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General discussion

Introduction

The aim of this thesis was to gain insights in the working mechanisms of hospital quality systems and more specifically into determining factors of effective quality systems and their long-term added value. The main research questions of this thesis were:

- (1) *Does having a hospital quality system lead to higher quality of care?*
- (2) *What are the working mechanisms of hospital quality systems that lead to higher quality of care?*

In this chapter, the main findings of the research in this thesis are summarized and reflected upon. Also, methodological considerations are discussed along with implications for practice and for future research.

Main findings and their interpretation

The first study in this thesis examined the development stage of hospital quality systems in Dutch hospitals. Development is divided in four stages, where stage 0 is the most 'immature' stage and stage 3 is the most 'mature'. By stage 3, the quality system encompasses all necessary elements of quality assurance and quality improvement and the results of that system are being used by the hospital to adjust input of and resources for the system. Our study showed that, more hospitals had reached this stage of development by the last measurement in 2011 than in 2007: 35% of Dutch hospitals had reached this highest stage in 2007 and this percentage had risen to 45% in 2011. This increase indicates that hospitals have continued to strive for enhancement of their quality systems. However, our results also showed that 5% of the hospitals moved from stage 1 to stage 2 but for a majority of Dutch hospitals (55%) the development of their quality system stagnated in stage 2. These hospitals have all the elements of the quality system in place, but outcomes of the quality system are not (yet) used to improve their system and processes further. This prevents the emergence of an important element of quality improvement: the continuous cycle of quality improvement. It is known from the literature that the implementation of a quality system takes time. The actual achievement of the results targeted by implementing a quality system may require more than a decade of disciplined use.¹ A considerable amount of time is needed to fully comprehend the benefits of a properly implemented quality system.² Doeleman's studies showed that for example the EFQM Excellence Model needs to be consistently applied over a lengthy period of time (5-10 years)

before the effects of its use became evident.³ Furthermore, we found that when all the various elements of the quality system are considered separately, the element of patient involvement is the least developed. The results from this study can be seen as defining a baseline needed for answering the research questions of this thesis.

The second study in this thesis examined the relationship between the development stage of the quality system and perceived organizational outcomes over a period of fifteen years (1995-2011). Based on Donabedian's quality improvement model, we hypothesized that having achieved a more advanced stage of quality system development is related to better organizational outcomes (*hypothesis 1*). Results showed that hospitals with more developed quality systems did indeed have better perceived organizational outcomes and that this positive relationship was consistent over time, thereby confirming *Hypothesis 1: A higher degree of implementation of the hospital quality system leads to improved outcomes of the organization*. In this study, we had measurements from multiple moments in time and linked the measures of the quality system to the organizational outcomes of the *next* measurement point. This was based on the assumption that structural measures do not have an immediate effect on organizational outcomes but that this process needs time to become visible. In this respect, since most previous studies used cross-sectional data, our study expands the theoretical understanding of quality systems by adding a longitudinal approach. It must however be noted that the effects that were found were relatively small and that the measured outcomes were perceived rather than clinical.

The relationship between organizational structure and organizational outcomes is assumed to be established through interrelation of the structure of the organization and organizational processes. In other words, the structure influences the processes in the organization and these in turn affect the organizational outcomes. This assumed interrelatedness of structure and outcome was translated into the following hypothesis. *Hypothesis 2: A higher degree of implementation of the hospital quality system leads to improved processes in the organization*. We examined the relationship between the development of the hospital quality system and process indicators taken from a national patient safety programme. It was assumed that hospitals with more highly developed quality systems would perform better on process indicators as they would reflect measures of the performance of an organization at the department level (process level). However, an inconsistent pattern of relationships between the development of the hospital quality system and the process indicators was found. Some positive associations were found

between the development stage of the quality system and several process indicators and some negative associations were found as well. Most of the process indicators in our study did not seem to be influenced by the quality system at all.

