

## **Lean implementation approaches at different levels in Swedish hospitals: the importance for working conditions, worker engagement, health and performance**

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**Abstract.** This paper reports result from one-year follow up in a research program with the overall aim to investigate how implementations of lean in health care affect working conditions, health, and performance of employees at five Swedish hospitals. This paper summarizes the implementation approaches, and their importance at short-term follow up for performance (with regard to active work with improvements), perceived working conditions and stress-related health among the healthcare workers. The implementation strategies and pace varied between the hospitals and between the strategic and operative levels. This short-term follow up showed that physical stress-related symptoms had increased overall but the cognitive stress had increased only in hospitals implementing lean. In hospitals with high implementation pace, there were more improvement work among the employees, but higher quantitative demands and lower job satisfaction.

**Keywords.** Lean, Continuous improvements, Stress, Work environment

### **1. Background**

Swedish healthcare organizations are struggling with increasing efficiency and quality of care as well as with problems related to work environment and recruitment. Demographic, political, technical and economic conditions have urged internal reforms of care processes. In particular, lean has been frequently used in Swedish hospitals as an overall concept to improve care processes and decrease costs.

Despite the widespread implementation of lean concepts, there are few prospective studies evaluating lean in health care contexts. However, there are considerable difficulties evaluating lean as a concept, as its application and interpretation seem to vary widely. Some recent evaluations of lean have pointed to positive results, especially if work environment issues are considered in parallel with other desired outcomes.

Effects of restructurings and reorganizations in health care settings are likely to depend on the implementation processes (Holden, 2011). In the mid-90's in Sweden, there was also widespread reorganizations of health care due to needs of cost savings. Many studies demonstrated the associations between those reorganizations and sick leave among health care workers (see for example Scuzs, et al 2003; 2004). Explanations were found related to the decreased psychosocial work environment, such as lack of influence, high demands in combination with low control and poor leadership (see for example Hertting, 2003). Other studies showed negative associations only when the reorganizations were regarded as negative consequences for the individual employee (Dellve, et al 2003). Further, results from the research studies taught us that when top-down or external consultant driven

management concepts which promise increased efficiency are approached in hospitals, they turn out to be very slow and difficult to implement (for review see Dellve et al 2013). The local and contextual implementations of reorganizations at various levels are therefore considered as key factors for sustainable effects of reforms.

## 2. Aim

This paper reports result from one-year follow up, in a research program with an overall aim to investigate implementations of lean and lean-like developments of processes of care, and how these affect the working conditions, health, and performance of healthcare employees. This paper summarizes the implementation approaches, and their importance at short-term follow up for performance (with regard to active work with improvements), perceived working conditions and stress-related health among the healthcare workers.

## 3. Method

Five hospitals were selected and followed over three years and within each five units that were connected by their flow of acute care patients, i.e. the emergency unit, the medical and surgical acute care wards (or ICU at small hospital) as well as one medical and one surgical ward. Three hospitals were implementing lean to improve care processes. Two hospitals used their own models for developing care processes. The paper presents result from the second year.

The project had mixed method design. Initially we used qualitative-driven analyses and thereafter quantitative-driven mixed method analysis. The qualitative driven analysis focused on contexts, motives and strategies related to implementation. Quantitative driven mixed method focused analysis on the importance of implementation for the employees' active work with improvements, their working conditions, health and performance.

Initially we conducted and analyzed qualitative interviews with key actors, including hospital managers, administrators, clinical unit managers and change agents (n=59 from lean hospital and n=20 from comparison hospitals).

A questionnaire was sent to all employees at the selected units in 2012, T1 (n=1002, mean hospital response rate 65%, in comparison hospitals: n=546, mean response rate 75%) and in 2013, T2 (n=1030, mean hospital response rate 66%, in comparison hospitals: n=1086, mean response rate 50%). The questionnaire included validated index, e.g. from COPSOQ, and items about improvement work. The result from the survey was analyzed with descriptive and analytic methods (paired mean differences, between and within hospitals).

## 4. Results

### *4.1 Implementation approaches at strategic and operative levels in hospitals implementing lean*

The implementation strategies varied between the hospitals and between the strategic and operative levels. The shared motives for implementing lean were to increase learning about efficient work with care processes across the organization and systematize the work with continuous improvements. The reason to increase governance of care processes and decrease costs were not explicit in all organizations. Strategic managers also used different approaches to overcome the gap between strategic and operative levels. The overall strategies were to focus on small scale improvements by stimulating initiatives at operative levels *or* governance of large-scale care processes, to start the work in the hospital management group *or* in clinical practice, and to start by educating managers, employees

and/or change agents. The organizational position of change agents meant differences in legitimacy and power to support the changes at strategic or operative levels. Operative managers' main challenge was to negotiate and build participation among employees. They shared similarities in their stepwise and coaching approaches encouraging participation among employees, but differences regarding how assignments were delegated. The social capital and attitudes among health care profession were of importance for employees' active engagement in development work. The social capital was associated with active clinical development of patient safety and quality of care, and the employees' general work engagement.

