

# Lean Thinking for Healthcare

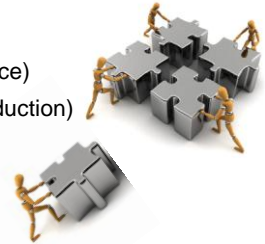
## Applications of LEAN thinking to hospital management

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## Five Key Concepts of Lean

- Eliminate waste
- Process analysis
- *Jidoka* (defect avoidance)
- SMED (Set-up time reduction)
- Respect for people

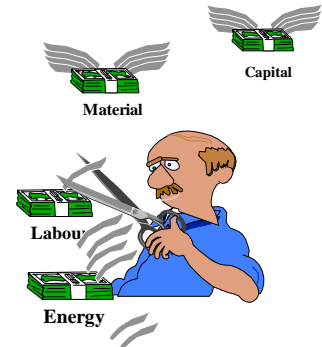


## Eliminate Waste

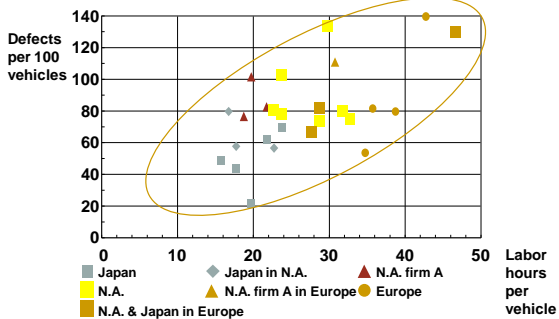


## Goal of Just-in-Time (JIT)

JIT aims to eliminate waste wherever it occurs



## Productivity versus Quality



## Process Analysis



# Lean Thinking for Healthcare

## Forms of Work

Inspection

Storage

Delay

Transportation

Processing

Which add value?

## Value Added versus Not at the Paediatric Orthopaedic Clinic in London, Ontario

Activity	Value added	Other	Waiting
Front desk	0	14	16
Radiology	6	10	35
Front desk	0	4	0
Examination & cast change	24	0	14
Total	30	28	65

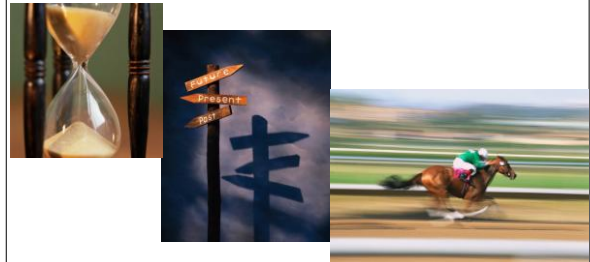


## What Does This Time Study Imply?

Observation	Time (minutes)	Effort rating
1	2.9	100%
2	3.4	100%
3	3.0	100%
4	3.3	100%
5	2.9	100%
6	2.5	100%
Total	18.0	



