

#### June 20, 2011 (Monday)

**Pre-Congress Seminars** 

#### KEMPINSKI HOTEL CORVINUS REGINA BALLROOM I.

Erzsébet tér 7-8, Budapest V. Monday 10:00 – 18:15

#### **2.2. QUALITY IN HEALTHCARE**

Session Chair: Paula Friedman, SSM Health Care, St. Louis, MO, USA

#### 12.50 Process Improvement in Healthcare

Ronald J. M. M. Does, University of Amsterdam, The Netherlands

Does, Ronald J.M.M. (The Netherlands), Member of the International Academy for Quality (IAQ)

Ronald Does worked as a senior consultant in Industrial Statistics at Philips Electronics, Eindhoven, The Netherlands. Currently, he is Professor of Industrial Statistics at the Faculty of Economics and Business of the University of Amsterdam. In 1994 he founded the Institute for Business and Industrial Statistics, which operates as an independent consultancy firm within the University of Amsterdam. His current research activities lie in the design of control charts for nonstandard situations, healthcare engineering and the improvement of statistical methods in Lean Six Sigma. Ronald Does has published about 160 scientific papers and 9 books. In 2008 he received the ASQ's Statistics Division Hunter Award. He is member of the editorial boards of Quality Engineering, Quality Technology and Quantitative Management and International Journal of Lean Six Sigma. He is also Academician of the International Academy of Quality and Fellow of the American Society for Quality

### EOQ-2011, Budapest, Hungary

### Process Improvement in Healthcare

### Ronald J.M.M. Does

Institute for Business and Industrial Statistics, Faculty of Economics and Business, University of Amsterdam

June 20, 2011

#### Email: r.j.m.m.does@uva.nl

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#### **IBIS UvA:** many hospitals are clients





# Healthcare Quality: Expectations!



# Healthcare Quality: Efficiency!



# Healthcare Quality: Patient Safety!



## Healthcare Quality

#### Observations

- Worldwide the cost of medical care is increasing at an alarming and unsustainable rate
- A significant source of healthcare cost increases can broadly be characterized as operational inefficiency.
- Outdated (pre-industrial) organizational structures
- New expensive treatments and procedures
- An aging population
- Competition and Globalization (e.g. medical tourism, services that can be performed remotely, low-cost competitors, retail healthcare)

# Effective Healthcare Delivery

#### Remedies

- Improving the quality and safety of care
- Reducing the direct cost of care
- Improving the efficiency of healthcare administration, logistics and the operational side of the healthcare delivery system
- Make affordable medical services available to a larger segment of the population

Healthcare can learn from how other industries and sectors of the economy have dealt with competition, market pressures and change

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## Process management







## The Special Position of the Patient







# DMAIC method

Define				
Measure	<ol> <li>Define the CTQs</li> <li>Validate the measurement procedures</li> </ol>			
Analyse	<ol> <li>Diagnose the current process</li> <li>Identify potential influence factors</li> </ol>			
Improve	<ol> <li>5. Establish the effect of influence factors</li> <li>6. Design improvement actions</li> </ol>			
Control	<ol> <li>7. Improve process control</li> <li>8. Close the project</li> </ol>			

Lean Six Sigma breakthrough cookbook



# Project selection: Cost breakdown.



# Project execution: standardized approach

Hospital	City	Туре	Beds	Projects
Lange Land Hospital	Zoetermeer (NL)	general	245	9
Red Cross Hospital	Beverwijk (NL)	general	384	18
Deventer Hospital	Deventer (NL)	teaching	477	14
Virga Jesse Hospital	Hasselt (B)	teaching	567	29
Canisius Wilhelmina Hospital	Nijmegen (NL)	teaching	635	37
Reinier de Graaf Healthcare Group	Delft (NL)	teaching	881	28
Erasmus Medical Centre	Rotterdam (NL)	academic	1221	19
University Medical Centre	Groningen (NL)	academic	1339	112
Others	-	general	-	5