Consequently, we studied differences in the risks perceived by healthcare professionals in several organizational areas at the department level within the organizational domains (1) Procedures, (2) Training, (3) Communication, (4) Incompatible Goals and (5) Organization. This study was carried out in a general hospital that had been accredited for many years. It was therefore expected that healthcare professionals from this hospital would perceive little risks in the various organizational domains and that differences between healthcare staff from different departments in risk perceptions would be small to non-existent. Ideally, the quality system would have standardized the processes resulting in departmental processes becoming more similar (less between-groups variation) and reducing the amount of risky processes. However, we found that the hospital reported a high level of perceived risk for patient safety in most of the five organizational domains, especially in the procedures domain. Furthermore, inter-departmental converging effects of quality systems on organizational areas were not found, which can be seen as another contradiction of *Hypothesis 2*.

Both these studies contradict the idea that a quality system improves the processes of an organization. These findings contradict the results from the European research project DUQuE.⁴ Within this large study on the effectiveness of quality improvement systems in hospitals from different European countries, researchers found no relationship between quality management systems at hospital level and patient outcomes. However, they did find a positive relationship between quality management systems at hospital level and quality improvement at department level and between quality improvement at department level and patient outcomes.⁵⁻⁸ These contradictory findings can (at least partially) be explained by the use of different type of outcome measures that were used: where DUQuE used patient outcomes measures in this thesis perceived outcomes were used. Furthermore, another explanation can be found in the process indicators used in this study. These were part of a national safety programme that was designed separately from the existing quality system of the hospitals and therefore possibly less integrated in the hospital organization than the indicators used in the DUQuE project.

Based on our findings, we cannot rule out the possibility that a quality system does not contribute to improvement of process-level measures. This would contradict the first part of Donabedian's theoretical model of quality improvement. However, we have proposed several alternative explanations for these findings. One of these explanations was examined further in our study that examines the attitudes of healthcare staff towards procedures, an important aspect of a quality system, reasoning that this might play an important role in the extent to which parts of the quality system are adopted and adhered to at the clinical level. Attitudes of healthcare staff might mediate the relationship between quality systems and processes, making it complex to measure and attribute to the variation of scores for process indicators that we found. We will come back to this when we discuss the results of the study into attitudes of healthcare staff.

In a developed quality system, quality activities are integrated into daily working processes throughout the organization. Policy and management of the organization ensure that this is carried out at the process level of the organization as well and this becomes visible in a reduction of variation in processes of the organization (over departments) and improvement of these processes over time. This led us to hypothesis 3: *Improved processes of the organization lead to improved outcomes of the organization*. We studied the compliance of healthcare professionals with a procedure intended to prevent wrong surgery. Compliance with this safety procedure can be seen as an outcome of the organization because compliant behaviour is thought of to result from a procedure developed to standardize processes at the departmental level of the organization and implemented similarly in all participating hospitals. We found that compliance with this specific procedure was generally low and influenced by a multitude of factors. Based on our hypothesis, we would have expected high compliance in general. Our research suggests that hypothesis 3 must be rejected. As discussed in previous chapters, existent research findings on compliance with quality and safety procedures indicated low compliance rates as well.

In the second study, mentioned earlier in the description of the results under hypothesis 2, we also examined the influence of organizational outcomes on the structure of the quality system over time (1995-2011). We hypothesized that hospitals with a more developed quality system (stage 3) would use their organizational outcomes as input to further improve their quality system. This is a feedback loop intended to effect continuous quality improvement over time. In this study we found that hospitals with a more developed quality system do indeed use organizational outcomes to

improve the structure of their quality system. *Hypothesis 4: In a more developed quality system, the outcomes of an organization feed back into the structure of the organization and this forms a cycle of continuous quality improvement.* This study revealed a positive relationship between organizational outcomes and measures of the structure of the quality system at a later point in time. Hypothesis 4 is confirmed by these results. Unique to this study is that it is the first to measure quality improvement over a longer period of time and test whether the results of an organization are being used to improve the structure of the system, which is an important assumption in quality improvement theory. The results obtained in this study can therefore be seen as a contribution to existing theoretical knowledge about quality improvement. It shows the results of a continuous cycle of quality improvement and confirms the theoretical idea of a feedback loop of improvement. However, the effects we found were smaller than the effects we found in the relationship between structure of the quality system and organizational outcomes. Furthermore, not all of the effects between organizational outcomes and structure were statistically significant. One explanation is that the relationship between results of an organization and the quality system is weaker because such a feedback loop is more difficult for organizations to obtain.

