A novel approach to understand nested layers in quality improvement

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Abstract. Studies on healthcare quality improvement (QI) increasingly point at the importance of understanding multilevel organizational issues, especially interaction between national, hospital and clinical level. In a EU-study involving ten hospitals in five countries one hospital stood out in successful multilevel QI work, which is elaborated in this paper. It is suggested that there is a potential in using linkages and dependencies in terms of organisational development and resource support (O) and method, process and IT support (T) affecting the individual caregiver (H), to understand the nestedness and interaction between operational system levels in QI.

Keywords. HTO, Healthcare, Complex systems, Interaction between system levels.

1. Introduction

Studies on healthcare quality improvement (QI) increasingly points at the importance of understanding multilevel organizational issues (Robert et al, 2011). There are several studies undertaken at the clinical level but the influence of the interaction between national, hospital and clinical level on QI is less investigated and understood.

In a study of quality improvement strategies in the UK and US national health care systems, Ferlie and Shortell (2001) underline the importance considering a comprehensive multilevel approach recognizing four essential core properties of successful QI work; leadership at all levels, a culture that supports learning, development of effective teams and improved use of information technologies. There is, however, still limited understanding of why QI efforts are more successful in some hospitals than others even if we know that certain properties, system levels and contextual factors are important to address (Krein et al., 2010).

There is a need to understand what constituents of context are important for successful QI and how the interface between levels affects human performance. There is now a beginning trend towards a development of casual explanations between more distant system levels as governments, policy makers, regularity bodies and onward to the individual operational level (Karsh, Waterson and Holden, 2014).

1.1 Interaction between system levels and subsystems
The concept of a 'system' embodies the idea of a set of elements connected together which form a whole, showing properties which are properties of the whole, rather than the properties of its element parts (Checkland, 1981). This is particularly true about complex systems as health care systems which are composed of many interrelated constituents and

whose behavior or structure therefore is difficult to understand. Whatever complexity such systems have is a joint property of the system performance character depending on the interaction between system constituents and levels (Katz and Kahn, 1966; Karsh et al., 2014).

1.2 Interface, interaction and nesting between system levels

Interactivity between system levels implies that it is important to understand what is going on in the interfaces between levels in order to comprehend the dynamics that affect systems performance. Karsh et al., (2014) address the notion of nesting in levels, which means that each broader level of the operational system provides context for the operational subordinate systems nested within it. The context is stated in terms of e.g. polices, procedures, norms, technologies and individuals/people specific for each level. For example, individual workers in a hospital are nested within clinical departments (micro level), which are nested within hospitals (meso level) and in turn hospitals are nested in larger regional and national organisational contexts (macro level). Addressing the nesting may facilitate the understanding of aspects in the interface and interaction between levels. It may further shed light on how the interaction between constituents affects the system performance and possible causal relations, which may add to the understanding of what the system does rather than only what it is (Hollnagel, 2014).

The aim of this paper is to contribute to the understanding of how a fruitful interaction between operational system levels supported by contextual nesting promote successful quality improvement in healthcare.

2. Methods

The results presented in this paper are based on the EU project *Quality and Safety in European Union Hospitals (QUASER)* aiming to study quality improvement (QI) from a multi-level perspective incorporating the clinical (micro), hospital (meso) and national (macro) levels. Cross-case comparative case studies were undertaken across ten hospitals; two hospitals in each of the five EU partner countries (England, the Netherlands, Norway, Portugal and Sweden) over a period of 12 months. The five countries were chosen as they represent variation in important aspects of healthcare with focus on the way that progress had been made on their 'quality journey'. One hospital in each country was chosen according to criteria for high-performing QI and the other hospital chosen was one that had not progressed as far in their QI development (Robert et al., 2011; Burnett et al., 2013). The Organizing for Quality framework (Bate et al., 2008) guided data collection and analysis at meso and micro level. Interviews covered the topics: structure, politics, culture, emotions, education, physical environment and technology, leadership, and external demands. In the interview guides, the topics were linked to the three dimensions of quality: clinical effectiveness, patient safety and patient experience. The Swedish hospital that was characterized as the high performing in conducting QI work is addressed in this paper, as it stood out from the other high performing hospitals in the *QUASER* study according to the issues discussed in this paper. At this hospital a total of 36 interviews and 40 hours of observations (including 20 meetings relating to QI) were conducted at the meso and micro level and related to data collected on the macro level.

Complex processes with numerous activities and interactions performed by individuals (H) characterize work on the operational clinical level. To manage these operations and maintain a high quality, support in organizational (O) and in technical (T) respect is demanded. To understand how this support influences the quality improvement work and how the different operational levels are nested, the HTO concept is used for analysis of QI

in the Swedish high performing hospital in the *QUASER* project. For further elaboration on the HTO concept, see Karltun et al., (2014).

