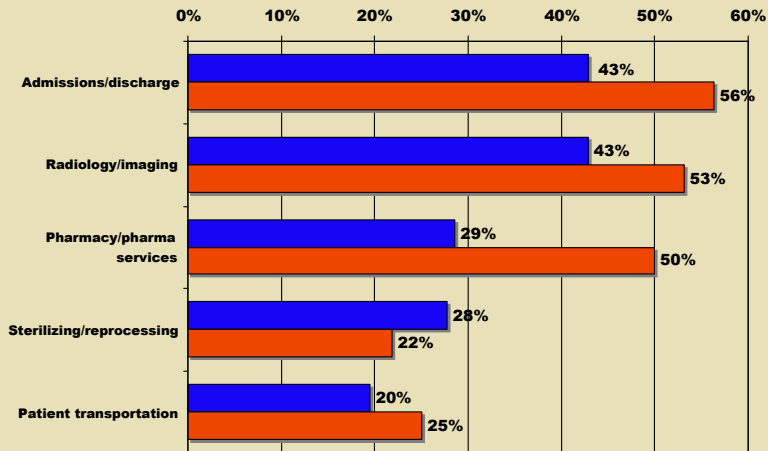
Deployment by hospital departments/areas among hospitals that have deployed Lean and/or Six Sigma:





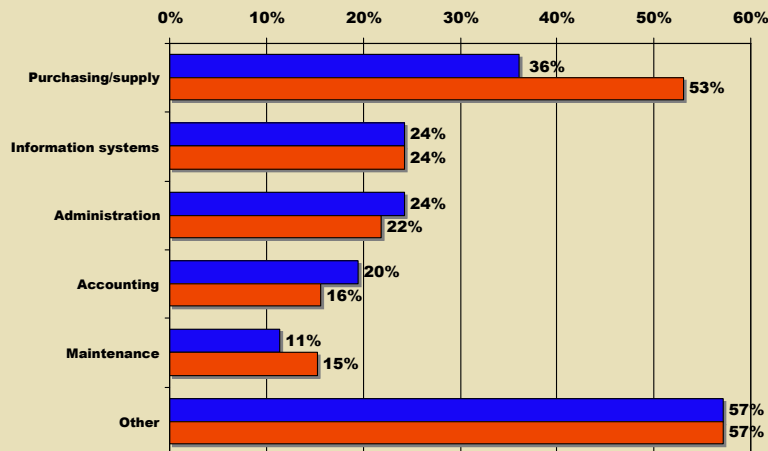
## Lean and Six Sigma deployment targets — Ancillary/support

Deployment by hospital departments/areas among hospitals that have deployed Lean and/or Six Sigma:



## Lean and Six Sigma deployment targets — Non-clinical support

Deployment by hospital departments/areas among hospitals that have deployed Lean and/or Six Sigma:





## Where are hospital deploying Lean and/or Six Sigma?

- Half (50% median) of both Lean and Six Sigma deployments cut across departments
- Common areas of focus for the two methods:
  - **Clinical**
    - Lean deployers: Surgery/operating room (61%) and emergency (60%)
    - Six Sigma deployers: Emergency (72%) and surgery/operating room (66%)
  - **Ancillary/support services**
    - Lean deployers: Admissions/discharge (43%) and radiology/imaging (43%)
    - Six Sigma deployers: Admissions/discharge (56%)
  - **Non-clinical/support**
    - Lean deployers: Purchasing/supply (36%)
    - Six Sigma deployers: Purchasing/supply (53%)



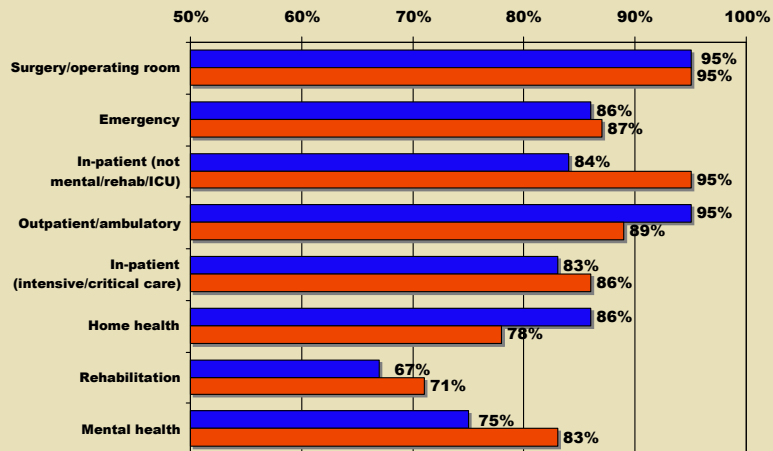
## Where are hospital deploying Lean and/or Six Sigma?