Hypothesis 5: The relationship between the level of development of a quality system and the processes, and the relationship between the processes and outcomes of a hospital are modified by the degree to which healthcare professionals are aware of the importance of standards and procedures set by the quality system and act accordingly. In this thesis we considered two aspects of this hypothesis: 1) healthcare professionals' attitudes towards working with procedures and 2) healthcare professionals' compliance with these procedures. We acknowledge that this is only a fraction of the many different ways that healthcare professionals interact with the quality system. In one study we examined compliance with a surgical checklist intended to reduce the incidence of wrong surgery. Overall compliance was found to be 71.3%. However, differences between hospitals and different departments within the same hospitals were large. Furthermore, actual execution of this procedure was suboptimal because healthcare professionals performed all kinds of tasks simultaneously. The study showed that having implemented procedures in a hospital is no guarantee for procedural compliance. Therefore, the intended effect of procedures on standardization of care and outcomes of treatment is suboptimal. Further examination of professionals' attitudes aimed to find reasons for non-compliance. From interview data it was shown that (according to the healthcare professionals) preconditions for

procedures are not always met and tend to vary between departments. The availability of procedures is limited, mostly due to technical problems such as inadequate search engines. Procedures are sometimes described too generally or on the contrary are too detailed to work with and often do not relate to practice. This indicates a gap between what the procedure prescribes and the actual work situation. Healthcare professionals acknowledged the importance of procedures and specified multiple objectives of compliance with procedures: uniformity, evidence-based treatment, increase of healthcare professionals' confidence, education of new healthcare professionals and a library. Non-compliance is accepted amongst healthcare professionals, mostly due to the fact that most procedures are not uniformly applicable to every individual patient. Also, specific work conditions, such as acute situations or time constraints, can lead to non-compliance. Non-compliance can also be (implicitly) demanded by the leading physician or derive from collaboration with other departments. Non-compliance looms when tasks become more routinized, a situation under which experience subjugates procedural piety. The decision to deviate from a procedure is often justified by the person's own clinical insight or discussed with colleagues, physicians or the head of the department. This information is important since it helps understand how healthcare professionals perceive the added value of quality procedures and how these procedures are applicable (or often not) in daily practice. Based on these two studies hypothesis 5 can neither be confirmed or rejected as they reveal only a part of the complicated relationship between healthcare professionals and the working mechanisms of quality systems. However, it seems safe to assume that the relationship between structure, process and outcomes is indeed modified by the attitudes of healthcare professionals towards procedures and the way in which they choose to work with them. This could also explain why we did not find the hypothesized positive relationship between the development stage of a quality system and higher scores of the process indicators.

To summarize our main findings, Table 1 describes the five hypotheses in this thesis, their working mechanisms and the conclusions based on research in this thesis.

Table 1 Hypotheses, working mechanisms and conclusions of this thesis.

	Hypothesis	Working mechanism	Conclusion
1	A higher degree of implementation of the hospital quality system leads to improved outcomes of the organization.	In a developed quality system, the quality activities are integrated in daily working processes throughout the organization. This leads to broad and systematic quality improvement. This is visible through a reduction of variation in results of the organization and improvement of these results over time.	Confirmed.
2	A higher degree of implementation of the hospital quality system leads to improved processes in the organization.	In a developed quality system, the relationship between the structure of the organization and results of the organization is assumed to be established through interrelation of the structure of the organization and organizational processes. This is visible in a reduction of variation in processes of the organization and improvement of these processes over time.	Rejected.

