The Toyota/Lean Approach Applied to Health Care
Haussse de 4 à 6% des chirurgies dans 16 hôpitaux en trois mois

Jacinthe Tremblay
Édition du samedi 04 et dimanche 05 octobre 2008
Mots clés : Haussse, Chirurgie, Hôspital, santé, Québec (province)

L’engagement de 2006 de la Fédération des médecins spécialistes du Québec (FMSQ) à collaborer à l’augmentation du nombre de chirurgies afin de réduire les délais d’attente commence à porter ses fruits. Depuis trois mois, le nombre d’opérations a augmenté de 4 à 6% en moyenne dans 16 hôpitaux. Une refonte de la rémunération des anesthésistes, entrée en vigueur mercédé derniers, devrait également accélérer les améliorations, estime son président Gaétan Barette.

Urgences : Montréal sur la bonne voie

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L’équipe de consultants de la firme CIM a permis d’identifier de nombreux défauts qui, au bout du compte, font une grosse différence aux blocs opératoires, comme de s’assurer que le patient a passé tous les tests requis ou que le travail commence à l’heure prévue.

PHOTO : LA PRESSE

Après les urgences, l’Agence de santé de Montréal a les blocs opératoires dans sa mire. Elle a mandaté une firme de consultants, au coût de 1.2 million, pour améliorer la gestion et la performance des hôpitaux de l’île, apprises La Presse.

PHOTO : ROBERT MALLOU, LA PRESSE

CONF WFHSS Sao paolo Lean toyota heathcare PRESENTATION v 7-2 © Copyrights Jean-Marc Legentil, Bell Nordic Inc, 2010
<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>MEASURE</th>
<th>IMPROVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL PROCESSING and SUPPLY</td>
<td>Instrument Tray Processing Time</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td>Floor Space Freed</td>
<td>740 ft²; 82m²</td>
</tr>
<tr>
<td></td>
<td>Labor Productivity</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Training Time for New Employee</td>
<td>50%</td>
</tr>
</tbody>
</table>
Akron Children’s Hospital
Sterile processing

- Increase in demand for surgical instruments
- Expansion of $3.6 million USD
- More space
- More people

- OR

- Lean analysis
- Employee involvement
- **Increased capacity from 13,000 to 16,000 procedures a year (+23%)**
- No additional employee
Virginia Mason Medical Center
Strategic Plan

The Virginia Mason Production System
Toyota and healthcare

Translation in appendix

Toyota Memorial Hospital
Industrialisation of healthcare?

The industrialisation of healthcare is the only way to increase the human touch of care.

Marcus Froehling  MD
Plan of this presentation

- Origins
- Value added activities
- The continuous improvement dilemma
- Key methodologies
  - 5S
  - Process review
  - Unit flow and U shape cells
  - Kanban
  - Poka-yoke and jidoka
  - SMED
  - TPM and check list
- Change management
- Conclusion
Origin of the Toyota production system and introduction of the Lean/Toyota approach in a hospital setting
Lean: definition

- A quality and process improvement management system
- based on the Toyota Production System
- that emphasizes customer needs,
- improving quality,
- and reducing time delays and costs,
- all through continuous improvement
- and employee involvement.

Adapted from Graban, *Lean Hospitals*, 2009
Introduction to Lean Toyota Production System
Or LEAN

Objectives
Safety - Quality
Moral - Costs - Delay

Just in time (Right part, right quantity, right time)

Teamwork

Kaizen

Reduce waste

Jidoka (Quality exposes problems)

Stable and standardized process

Visual management (indicators)
Standardisation

- First step of a Continuous Improvement Program
- *When addressing a problem, the first question is: do we have a standard?*

Dr Gary Kaplan, CEO Virginia Mason Medical Center, March 2009

standardize → stabilize → improve → Innovate
Improving value added activities
VAA and NVAA

Value added activity (VAA)

- One that **transforms** or modifies a product or a service into what can be sold to customers and from which they will perceive value.

Non value added activity (NVAA)

- One that uses time, resources or space without adding value to a product or a service. These activities don’t have an impact on the shape, function and utilization of the product or service.

  *Non value added activities (NVAA) are considered as waste and increase costs. MUDA.*

  *In Lean-Kaizen activities, we try to eliminate all MUDAs.*
Eliminating Seven sources of waste---- muda
Reducing non value added activities

1. Overproduction
2. Lead time/delays
3. Transportation of materials
4. Stocks
5. Ineffective processes/operations
6. Defects/repairs/do-overs
7. Unnecessary movements (once step = one second, one second = one yen)

Maybe two important sources of non value added activities are:

- Confusion
- No formal continuous improvement of Work Organisation
Work content analysis

Division of tasks either care related or not (break excluded)

- Indirect care
- Direct care
- Break excluded
- Not related to nursing
- Training
- Documentation