The implementation pace varied between hospitals. The pace was highest where there was a designated high-skilled group at the strategic level that almost exclusively worked with the developments. At other hospitals, the pace differed due to, for example, other competing issues or personnel turnovers at strategic levels. However, there were also examples at operative levels that had higher pace in developments.

Results from analysis of questionnaire follow-up data showed that the numbers and degrees of suggested, discussed and also implemented improvements from employees, were highest where the overall (at strategic level) implementation pace was highest ( $p < 0,05$ ) (figure 1).

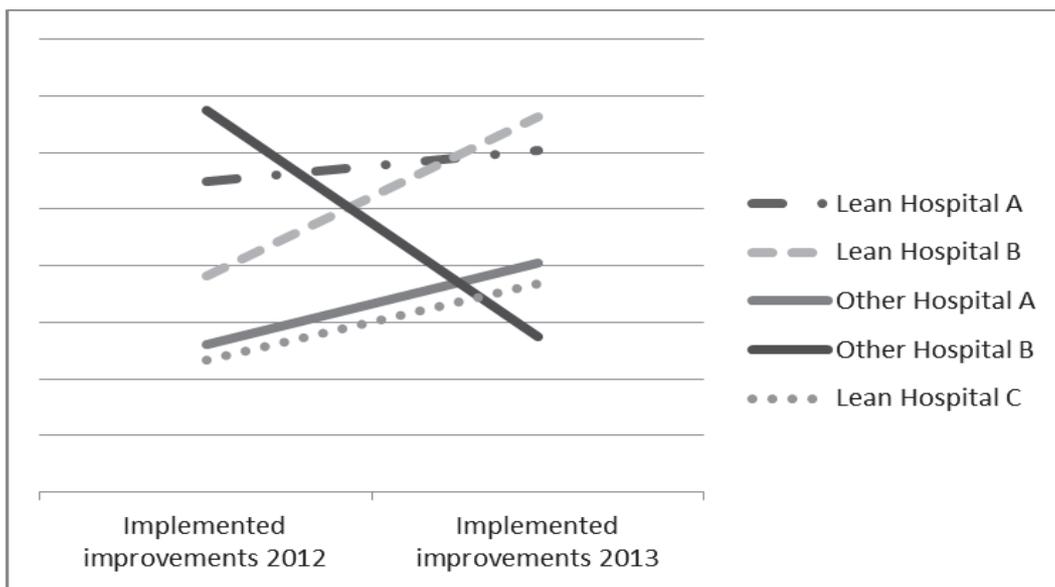


Figure 1 Numbers of implemented improvements from suggestions among employees (mean values)

#### 4.2 Working conditions and stress-related health among employees

The result from short-term follow up questionnaire data showed that the mean values of physical stress-related symptoms had increased in all organizations between 2012-2013 ( $p < 0,00$ ) (figure 2), but the mean values of cognitive stress increased only in the organizations that implemented lean ( $p = 0,01$ ) (figure 3).