Table 1 Hypotheses, working mechanisms and conclusions of this thesis. (*Continued*)

3	Improved processes of the organization lead to improved outcomes of the organization.	In a developed quality system, the quality activities are integrated into daily working processes throughout the organization. Policy and management of the organization ensure that this is carried out at the process level of organizations as well. This is visible in a reduction of variation in processes of the organization leading to improvement of results of the organization over time.	Rejected.
4	In a more developed quality system, the outcomes of an organization feed back into the structure of the organization and this forms a cycle of continuous quality improvement.	The key aspect of a developed quality system is the feedback loop of organizational learning. Results of the organization are being used to adjust policy and strategy at the structure level. This creates a cycle of continuous improvement which is visible not only in an improvement of results but also improvement of the system itself over time.	Confirmed.
5	The relationship between the level of development of a quality system and the processes, and the relationship between the processes and outcomes of a hospital are modified by the degree to which healthcare professionals are aware of the importance of standards and procedures set by the quality system and act accordingly.	Awareness of the importance of quality and safety creates an environment where it becomes natural to act according to the standards and procedures set by the quality system. This is a prerequisite for quality policy and strategy at the system level to seep through to the results of the organization and thereby optimize the functioning of the quality system.	Confirmed.

In conclusion, the results of this research show the complexity of the relationship between hospital quality systems and high quality of care. We showed that a higher degree of implementation of the hospital quality system leads to improved outcomes, and that these improved outcomes can in turn have a positive effect on the structure of the hospital quality system. However, contrary to expectations based on the idea of quality improvement, we did not find a positive relationship between the degree of implementation of the quality system and improved processes of the organization. Furthermore, we did not observe a positive relationship between improved processes and outcomes of the organization. Based on our findings it seems that hospitals don't systematically use the data and results from the quality system to improve their quality system, processes and outcomes. A key aspect for optimal functioning of the quality system is the commitment and input to quality and quality improvement of healthcare professionals.

Methodological considerations

This thesis combined quantitative and qualitative research methods in order to answer the main research questions. More specifically, we used questionnaires, interviews, observations and record reviews. Data triangulation is seen as a way to obtain a broad understanding of the phenomenon being studied, in this case the hospital quality system. Data was measured at the structure, process and outcome levels in order to gain insight into all the levels involved in quality improvement. This study used data from fifteen years of quality management in Dutch hospitals, a unique dataset that enables to consider long-term development of both quality systems and organizational outcomes. Multilevel statistical techniques were used to analyse the results.

Despite these methodological strengths, several limitations should be mentioned. For a more detailed overview of limitations per study we refer to chapters 2 to 7. The first two limitations necessary to mention here are related to the way in which the development stage of quality systems was measured. These limitations were reported by other researchers in previous publications as well.⁹⁻¹¹ First, the development of quality systems and the results of the quality system were measured by means of self-reported questionnaires with a risk of socially desirable answers. However, the wide range of scores, the general tendency of quality systems to shift towards higher stages of development over the years of measurement, the guaranteed anonymity of the respondents and the provision of feedback

reports for benchmarking do seem to minimize biased results due to socially desirable response tendencies.

Second, the quality system questionnaire portrays the hospital as a whole, without providing any insights into differences between and/or within departments. The possibility that differences do exist between parts of the hospital cannot be ruled out. Therefore, this should be taken into account when interpreting the results. The use of a second questionnaire, Tripod Delta HC, that measures risk perception at department level gives more insight in these differences between departments and can be seen as complementary to the quality system questionnaire.

A third limitation is that the organizational outcomes were based on perceived outcomes, allowing some form of subjectivity. Ideally more objective measures such as clinical outcome data should be used to measure the performance of hospitals. However, no stable and reliable clinical outcome data were available, partly due to the length of the study period (1995-2011).