Only 43% Value added activities
# Examples of non-added value in a hospital

<table>
<thead>
<tr>
<th>Sector</th>
<th>Process</th>
<th>% VAA</th>
<th>NVAA</th>
<th>% AVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio oncology</td>
<td>3 patients per hour exposed to source for 3 minutes each time</td>
<td>9 minutes</td>
<td>51 minutes out of 60</td>
<td>15%</td>
</tr>
<tr>
<td>Emergency</td>
<td>Sprained ankle</td>
<td>Examination/diagnostic 7 minutes X-rays 2 minutes</td>
<td>8 hours waiting time</td>
<td>2%</td>
</tr>
<tr>
<td>Haematology</td>
<td>Blood test</td>
<td>1 minute blood test</td>
<td>50 minutes wait time</td>
<td>2%</td>
</tr>
<tr>
<td>Surgery</td>
<td>Surgery on a bladder tumour</td>
<td>20 minutes surgery</td>
<td>5 hours from the time the patient leaves his room until he returns</td>
<td>7%</td>
</tr>
<tr>
<td>Radiology</td>
<td>Mammogram</td>
<td>2 mammograms and 1 biopsy: 30 minutes</td>
<td>7 weeks wait time</td>
<td>≥ 1%</td>
</tr>
<tr>
<td>Care unit</td>
<td>Various duties related to nursing</td>
<td>Direct patient care training</td>
<td>Making the bed, dressing the patient, seeking medical supplies, carrying meal trays</td>
<td>40%</td>
</tr>
<tr>
<td>Recruiting</td>
<td>Hiring</td>
<td>4 hours of interviews, 30 minutes reading documents, 30 minutes fact checking</td>
<td>90 day delay in hiring</td>
<td>1%</td>
</tr>
</tbody>
</table>
Zero defect

- It is a paradigm shift: instead of accepting errors as being inevitable or to be expected, we have to find how NOT to make mistakes.

- Error free medicine is feasible, we just do not know how to make it happen yet.

Dr Gary Kaplan, CEO du Virginia Mason Medical Center, mars 2009
We have zero medication errors for two years. And those sorts of things…

Dr John Toussaint
Président et CEO
TishedaCare, WI
The expressions and acronyms dilemma
What is Continuous Improvement (CI)?

Continuous improvement is a structured step by step plan which enables organizations to review the ways they operate by using appropriate techniques in order to make each procedure more efficient.

Continuous improvement is a discipline, an art form, which must be constantly in use; it’s a way of life.
### Each problem has its own methodology

<table>
<thead>
<tr>
<th>Problem</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time wasting, frequent work accidents</td>
<td>Five-S</td>
</tr>
<tr>
<td>Inefficient process</td>
<td>Process review</td>
</tr>
<tr>
<td>Backlog of files, patients in a waiting room, high stock level between operations</td>
<td>One piece flow U shape cell</td>
</tr>
<tr>
<td>Inefficient scheduling, delays, unnecessary stock and stock out at the same time</td>
<td>KANBAN</td>
</tr>
<tr>
<td>Too many repetitive errors</td>
<td>Poke yoke</td>
</tr>
<tr>
<td>Set up time too long between 2 operations</td>
<td>SMED</td>
</tr>
<tr>
<td>Critical errors occurs or should be avoided</td>
<td>Check list /TPM</td>
</tr>
</tbody>
</table>
Lean: main tools

- Five-S – visual management
- Process review
- One piece flow and U shape cell
- Kanban
- Poka-Yoke and Jidoka
- SMED
- TPM and verification prior to start
Lean: main tools

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Objectives of the 5S’s

- A productive
- and efficient work area
- which self-regulates at all times
- through guidelines and visual instructions.
## 5S definitions

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td><strong>Sort</strong> <em>(Seiri)</em></td>
<td>Remove all useless objects from the work area</td>
</tr>
<tr>
<td>S2</td>
<td><strong>Situate</strong> <em>(Seiton)</em></td>
<td>Everything at the right place A place for everything</td>
</tr>
<tr>
<td>S3</td>
<td><strong>Shine</strong> <em>(Seiso)</em></td>
<td>Keep it clean; cleaning is inspection</td>
</tr>
<tr>
<td>S4</td>
<td><strong>Standardize</strong> <em>(Seiketsu)</em></td>
<td>Make sure it is easy to understand All do it the same agreed upon way</td>
</tr>
<tr>
<td>S5</td>
<td><strong>Sustain</strong> <em>(Shitsuke)</em></td>
<td>Implement the necessary discipline for good work to be done</td>
</tr>
</tbody>
</table>
The 6 essential key questions for events to occur:

- Where?
- What?
- When?
- Who?
- How?
- How many/much?

- And do not forget that 30% of our population are functional illiterate (cannot write and read).
- For those who can, 30% have variable reading (and understanding) skills.
- They have developed strategies to work effectively.
- But they do not read procedures, they learn them.
S4- Standardize

[Image of waste bins and a poster with illustrations of hospital staff and green bags]
S4- Standardize
S4- Standardize

Mini systems
Lean: main tools

- Five-S – visual management
- Process review
- One piece flow and U shape cell
- Kanban
- Poka-Yoke and Jidoka
- SMED
- TPM and verification prior to start
## Definitions

