LEAN AND PHYSICIANS:
From Antecedents to Behavioral Support of Change

Pierre-Luc Fournier, PhD
Assistant Professor
Department of Information Systems and Quantitative Methods for Management
Business School
University of Sherbrooke

Introduction

Lean in Healthcare
THE ORIGINS OF LEAN

- Taichi Ohno begins work on TPS
- Shingo develops Poka-Yoke based on Jidoka.
- Ohno works on Kanban, JIT and the reduction of wastes.
- Edwards Deming arrives in Japan
- First written documentation on TPS
- International Motor Vehicle Program at MIT
- "Lean" is coined by John Krafcik.
- DNA of the TPS in HBR by Spear
- NUMMI joint venture, GM & Toyota
- Five principles of Lean by Womack and Jones
- "The Machine that changed the world" is published.
- "Lean" and "TQM" as a holistic management system
- Nightingale and Mize: Lean as a holistic management system
- Nightingale and Mize: Lean as a holistic management system
- 10 dimensions of Lean by Shah and Ward
- Toyota Kata by Rother
- Clear Research Symposium 2019 – Pierre-Luc Fournier, PhD

LEAN IN HEALTHCARE

- Worldwide use (early 2000s)
- Disputed results
- Trouble sustaining implementation

From Costa and Godinho Filho (2016) and Moraros, Lemstra et al. (2016)
THE UNFULFILLED PROMISE...

• For many, Lean in healthcare has failed to produce conclusive gains at the organizational level (Radnor and Osborne 2012).
  • Two recent studies delved deep into the subject.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Literature review</td>
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</tr>
<tr>
<td>Current trends in academic research</td>
<td>The impact of Lean interventions in healthcare</td>
</tr>
<tr>
<td>107 papers on Lean healthcare</td>
<td>22 papers on Lean impact evaluation</td>
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</table>

**Conclusion:** no conclusive evidence of positive effects of Lean at the organizational level...

FINDINGS

• Implementation is localized
  • Based on tools and techniques (visual elements)

• Systematization of gains is difficult

• Organizations are caught in a “state of transition.”
  • Project-based mindset
  • Maturity does not progress
  • Daily continuous improvement rarely takes place

• **Sustaining Lean is difficult!**
SHORTELL, RUNDALL ET AL.

1222 American hospitals
69.3% use Lean

Positive impact of Lean on organizational performance
- Maturity level
- Leader engagement
- Daily management system
- Training and coaching


WHY SUCH DIFFICULTY?
PHYSICIANS

As Organizational Actors

PHYSICIANS AS ORGANIZATIONAL ACTORS

STATUS

• Atop the clinical hierarchy (Kellogg 2009)
• Ascendancy over all other healthcare professionals (Giaimo 2009)

“Central decision-makers” of both the clinical and administrative domains (Battilana and Casciaro 2012)

Creates a leadership paradox.

POWER

• Large professional autonomy (Giaimo 2009)
• Monopoly of expertise (McNulty and Ferlie 2002)

Traditional “rewards and punishments” don’t work (Callister and Wall Jr, 2001)

Pluralism

Concentrated power
PHYSICIAN CENTRALITY AND CHANGE

Inertia towards change (Cabana, Rand et al. 1999)

Resistance tends to be higher (Lapointe and Rivard 2005, Lapointe and Rivard 2007, Rivard, Lapointe et al. 2011)

Negotiate their participation (McNulty and Ferlie 2002)

Exacerbated if change threatens

- Professional dominance
- Decision-making authority
- Professional judgment
- Economic well-being
- Organization of work
- Quality of care to patients

However, physicians can also be powerful change agents (Goldstein and Ward 2004)!

- They must be involved in strategic decision-making and viewed as partners.

PHYSICIANS AND LEAN

- Physician engagement is critical to success (Toussaint, Billi et al. 2017)

- Physicians can be barriers to implementation (Lorden, Zhang et al. 2014)

- However, no empirical studies go beyond “physician engagement is important for Lean change”.

- Before Lean, drawing on TQM and BPR...
  - Under-involvement (Shortell, Levin et al. 1995)
  - Fail when imposed on physicians (McNulty and Ferlie 2004)
  - “Medical work is complex and not accessible to standardization” (Freidson, 1984)
  - “Sacred view of healthcare” (Zimmerer, Zimmerer et al. 1999)
COMMITMENT TO ORGANIZATIONAL CHANGE

And What Influences It.

ANTECEDENTS OF CHANGE

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-change antecedents</td>
<td>Pre-existing conditions in place prior to the change</td>
<td>Individual characteristics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal organizational context</td>
</tr>
<tr>
<td>Change antecedents</td>
<td>Aspects related to the change itself</td>
<td>Content of the change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process of the change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceived benefits of the change</td>
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</tbody>
</table>

Antecedents are the “reasons for the reactions rather than the reaction itself”.