Implications for practice

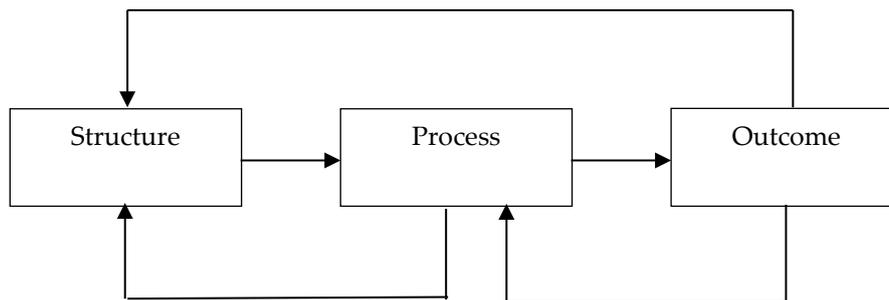
In order to achieve continuous quality improvement, hospitals need to use their outcomes to improve the structure and processes of their organization

Our research showed that within our observation period most hospitals did not manage to establish a feedback loop of continuous quality improvement.¹² Without such a feedback loop, hospitals do not use their outcomes to systematically improve their quality system (structure). It is important to establish this feedback loop since outcomes of the hospital organization can have a positive influence on the structure. The research in this thesis showed that over 50% of Dutch hospitals have not reached the highest stage of development of their quality system.¹² It is important that hospitals continue their efforts to develop their quality systems further. Only a fully developed quality system has the potential to contribute to better quality of care for patients. Hospitals that do have all the elements of the quality system in place but are struggling to get all these elements integrated into the daily working processes (the highest stage of development) could learn from the experiences of hospitals that have managed to do so. This requires a transparent and open culture of sharing and learning between hospital organizations. Some collaborations between hospitals have already

been formed in the Netherlands, for example a group of six teaching hospitals that started an open collaboration to improve their quality of care in 2010.¹³ Within this collaboration, quality information of the individual hospitals and hospital departments is shared and used for benchmarking and quality improvement. Quality information is made publicly available in other countries as well. For example, in the United Kingdom the NHS publishes results using quality indicators.¹⁴ Multiple purposes are being served: it can be used by the public to choose healthcare providers based on their quality of care and it can be used by the healthcare providers to share and detect best practices and learn from each other.

Moreover, it is not only the feedback loop from outcomes of the organization to structure that is important: a feedback loop from organizational processes to the structure is also needed and currently missing. We have shown that wide variation exists in organizational processes between hospitals and that the results of these processes are not always used to improve the quality (system) of care. For example, hospitals can perform numerous quality improvement projects but the results of those projects are not always used as feedback to shape future quality improvement projects. This entails a danger of repeating inefficient ways of working. Figure 1 shows the two proposed feedback loops.

Figure 1 Quality improvement through a feedback loop of continuous learning.



Patient involvement should be developed further

The results of this thesis showed that there is variation in the degree to which the different elements of the quality system are developed. Least developed is the element of patient involvement. This is consistent with

research into patient involvement in European hospitals that shows that patient involvement in European hospitals is generally low.^{5,15} Patients are an important actor in the quality system as they not only interact with the system but are also the outcome of the system: patient safety and quality of care. It is therefore important to develop patient involvement in hospitals further. Patient involvement is defined by the European Patients Forum (EPF) as *'the extent to which patients and their families or caregivers, whenever appropriate, participate in decisions related to their condition (e.g. through shared decision-making, self-management) and contribute to organizational learning through their specific experience as patients (e.g. patient reporting of adverse events or participation in root cause analysis related to their care).'*¹⁶ During the last decade, emphasis has been placed on the idea that patients should be involved in care in general but also in for example factual decisions and medical procedures concerning their own disease and treatment. This is also apparent from the growing body of literature on patient involvement (for example ¹⁷⁻²³). This literature also highlights several difficulties in patient involvement, such as the high level of institutionalisation of participation, and increase in proto-professionalization of patients.^{21,22} Both aforementioned benefits and threats of patient involvement can be taken as a starting point for developing efficient techniques to involve patients in a more systematic manner than is currently the case.