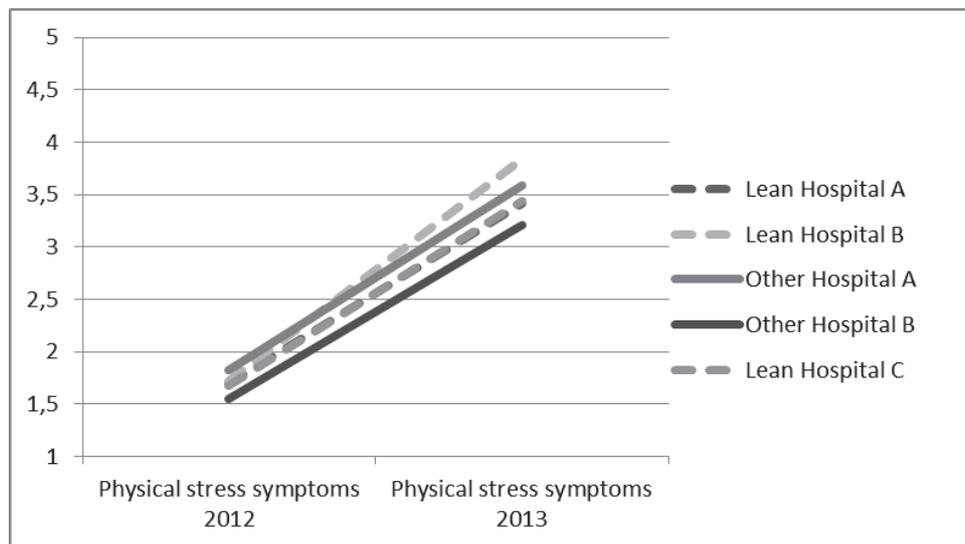


Figure 2 Perceived physical stress symptoms (meanvalues) among employees at the different hospitals

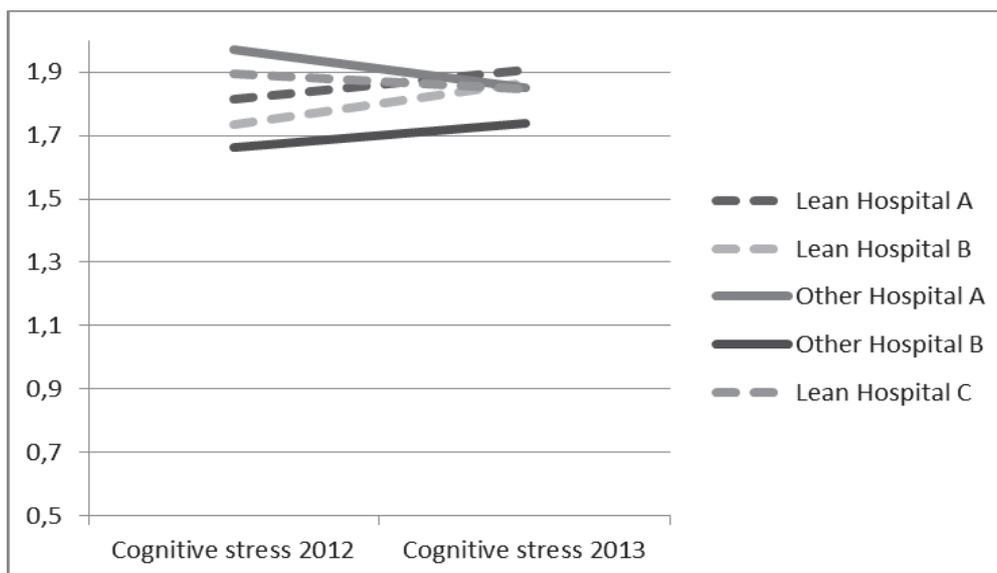


Figure 3 Perceived cognitive stress symptoms (meanvalue) among employees at the hospitals

The mean values of quantitative demands differed between the hospitals ( $p=0,04$ ) and had increased most where the implementation pace was highest. The same pattern was shown for mean values of job satisfaction ( $p<0,00$ ). Perceived time-pressure was not statistically related to implementation pace.

## 5. Concluding discussion

Overall approaches and pace in implementing lean or other models for care processes differed between hospitals and were related to short-term outcomes. The motives and approaches at strategic levels were related to organizational preconditions and local

contexts (Eriksson, et al 2014; Williamsson, et al 2013). The approaches among operative managers shared similarities with regard to how to meet the challenges to engage the employees (Andersson, et al 2014).

This paper focused on the short-time outcomes regarding engagement, health-related stress and work environment. The result could imply that implementing lean is cognitively demanding and challenging in health care during the implementation phase. Cognitive demands and cognitive stress-related symptoms were higher in organizations where lean was implemented, and especially where the implementation pace was high. Having a high implementation pace at strategic levels was associated with more active work with improvements at operative levels. However, having a higher pace was also associated with lower job satisfaction and higher quantitative demands. The implementation of new models may require a strong organizational social capital among health care professional. By this, we mean the presence of network, norms and trust which promotes coordination and cooperation for the common good (Gylling Olesen, et al, 2008; Kristensen et al, 2007; Hasle, 2009). In the cross-sectional analysis, the social capital was associated with employees active work with clinical development of patient safety and quality of care, and the employees' general work engagement (Strömgren, et al 2013).

The results indicate that implementing lean, especially the pace in implementation can have importance for one-year effects and consequences. The long-term outcomes from higher/lower implementation paces, the mediating effects of strong organizational capital as well as managerial approaches at strategic and operative levels (and their alignments) will be further studied.

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