## Time is the shadow of motion!

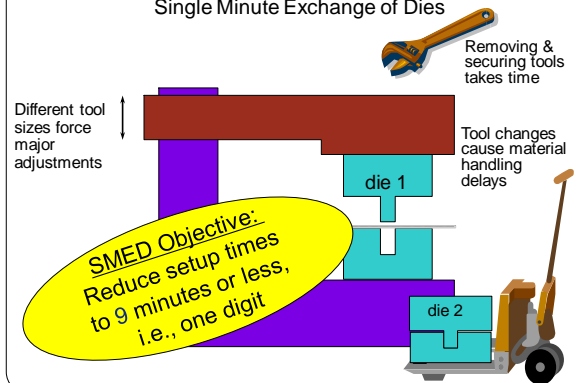


## SMED

Set-up Time Reduction  
= Single Minute Exchange of Dies



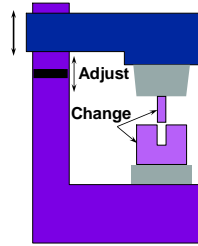
## SMED: Single Minute Exchange of Dies



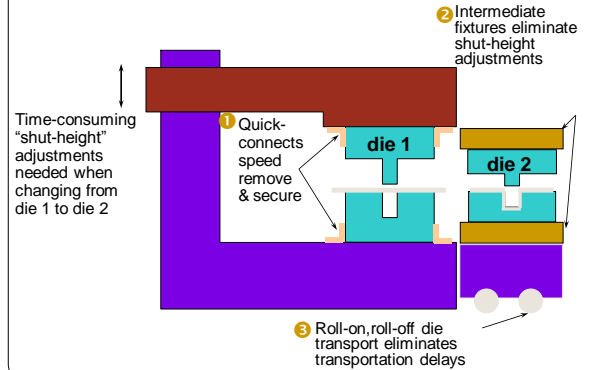
# Lean Thinking for Healthcare

## Shigeo Shingo's SMED System

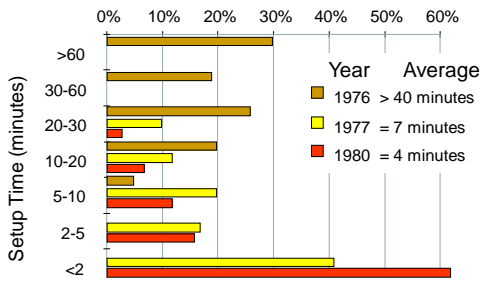
- Identify setup tasks as *internal* (must be done during shutdown) or *external* (can be done while equipment is running)
- Establish procedures (e.g., **checklists**) to ensure that all external tasks are completed prior to shutdown.
- Modify procedures, tooling or equipment to **convert** internal tasks to external tasks.
- **Simplify** or **eliminate** tasks, especially internal ones.



## SMED Examples



## SMED: Jidosha Kiki Experience Ten-fold Improvement in 4 years



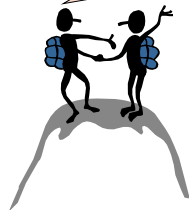
## Jidoka

Making Errors Impossible

## Toyota's Good Thinking for Problem-Solving

- Stick to the facts  
"Let's go see it"
- Find the root cause  
Ask Why 5 times
- Eliminate the root cause

Isolate the problems from people and enable people to focus on solving the problems



## Cost of Quality



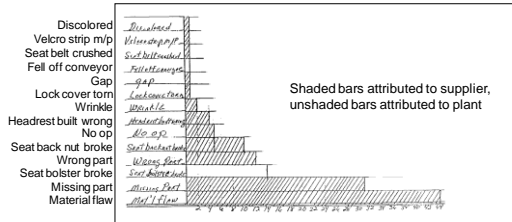
- Quality lapses may cause these extra costs
  - Reduced facility and human resource capacity to handle incoming patients
  - Costs of added drugs and other materials
  - Extra patient care upon release
  - Increased likelihood of readmission
  - Patient death, pain, suffering and malpractice claims
  - Employee turnover and associated training costs
  - Reduced budgets in following years due to lower patient intake
  - Negative publicity impacts reputation, donor giving and ability to attract top talent



# Lean Thinking for Healthcare

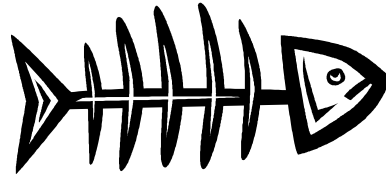
## Which Defect\* to Investigate First?

Prioritize with a Pareto Diagram

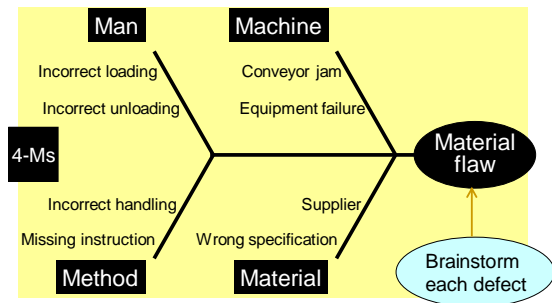


\* 128 CAMRY Seat Defects in 17 days at Toyota's Georgetown, Kentucky assembly plant

## Think Fishbone



## Fishbone Diagram\*



\* Also known as Ishikawa and Cause & Effect Diagrams

## Quality Control



### Traditional

- Accept that defects are inevitable
- Trade-off customer costs against inspection costs
- Keep production flowing, fix defective products later
- Reduce the cost of inspection by sampling
- SQC's role: control product quality



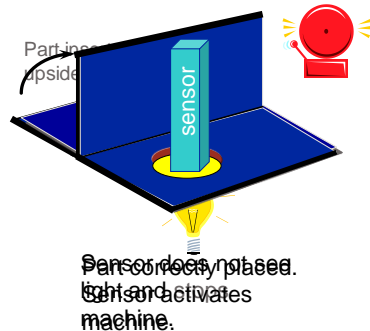
### Zero Defect

- Accept that "To err is human"
- Deliver 100% good quality to the customer
- Identify defects and eliminate their source as soon as they occur
- Reduce cost of inspection with Poka-yoke
- SQC's role: control process quality