Hospitals need to find the balance between bureaucracy and quality improvement

From our interviews with healthcare professionals it became clear that a general feeling exists of an abundance of rules and procedures interferes with daily work. As quality systems develop, so do the numbers of procedures, rules and guidelines within the system. The next step should be to take the time to take a step back and consider the purpose of these rules and procedures. Rules and procedures are not intended to increase the bureaucratic burden but to improve the quality of care by standardizing the way in which healthcare professionals work. When a procedure does not contribute to this purpose, or when it even has a corroding effect, it should be eliminated from the system.

Involvement of healthcare professionals in quality improvement is essential for good functioning of the hospital quality system

A key aspect of quality improvement is the involvement of healthcare professionals in quality management. Attitudes of healthcare professionals

towards protocols are a potential source of resistance to quality initiatives.²⁴ It is known that professional autonomy plays a key role in the decision whether to engage in quality improvement activities.²⁵ Failing to engage healthcare professionals in the development and implementation of interventions is seen as one of the most important barriers to successful quality improvement.²⁶ Objections of healthcare professionals to standards and procedures should be taken seriously in order to keep them committed to safety and quality. But listening and trying to understand the resistance of healthcare professionals could also provide meaningful insights into the added value of certain standards and procedures. Healthcare professionals are the people most able to determine the merits of standards and procedures where it matters the most: patient care at the front line. This could contribute to the balance between bureaucratization and quality improvement. What should be taken into account in this respect is the increasing pressure that is being put on resources in healthcare in combination with the increasing numbers of new standards and rules that professionals need to work with, as was mentioned in the previous section. It is not surprising that new rules and procedures probably meet more resistance in an environment where there is a lot of time pressure on professionals to get their work done with less manpower available.

Implications for future research

Several implications for future research can be derived from this thesis. These implications take the form of proposed research questions for future research. The aim of these questions is to add to knowledge about how quality systems work and develop existing theories about quality improvement.

What role do processes play in hospital quality improvement?

The results of this thesis showed that the role of processes in hospital quality improvement is contradictory to our expectations based on the idea of quality improvement. Future research is needed to confirm whether this contradiction has theoretical or methodological origins. In this thesis we already suggested several theoretical explanations which mainly focused on aspects of implementation of quality improvement initiatives on the process level and the attitudes and behaviours of healthcare professionals. A first step in further developing our theoretical understanding of quality improvement would be to examine these possible explanations and gain

more insights into the role processes seem to play in quality improvement. Another possibility is that our method of measuring processes was not optimally suited to reveal a possible relationship between the structure of the quality system and processes, and a relationship between processes and outcomes of the organization. In this thesis we mainly focused on variation in processes, and assumed that improvement of processes is reflected in a reduction of variation in these processes. However, future research could define other ways of operationalizing improvement in processes and decide whether these relate to structure and outcome measures of the organization.

What obstacles do hospitals face in trying to reach the highest stage of development of their quality system?

The results of this thesis showed that organizations find it difficult to reach the highest stage of development of a quality system. The stage where quality is integrated into the normal operational processes and organizational outcomes are being used to improve the quality system. What could explain why hospitals experience difficulties in taking this step in development? And what type of resources and/or support would these hospitals need to move their quality system to this desired stage of development? A good starting point for answering these questions could be to study the hospitals that did manage to develop their quality system optimally and reached the highest stage of development of their quality system.

Can the quality system be designed in such a way that a maximum level of quality can be reached with a limited amount of resources? What should a selection of the essential elements of the system be based upon?