3. Results

Referring to the notion of nestedness in organizations above, the micro level is dependant on the conditions created by the meso level context that in turn needs to adapt to the macro level context. That means that the higher system level's demands and support functions affect the nature of work within the subordinate levels and in the end the result of quality and safety in healthcare. The results in this paper are focused not on direct patient care that occurs between the individual caregiver (H) and the patient, but instead on the support functions regarding organizational support (O) and methodological support through technology (T) that affects the individual caregiver and thus the outcome of quality improvement in healthcare. Some of the more prominent subsystems and functions supporting the development of QI related interactions and processes are illustrated in figure 1. The traditional management system for operations in health care however, is not represented although these features interact to varying degrees.

As mentioned above, one of the five high performing hospitals in the *QUASER* study stood out from the others in terms of successful characteristics in QI work. A closer analysis revealed that this was strongly related to the combination of aspects referred to above, which is illustrated and discussed below through good interaction and nesting between the micro, meso and macro levels and interaction between HTO subsystems. The hospital showed an exceptional high level of functionality and integration between the topics: structure, politics, culture, emotions, education, physical environment and technology, leadership, and external demands, as well as an outstanding balance between all topics, which was unique to this hospital. Furthermore, elements at the macro level were unusually well integrated through the meso level all the way down to micro level through supportive H-T-O interactions as illustrated in figure 1 and further elaborated below.
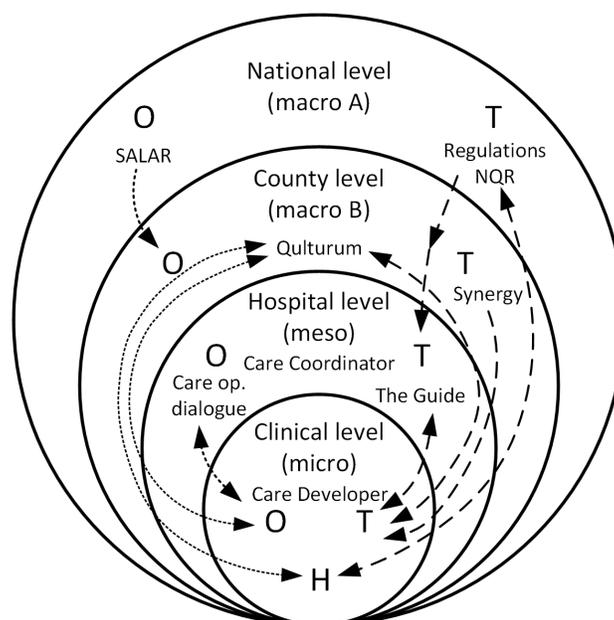

Figure 1: QI related interactions/nesting between operational system levels and subsystems*; dotted lines are organisational development and resource support (O) while dashed lines are method, process and IT-support (T) affecting the individual caregiver (H).*

Clinical (micro) level

A patient who enters a hospital for clinical care goes through a number of more or less complex processes that demands for organisational as well as technical support for the clinical staff during various operations. The clinic for Infectious Diseases had for example documented 15 processes based on medical diagnoses led by physicians and 10 processes for basic care needs led by nurses. Each clinical process had a multidisciplinary team that identified health care needs, collaborated across department boundaries, created treatment guidelines and measured treatment outcomes.

The documentation of these processes was included in an IT-based hospital-led management system called "The Guide" (fig 1). On the clinical level, The Guide further included documentation of each department's targeting and vantage points, its resources and conditions as well as results for each calendar year. Performance reporting included how patients experienced care, care processes and care production, learning and innovation, economy, the use of Balanced Scorecards and monthly reporting (The Guide, 2011). The Guide, which was continuously updated, formed the structural basis for a yearly Care Operations Dialogue meeting (fig 1) between each clinic at the micro level and the hospital management at the meso level. The yearly report reflected on the clinic's specialty and features, resources and conditions, processes, results and deviations and included an action plan forward. By reviewing their operations regularly through The Guide and having a yearly dialogue with hospital management, the clinical performance became transparent, providing support for continuous QI.

An important organizational support at the clinical level was the "Care Developer" (fig 1) who was part of the clinical management team generally consisting of the Clinical Department Manager, a Care Developer, an Administrative Developer, heads of ward units and process leaders. The Care Developer worked closely with the clinical first line managers to strengthen dialogue and leadership in QI work. As the quality strategy at the hospital was a combination of top-down, bottom-up and middle out initiatives including patient involvement, the staff working close to the patients initiated many QI projects. In these projects the clinics could also call for assistance from the county commissioned center Qulturum that supported clinics with education and development in QI.