## Poka-yoke = Mistake-Proofing



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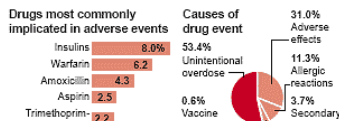
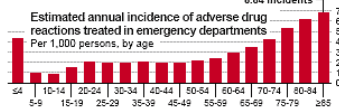


# Lean Thinking for Healthcare

## Quality in Healthcare...

### Common drugs can cause bad reactions

A government report estimates 700,000 Americans suffer from harmful reactions to commonly used drugs. The study relied on information from 63 hospitals reporting 21,298 bad reactions in 2004-05.



NOTE: Numbers may not add to 100 percent due to rounding; Warfarin is a blood thinner, Trimethoprim sulfamethoxazole is used to treat infections

SOURCES: Journal of the American Medical Association; Centers for Disease Control and Prevention

### CDC Urges Hospitals to Tackle Drug-Resistant Infections

DOW JONES NEWSWIRES  
October 19, 2006 8:55 p.m.

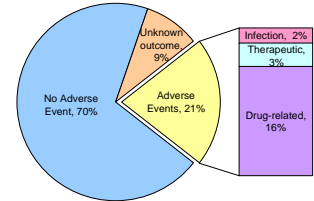
• **2 million** people acquire infections in hospitals per year in U.S.

• Result in **90,000 deaths**

• Account for **\$4.5 billion** in excess health-care costs annually

## And in Canada...

- 3,745 patient charts randomly selected from 4 hospitals in each of 5 Canadian provinces in 2002
- 1,527 charts (40.8%) met the screening criteria and 255 AEs (16.7%) were identified
- Each outcome independently reviewed by two physicians to see if patient experienced an adverse event (AE) and if it could have been avoided
- Average age was 71 years
- 28% of the adverse events were preventable and a further 22% were ameliorable!



**"195,000 U.S. deaths blamed on hospital errors" - HealthGrades Inc.**  
Reuters. Updated: 12:33 p.m. ET July 28, 2004

Source: "Adverse Events Among Medical Patients After Discharge from Hospital", Alan J. Forster et al, CMAJ, February 3, 2004; 170 (3)

## Quality Takeaways

- All defects are caused—they don't just "happen"
- Aim to detect defects at their source
- Establish defect-specific inspection routines
  - Provide photographs to show what defects look like
- Use Pareto Analysis to prioritize problems
- Brain-storm each root cause using a Cause-and-Effect (Fishbone) Diagram
- Eliminate each root cause by installing one or more mistake-proofing (*Poka-Yoke*) devices

## Respect for People



## Kaisen = Incremental Approach

- Projects "bubble up"
- Lots of small experiments
- Low capital requirements
- Low-level expertise
- Committed, long-term employees
- Participation at all levels
- Broad experience and inter-functional working relationships
- Does not require...
  - Large staff organizations
  - Outside experts
  - Massive investments
- "Japanese successes in the auto, semiconductor, and consumer electronics markets are primarily due to a determined focus on short-term, incremental gains."



Kenichi Ohmai  
Wall Street Journal,  
January 18, 1982

## Kaizen versus Kaikaku

### Kaizen

- Many small changes
- Many suggestions by operators & staff
- Rapid acceptance and implementation
- Leading to reductions in labor, defects, accidents, late deliveries, delays

### Kaikaku (Kaizen Blitz)

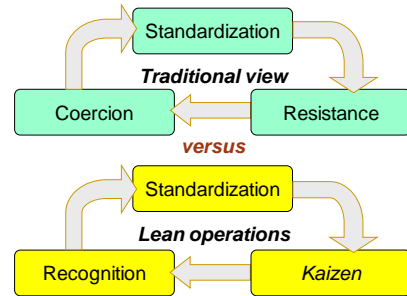
- One-time major leap
- Focused 3- to 5-day event
- Initiated by guru (*sensei*)
- Backed by lean champion
- Example: switch from a functional to a product layout (i.e., a cell)

# Lean Thinking for Healthcare

## Standardized Work Charts

- A chart for each job that shows:
  - the procedure
  - the standard time
  - the expected work-in-process
- Actively discourage individual variations from the standards
  - If you have a better way, please suggest it!
- Improvement suggestions are based on modifying the standardized chart
- Another old idea...
  - Installed in 1950 as a result of Toyota visits earlier in the year to the Ford Motor Company