- Clinical focus on operating rooms and emergency rooms
  - Addresses the top three reasons why methods are being deployed
    - Quality always a healthcare focus
    - Throughput (i.e., optimizes revenue generating abilities of operating rooms)
    - Which then addresses business need (increase revenues, lower costs)
- Six Sigma generally more in use in each area, possibly because it's more accepted among data-oriented medical and scientific professionals (i.e., analyze data at desk/computer?)



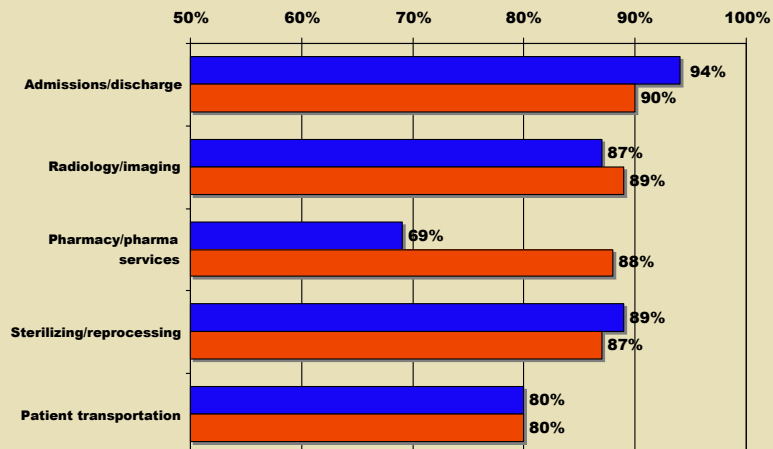
## Lean and Six Sigma somewhat or highly successful — Clinical

Deployment efforts somewhat or highly successful in departments/areas where Lean and/or Six Sigma was deployed:



## Lean and Six Sigma somewhat or highly successful — Ancillary

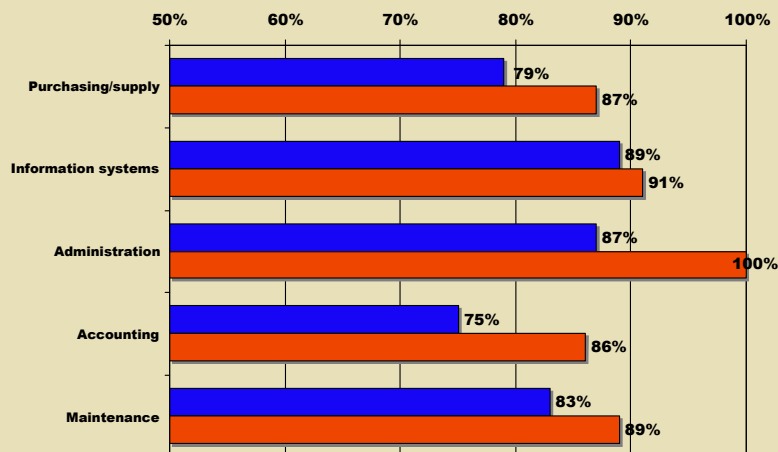
Deployment efforts somewhat or highly successful in departments/areas where Lean and/or Six Sigma was deployed:





## Lean and Six Sigma somewhat or highly successful — Non-clinical

Deployment efforts somewhat or highly successful in departments/areas where Lean and/or Six Sigma was deployed:



## Is Lean and/or Six Sigma providing benefit?

- Most hospitals are seeing some benefit (“somewhat” or “highly” successful) from their Lean and/or Six Sigma deployments
- Small sample sizes make it difficult to apply much granularity to this analysis
- Nonetheless, hospitals should be encouraged by ability to make an impact with small investment for entire hospital:
  - Lean \$25,000 (median)
  - Six Sigma \$96,485 (median)
- Note: Success-rate percentages are based on departments/areas where deployment has occurred



## Does Lean and/or Six Sigma affect hospital-wide performance?

- *ASQ Hospital Study* also sought data on variety of operations and financial measures (e.g., length of stay, operating margin)
- Correlating Lean and/or Six Sigma with hospital-wide improvement was equivocal and complicated by:
  - Small percentages/sample of deployment hospitals
  - Smaller percentages/sample of “moderate” or “full” deployment hospitals in which enterprise improvement would be expected
  - Some hospitals, especially those without Lean and/or Six Sigma, don’t track some metrics (e.g., 27% do not track formal patient complaints as a percentage of admissions)
- Questions:
  - Would deeper and broader levels of deployment lead to expected performance measures/improvements?
  - What if hospitals without Lean and/or Six Sigma tracked all the measures and provided answers to the Study?
  - What if other hospitals — those unaware of Lean and/or Six Sigma — had participated in the Study?



## Q&A

?



## **Contact ASQ**

**American Society for Quality  
600 North Plankinton Avenue  
Milwaukee, WI 53203**

**414-298-8789**

**[www.asq.org](http://www.asq.org)**