<table>
<thead>
<tr>
<th>Definition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>Sequence of activities, for example the process of handling an order</td>
</tr>
<tr>
<td>Sub-process</td>
<td>Group of logical activities that are part of the process; for example, the order taking/receiving sub-process, the conception sub-process, the billing sub-process</td>
</tr>
<tr>
<td>Activity</td>
<td>Defined by actions: to cut, walk, post, serve, write, sign</td>
</tr>
<tr>
<td>Task</td>
<td>Related to an activity: a sequence of activities assigned to one person that become his or her tasks within the process</td>
</tr>
<tr>
<td>Procedure</td>
<td>Detailed explanation of every sub-process, often using SIPOC.</td>
</tr>
</tbody>
</table>
Lean: main tools

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Use U Shape Cell to increase productivity

BEFORE

AFTER, U SHAPE CELL

Spaghetti diagram
Use U Shape Cell to increase productivity using UNIT FLOW


Lean: main tools

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Kanban: definition

Kan = card and Ban = signal

- Decentralized stock management method by which the activation of operations is assigned to the work stations upstream. These then **signal** the procurement or the authorization to produce.
- The Kanban system was developed more than 40 years ago by Taiichi Ohno, vice-president of Toyota.
Kanban for sterilized items
Kanban for sterile supplies
Two bin system in Canadian healthcare

Kanban board: Supply board

9 am
Lean: main tools

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Poká-Yoke

- Means *fool proof* in Japanese
- **System to prevent a person from making a mistake**
- Zero mistakes, error free work method
- An employee can verify his work himself

- How could we not make mistakes?... Is the challenge
Three POKE-YOKE levels

1. Guide
2. Picket fence
3. Brick wall
Poka-yoke – GUIDE LEVEL
Poke Yoke in Sao Paolo

OBRIGADA POR FACILITAR O EMBARQUE
Lean: main tools

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SMED

What is SMED?

It’s the acronym for:
- Single Minute Exchange of Die
- Refers to a technique for performing setup operations in 9 minutes or less

Objective:
- Each exercise aims at reducing the time needed by 30-50%.
Lean: main tools

- Five-S – visual management
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Checking the plane before starting the engine

Figure 4-1. Preflight Inspection

1. CABIN
   (1) Control Wheel Lock -- REMOVE.
   (2) Ignition Switch -- OFF.
   (3) Master Switch -- ON.
   (4) Fuel Quantity Indicators -- CHECK QUANTITY.
   (5) Master Switch -- OFF.
   (6) Fuel Shutoff Valve -- ON.

2. EMPENNAGE
   (1) Stabilizer Gust Lock -- REMOVE.
   (2) Tail Tie-Down -- DISCONNECT.
   (3) Control Surfaces -- CHECK freedom of movement and security.

3. RIGHT WING Trailing Edge
   (1) Aileron -- CHECK freedom of movement and security.

4. RIGHT WING
   (1) Wing Tie-Down -- DISCONNECT.
   (2) Main Wheel Tire -- CHECK for proper inflation
   (3) Before first flight of the day and after each refueling, use sample cup and drain small quantity of fuel from fuel tank; pump quick-drain valve to check for water, sediment, and proper fuel grade (red).
   (4) Fuel Quantity -- CHECK VISUALLY for desired level.
   (5) Fuel Filler Cap -- SECURE.

5. NOSE
   (1) Engine Oil Level -- CHECK, do not operate with less than four quarts. Fill to six quarts for extended flight.
   (2) Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Check strainer drain closed. If water is observed, the fuel system may contain additional water, and further draining of the system at the strainer, fuel tank sumps, and fuel line drain plug will be necessary.
Checklist

SURGICAL SAFETY CHECKLIST (FIRST EDITION)

Before induction of anaesthesia

SIGN IN
- PATIENT HAS CONFIRMED
  - IDENTITY
  - SITE
  - PROCEDURE
  - CONSENT
- SITE MARKED/NOT APPLICABLE
- ANAESTHESIA SAFETY CHECK COMPLETED
- PULSE OXIMETER ON PATIENT AND FUNCTIONING

DOES PATIENT HAVE A:
- KNOWN ALLERGY?
  - NO
  - YES
- DIFFICULT AIRWAY/ASPIRATION RISK?
  - NO
  - YES, AND EQUIPMENT/ASSISTANCE AVAILABLE
- RISK OF >500ML BLOOD LOSS
  - 7ML/KG IN CHILDREN?
  - NO
  - YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED

TIME OUT
- CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE
- SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM
  - PATIENT
  - SITE
  - PROCEDURE
- Anticipated critical events
- SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?
- ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS?
- NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?
- HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES?
  - YES
  - NOT APPLICABLE
- IS ESSENTIAL IMAGING DISPLAYED?
  - YES
  - NOT APPLICABLE

SIGN OUT
- NURSE VERBALLY CONFIRMS WITH THE TEAM:
- THE NAME OF THE PROCEDURE RECORDED
- THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE)
- HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME)
- WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED
- SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT

THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.
Managing changes for organizational transformations

Plan and orchestrate change
The Toyota/Lean Approach Applied to Healthcare

- Essentially
  - TPS for healthcare
  - To reduce non value added activities
  - By using appropriate tools

- Essence
  - Work standardization and standardized processes

- Essential
  - The people
Thanks!

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President of Bell Nordic Consulting