3.1 Hospital (meso) level

The hospital had built an organizational structure that promoted the QI work in different ways. Most of the 24 departments/clinics had a Care Developer who supported the Heads of the clinics. The hospital CEO regarded these positions as glue in in the organization as they facilitated QI-processes and performed much networking within the organization. A Care Development Coordinator (fig 1) was included in the CEO's staffs, which also included the Chief Medical Officer, the Care Controller who worked closely together with the Care Development Coordinator and first line managers to strengthen dialogue and leadership for QI work.

As mentioned above, the hospital had an IT-based management system called "The Guide" which was available on the hospital intranet. It embraced translation and decomposition of the national policy, County Council's and hospital's strategy into specific measurable objectives by supporting the operations of work in complying with laws and regulations decided on the national macro level regarding quality, patient safety, personnel, economy, working conditions and environment (fig 1). It was used by management of all care units as a tool for quality improvement and patient safety and included issues that the basic units/clinics responded to according to clinical specialization. The Guide formed the base for the yearly Care Operations Dialogue meeting between each clinic (micro level) and the hospital management as mentioned above. The deputy CEO said: *"You would*

really be able to say that [quality] is organized by our management system. The hospital management revises it annually /.../, clinics rework it and fill it with information on how to work. Then we're out actively as medical management and have dialogue once a year on this, and then we get an exchange of knowledge and refinements. The Guide has a dual ownership and is the glue between hospital management and clinical operations."

Guidelines from the national and County Council levels were continuously updated in The Guide by hospital management and reported on in The Guide by clinicians according to various clinical specialties. Data retrieved from various reporting systems at the hospital were added into The Guide at the clinical level, e.g. deviations from "Synergy" (fig 1), which was a countywide incident reporting system that managed all non-conformances, incidents, risks, risk analyses and improvement suggestions. This allowed for recognizing trends that could be followed up. An example is the clinic for Infectious Diseases that reported on the proportion of vaccinated people exceeding 65 years in The Guide and followed up how they met the recommended targets. New elements were continuously incorporated in The Guide management system as new regulations from the macro level were added, e.g. features and measurements regarding the national patient safety law.

3.2 County Council regional (macro B) level

The Director of Public Health and Healthcare of the County was responsible for health issues throughout the County. In an interview he stressed the importance of the existence of a supportive structure assisting staff working with QI and patient safety. An example is that the County had linked the budget and multi-annual planning to performance indicators in order to create a platform for the clinical staff to integrate QI in daily clinical work. Leadership for QI was an integrated part of the ordinary leadership responsibility and the Director stressed they had worked hard with management development programs in this regard. The County Council had commissioned the center for development and education in healthcare, Qulturum (fig 1) that acted as a freestanding unit. The center supported all three hospitals in the County regarding education and development in QI, patient safety, patient involvement and efficiency. Qulturum constituted an intermediary between macro and meso levels by e.g. bringing down national goals for patient safety work for inclusion in The Guide at the hospital, where it was translated into operational objectives at the clinical micro level. Moreover, Qulturum supported clinical driven QI projects on demand from the clinics and managed conferences on health care improvement on local, national and international levels.

3.3 National (macro A) level

In Sweden Quality is governed from the National Board of Health and Welfare. The Swedish Association of Local Authorities and Regions (SALAR), (fig 1) constitutes a national body of 21 county councils and regions responsible for delivering health care at the regional level in the country. There are a number of governmental laws governing the hospital's work such as the Act on Health and Safety and the Patient Safety Act from 2011. The Pharmaceutical Reimbursement Agency provides evidence about safety and efficacy of treatments, technology etc. The National Board of Health and Welfare focus effectiveness, patient safety and patient experiences in their definition of OI, which was in line with the definition of QI in the County Council and at the hospital in this study.

There is also a system of up to now 79 National Quality Registries (NQR), (fig 1) established. They contain individualised data concerning patient problems, medical interventions, and outcomes. NQR were initially started by health care professionals who themselves benefit from them by support in daily QI work, today also nationally supported.

4. Conclusions

The well-functioning nesting and interaction between and within operational system levels illustrated by the HTO concept are supported by the factors highlighted by Ferlie & Shortell (2001) characteristic of successful QI work.

At the operational clinical level in the high performing hospital presented in this study, the individual caregiver and clinical manager "H" were considerably supported by the "O" and "T" subsystems provided and actively supported by the hospital management at the meso level. Supportive context from the regional County Council level could be traced back further to national contextual support at the macro level.

It is the authors' experience that it is fruitful to use the HTO concept to analyse complex nested systems to detect potential improvements for QI. Thereby it could contribute to further improvements in research and practice regarding the understanding of how the interaction between operational system levels and subsystems promote successful quality improvement in healthcare.

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