CONCEPTUAL MODEL
METHOD

RESEARCH METHOD

Quantitative methodology

SURVEY

• Survey development with validation from experts across North America

• Use of existing measures (58 items)

• Email
  • Two reminders

• Hosted online by QUALTRICS
### SAMPLE

Over 60 hospitals  
N = 632 physicians  
n = 176 physicians  
Response rate = 27.85%

### DEMOGRAPHIC VARIABLES

<table>
<thead>
<tr>
<th>Respondants (N = 632, n = 176)</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>95</td>
<td>54.0 %</td>
</tr>
<tr>
<td>Female</td>
<td>81</td>
<td>46.0 %</td>
</tr>
<tr>
<td><strong>Medical Specialty</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialist</td>
<td>80</td>
<td>45.5 %</td>
</tr>
<tr>
<td>General practitioner</td>
<td>96</td>
<td>54.5 %</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>114</td>
<td>64.8 %</td>
</tr>
<tr>
<td>Independant worker</td>
<td>62</td>
<td>35.2 %</td>
</tr>
<tr>
<td><strong>Compensation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>151</td>
<td>85.8 %</td>
</tr>
<tr>
<td>Yes</td>
<td>25</td>
<td>14.2 %</td>
</tr>
<tr>
<td><strong>Previous Lean experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>60</td>
<td>34.1 %</td>
</tr>
<tr>
<td>Yes</td>
<td>116</td>
<td>65.9 %</td>
</tr>
</tbody>
</table>

Response rate = 27.85%
MEASUREMENT RELIABILITY AND CONSTRUCT VALIDITY

- Confirmatory Factor Analysis using Maximum Likelihood approach.

- Average Variance Extracted (AVE) for convergent validity (0.520 to 0.835)

- AVE > Max r² for divergent validity

- Reliability using Graham (2006)

GOOD FIT!

COMMON METHOD BIAS

   - Measures were psychologically separated
   - Participants guaranteed anonymity

2. Harman’s single factor test (Harman 1976)
   - Largest explained variance by any single factor was 38.64%

3. CFA using latent factor test (Podsakoff, MacKenzie et al. 2003)
   - No loss of significance
   - No improvement of model fit
RESULTS

And analysis

STRUCTURAL MODEL

• Structural Equation Modeling
  • Model trimming approach (Ullman and Bentler, 2012)
  • Controlling for: age, gender, medical specialty and employment status

• Mediation analysis
  • bootstrapping method at 5000 samples.

Good Fit!
DISCUSSION
COMMITMENT TO LEAN CHANGE

• **Affective commitment** is the **transmission** that favors the adoption of new behaviors.

• **Continuance commitment** has little to no effect on behavioral support for Lean change.

PRE-CHANGE ANTECEDENTS

**Individual Characteristics**

• Demographic variables (age, gender, medical specialty)

• Lean experience

• Employment status

**Internal Organizational Context**

• History of organizational support

• History of organizational change
PRE-CHANGE ANTECEDENTS

**Individual Characteristics**

- Demographic variables (age, gender, medical specialty)
  
  No significant effect!

- Lean experience

- Employment status

  Significant effect:
  - Training
  - Familiarity with Lean favors affective commitment

PRE-CHANGE ANTECEDENTS

**Internal Organizational Context**

Little to no impact on behavioral support for Lean change.

- History of organizational support
- History of organizational change

*That is (very) good news...*
### CHANGE ANTECEDENTS

<table>
<thead>
<tr>
<th>Content of the Change</th>
<th>Process of Change</th>
<th>Perceived Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Extent of change</td>
<td>• Participation</td>
<td>• Reduction of costs</td>
</tr>
<tr>
<td></td>
<td>• Compensation</td>
<td>• Improvement of quality</td>
</tr>
<tr>
<td></td>
<td>• Quality of change communication</td>
<td>• Improvement of patient satisfaction</td>
</tr>
<tr>
<td></td>
<td>• Transformational leadership behavior</td>
<td>• Improvement of working life</td>
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</table>

Surprisingly... **minimal impact** on behavioral support for Lean change.
CHANGE ANTECEDENTS

**Perceived benefits**
- Reduction of costs
- Improvement of quality
- Improvement of patient satisfaction
- Improvement of working life

**Change Antecedents**

Confirms what we have known for a while...

Lean for cost reduction = high risk of failure

Pay attention to the organizational discourse regarding Lean

**Process of Change**

- Participation
- Compensation
- Quality of change communication
- Transformational leadership behavior
CHANGE MANAGEMENT

Process of change

• Participation
• Compensation
• Quality of change communication
• Transformational leadership behavior

Physicians must be involved in the decision-making process.

Not simply informed...

Paying physicians for their participation is not conclusive.

Can even be negative, because it stimulates continuance commitment...
CHANGE MANAGEMENT

Process of change

• Participation
• Compensation
• Quality of change communication
• Transformational leadership behavior

The six dimensions of transformational leadership behavior:

1. Articulate a vision;
2. Provide a role model;
3. Communicating high performance expectations;
4. Provide individual support;
5. Foster the acceptance of group goals;
6. Provide intellectual stimulation.


Relevant and accurate information.

Communicate the reasons for the change.

Communicate continuously, throughout the change.

Avoid infobesity!
CHANGE MANAGEMENT

Process of change

• Participation
• Compensation
• Quality of change communication
• Transformational leadership behavior

In the end...

Organizations must invest in the development of their change management capabilities.
CONCLUSION

**Objective:** understand the impact of antecedents of change on physicians’ behavioral support of Lean change.

**Contributions:**
1. Notorious difficulty to study physicians as organizational actors.
2. First quantitative study on the role of physicians during Lean change.
3. Investigation of an operations management phenomena using behavioral sciences.
4. Offers insights and potential solutions to healthcare organizations undergoing Lean change.

**Limits:**
1. USA vs other jurisdictions
2. Physicians as a cluster of individuals
3. Use of cross-sectional data must be enhanced.
ACKNOWLEDGEMENTS
QUESTIONS?

CONTACT INFORMATION

Pierre-Luc Fournier, PhD
Assistant Professor
Department of Information Systems and Quantitative Methods for Management
Business School
Université de Sherbrooke

819 821-8000, poste 65043
pierre-luc.fournier2@usherbrooke.ca