## Standard Work—Different Viewpoints



## Employee Attitude Beliefs

### Traditional

- Employees wish to do as little as possible
- Employees are disrespectful and untrustworthy
- Employees expect the moon

### Lean

- Employees wish to excel
- Employees need and deserve respect and trust
- Employees have realistic expectations



## Suggestion Programs

- Who receives and approves them?
  - Team leader, coach or supervisor
- Feedback how quickly?
  - Within hours
  - Keep contributor informed if suggestion requires outside approval (safety, quality, engineering, finance, etc.)
- Who implements them?
  - Employees within work centre (i.e., the team) with assistance if required
- What types of rewards?
  - Mostly recognition and team-based



## Cultivating Suggestions

- Invest management time
  - Worry less about wasting management time with poor suggestions than about discouraging suggestions from being made in the first place
- Minimize approval and implementation red tape
  - Push process as low in the organization as possible
- Ensure that suggestions are focused
  - Tell employees which areas need their help
  - Especially welcome suggestions on areas that are likely to contribute to safety, quality, productivity or team cohesion

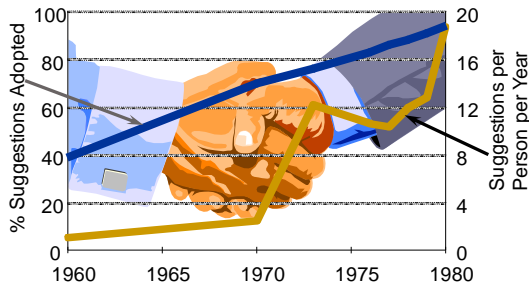


## Make Regular Suggestions a Habit

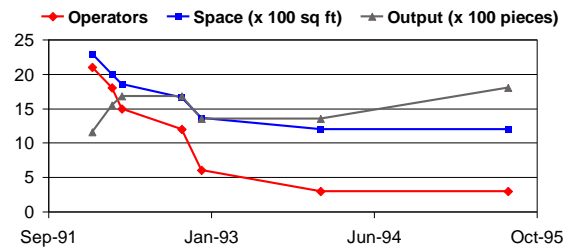
- Provide employees with a simple suggestion form on which they can write or sketch their ideas & their benefits
- Treat effort in the beginning as a learning process
- Don't build expectations too high
- Keep trying even if the first few suggestions reveal that employees do not understand the process
- Employees will learn and the next suggestion could be a really important one
- Avoid distinguishing excessively upon "great" versus "good" suggestions—they all count—there are lots more of the latter!

# Lean Thinking for Healthcare

## Suggestions Received at Toyota



## Six Kaikakus at Freudenberg-NOK



Results achieved by six 3-day Kaizen blitzes ("Kaikaku") in same department  
Source: Lean Thinking, James P. Womack and Daniel Jones, Free Press 2003

## The 5 S's – A Great CI Start

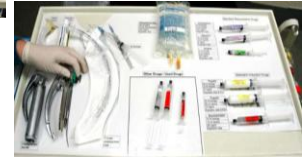
- Sort (Seiri)
  - Eliminate clutter, discard unneeded items
- Stabilize (Seiton)
  - A place for everything, and everything in its place
  - Create shadow boards, mark each storage location
- Shine (Seiso)
  - Clean tools, equipment & workplace
- Standardize (Seiketsu)
  - Develop equipment and workplace cleaning routines
- Sustain (Shitsuke)
  - Stick to the rules, encourage self-discipline

## 5S Example in Anesthesia at Virginia Mason Medical Center

Before



After (shadow board)



## Lean Beginnings

- Provide a *sensei* (guru) at the start
  - Employees unlikely to succeed on their own
  - Teach & help identify targets for *kaikaku* or *kaizen*
- Appoint a champion within the organization with power to remove roadblocks
- Give employees the confidence that they will not be working themselves out of a job
  - If head count reductions are required, make them before starting lean journey
  - Once lean begins and efficiencies improve, it is management's job to find additional work to consume the freed-up resources

## In Summary

- Lean works!
  - But not without employee participation
  - Employees will not work themselves out of their jobs
- Expect to *kaizen* over and over
- Success requires continuous stream of new work
  - Increase market share
  - Develop more new products faster
  - Bring input production in-house (i.e., in-source)