Related to the previous question, there is a contradiction that is worth examining in future research. On the one hand the quality system produces a growing number of rules, procedures, protocols and guidelines and calls for registration and data collection. However, this contrasts with fewer (financial and human) resources, which places a lot of time pressure on healthcare professionals. In order to maintain a balance between the competing demands (high quality with fewer resources) it would be interesting to provide a minimum set of requirements for their quality systems so that hospitals can focus on the essential elements that are needed to obtain high quality of care. It would be therefore important to examine whether there are specific rules, procedures and registrations that do not contribute (or only do so to a minimal extent) to higher quality of care. And

how can the contribution of rules and procedures be assessed? In other words: if policy makers want to make a selection of the aspects that are really necessary, what should this selection be based upon? Future research could provide insights that are valuable for research and practice, and help organizations to focus their resources and organize their processes in the most efficient way. As a first step to reduce the numbers of procedures carried out in an organization and give more autonomy to professionals working with procedures, the classification of Hale and Swuste²⁷ can provide guidance in determining which procedures allow space for interpretation. Hale and Swuste categorize rules into three types that are based on the amount of autonomy, or freedom of choice, that the rule allows for: (1) goal rules, which define goals that need to be achieved - goal rules leave a large amount of autonomy with the professional; (2) procedural rules, which define the way to arrive at a decision about a course of action; (3) action rules, which define concrete actions. Action rules remove almost all autonomy from the professional.²⁷ Certain organizational factors are relevant for determining the level of the constraint of the rules, for example a more unpredictable system needs goal rules.²⁸

How can healthcare professionals stay connected to the hospital quality system?

How can hospitals avoid losing the commitment of healthcare professionals to quality management? How can the input of healthcare professionals be used to improve quality of care? What do healthcare professionals need in order to be able to work according to the rules and procedures set by the quality system? A key aspect of the functioning of quality systems is the healthcare professionals who need to work within the system. Quality management is often performed using a top-down approach, with little involvement and input from healthcare professionals at the structure level. This creates a risk of healthcare professionals feeling passed over and in turn they might not feel connected with the quality system. In order to avoid losing the valuable contribution of healthcare professionals to quality improvement, it is important to know exactly how healthcare professionals can stay motivated, connected, involved and committed to quality management. Future research should focus more on the needs of healthcare professionals and point to solutions for existing barriers for them, facilitating more interaction with the hospital quality system and more bottom-up input.

Future methodological approaches

As well as pointing to relevant future research questions that could contribute to the theoretical understanding of quality systems, it is also relevant to consider different methodological approaches. With regard to the *study population*, future research should try to study the effectiveness of quality systems in larger hospital populations, for example within a European context. A recent example of one such valuable approach was the European research project DUQuE.⁴ Furthermore, it would be worthwhile to see whether the mechanisms for quality systems show a similar pattern in different healthcare sectors, such as long-term care. Long-term care is a relevant sector given the rapidly ageing population worldwide. Researchers should favour *study designs* that are longitudinal in nature. Even though a longitudinal design is in practice often very difficult to realize, it does provide more meaningful insights when researchers want to determine causal relationships between quality systems, organizational processes and organizational outcomes. Complementary, in-depth studies that are more qualitative in nature could be used to provide insights into the attitudes and needs of healthcare professionals. The complexity of the human mind, cognition, decision-making and attitudes might be better captured with these kinds of in-depth qualitative methodologies. Replication of results of previous studies might sound trivial and is often mentioned in published papers, but in practice replication is not common at all, even though it is an important cornerstone of science.²⁹ Future research in the field of quality management could benefit from *other scientific disciplines* such as safety science (for example to learn about the working of safety systems in other high risk industries, e.g., aviation), human factor engineering (for example to learn how a system can be designed around humans instead of how the system should be 'forced upon' them) or social psychology (for example to understand the decision-making processes of healthcare professionals). At the measurement level, future research should develop valid and stable clinical outcome measures. There are not many clinical outcome indicators available and the measures that are available are often unreliable or not validated. These clinical outcome measures should not replace the currently used process indicators but should be seen as supplementary to them.

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