# Project execution: 9 templates for the first steps.



### Examples: projects with impact. Projects w.r.t. Fte reduction: Salaries hospital 2009: 287 million dollars; 6430 Fte's Mobility in personnel 2009: about 550 Fte's. • Recording of processing times reveals insight in the activities (e.g. in one of the units 38,5% of the available time was not spent on the patients). Almost 50% of the projects within the financial service has to deal with Fte reduction. • Reference: Wijma et al. (2009), Quality Engineering 21, 222-228. Projects w.r.t. Length of Stay: • About 30% of the Length of Stay in a hospital is due to an inappropriate discharge procedure. Reducing the inappropriate stay by 50% means 15% extra admissions or closing beds. Reference: Niemeijer et al. (2010), Journal of Trauma 69(3), 614-619. 24

# Examples: projects with a big impact.

Projects w.r.t. use of materials:

• Costs of medicines in an academic hospital in 2009: 18 million dollars.

• Reduction with 5% is almost 1 million dollars.

• Example: the difference in price of the use of antibiotics with or without infusion is substantial.

• Reference: Van den Heuvel et al. (2004), Quality and Reliability Engineering International **20**, 419-426.

Projects w.r.t. optimal use of facilities:

• A CT scan takes about 6 minutes. This means that one may run 10 CT scans per hour.

• In most hospital the average number of CT scans per hour is about 3 to 4.

• Hence doubling is possible!

• Reference: De Mast et al. (2011), To appear in *Quality and Reliability* 25 *Engineering International*.

# Lean Six Sigma In Practice



# Lean Six Sigma: Does it Work?

- 20 Black Belts; 73 Green Belts
- 147 projects resulted in 15 million euros savings
- Generalization of the results will result in an additional 30 million euros savings

![](_page_14_Picture_5.jpeg)

![](_page_14_Figure_6.jpeg)

![](_page_15_Figure_0.jpeg)

# Healthcare Engineering

Flow in Healthcare Processes Overall Resource Efficiency

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![](_page_16_Figure_0.jpeg)

# Capacity calculations

![](_page_16_Figure_2.jpeg)

![](_page_17_Figure_0.jpeg)

- Improve availability Av% (less downtime)
- Improve FTR% (less rework)
- Improve synchronization efficiency SE%
- Increase the number of resources N
- Increase the total worktime TotT
- Reduce cycle time CT (shorter processing time or faster changeovers)

#### Identify wasted resources

#### TP = Av% × FTR% × SE% × T-Ut% × P-Cap

Throughput equals potential capacity multiplied by 4 efficiency factors.

- Low availability Av%: capacity is wasted due to downtime
- Low first time right FTR%: capacity is wasted due to rework
- Low synchronization efficiency SE%: capacity is wasted in synchronization idle time (waiting for other resources to become available)
- Low true utilization *T-Ut%*: capacity is wasted in idle time because the workload is lower than the true capacity *T-Cap*

![](_page_18_Figure_0.jpeg)

### Literature I

This presentation is based on the book:

J. de Mast, R.J.M.M. Does and H. de Koning (2006), "Lean Six Sigma for Service and Healthcare", Beaumont, Alphen a/d Rijn, the Netherlands.

And the articles:

- J. van den Heuvel, R.J.M.M. Does & M.B. Vermaat (2004), "Six Sigma in a Dutch hospital: does it work in the nursing department?" *Quality and Reliability Engineering International* **20**, 419-426.
- G.C. Niemeijer, A. Trip, K.T.B. Ahaus, R.J.M.M. Does & K.W. Wendt (2010), "Quality in Trauma Care: Improving the discharge procedure of patients with Lean Six Sigma" *Journal of Trauma* 69, 614-619.

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### Literature II

- J. de Mast, B.P.H. Kemper, R.J.M.M. Does, M.R.H. Mandjes & H.W.J. van der Bijl (2011), "Process improvement in healthcare: A model for overall resource efficiency", To appear in *Quality and Reliability Engineering International*.
- J. Wijma, A. Trip, R.J.M.M. Does & S. Bisgaard (2009), "Health care quality: Efficiency improvement in a nursing department", *Quality Engineering* **21**, 222-228.
- G.C. Niemeijer, R.J.M.M. Does, J. de Mast, A. Trip, J. van den Heuvel & S. Bisgaard (2011), "Generic project definitions for improvement of healthcare delivery: casebased reasoning research", *Quality Management in Health Care* 20, 152-164.

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