Exploring Complexity in Health: An Interdisciplinary Systems Approach
A. Hoerbst et al. (Eds.)

doi:10.3233/978-1-61499-678-1-38

Conceptual Considerations on the Integration of Quality Indicators into Clinical Pathways

Peggy RICHTER[a,1], Martin BURWITZ[a] and Werner ESSWEIN[a]
[a]*Technische Universität Dresden, Deutschland*

Abstract. Health care systems need to cope with continuous changes such as with the current trends towards pay-for-performance and value-based health care. In this context, the article aims at analysing the potentials of the integration and utilisation of quality indicators in clinical pathways. It comprises the first steps of a design-oriented research process, i.e. problem motivation and objective definition. Therefore, a conceptual framework for pathway-integrated quality indicators is proposed. Potentials of the approach are outlined in three use case scenarios. The analysis points out great potentials for quality management on institutional and network level and for bridging the gap between medical research and practice. Further research topics are derived and summarised in an agenda.

Keywords. Clinical pathway, clinical process, quality management, quality indicator, pay-for-performance

1. Introduction

Health care systems are subject to continuous change that all involved health service providers need to cope with. The current trend is towards value-based health care that strives for balancing costs, quality and patient safety and puts value instead of volume of care first [1]. Value is defined as the health outcome for patients relative to the costs of their treatment [2]. Thus, value relates to the concept of quality, since quality of medical care is defined as the chain of structure, process and outcome quality [3]. A pillar for the implementation of value-based health care is to link outcome performance to reimbursement (pay-for-performance). The approach is already practiced on a routine basis in a few countries such as Sweden or the United Kingdom [4], [5]. This makes it highly important for health service providers and managers to monitor and control the quality level of health care provision in order to being able to adapt or renew processes or structures of the corresponding institution. Quality indicators (QIs) are well-established instruments for this purpose [6]. However, quality assessments are time-consuming due to long collection and evaluation phases. Thus, their results represent an ex-post view and the health service providers and managers cannot intervene at the point in time when low quality is foreseeable with regard to the associated QIs. In case of pay-for-performance this holds potential for increasing earnings. Hence, a more real-time

[1] Corresponding Author: peggy.richter2@tu-dresden.de

oriented approach that also enables ex-ante and formative assessments of quality is desirable.

Since the care process represents the core of health care provision, it is reasonable to also monitor and control quality on this basis to reduce additional documentation work for health care providers. Clinical pathways (CPs) are common tools to document and manage the process of care provision. CPs detail and structure the significant steps in the care process for patients with specific health conditions [7]. They are multidisciplinary care plans that are adapted to local structures, resources and conditions and that focus on quality and efficiency of the care process with regard to the recommendations of clinical practice guidelines [8]-[10]. However, quality is not systematically monitored in CPs yet.

The objective of this paper is to analyse the potentials of the integration and utilisation of QIs in CPs regarding quality management on institutional and network level as well as for bridging the gap between research and practice. Therefore, a framework is proposed (section 2) and use case scenarios are outlined (section 3). The article comprises the first two steps in a design-oriented research process, i.e. identifying and motivating the problem and defining the objectives of a solution [11]. For this, a literature-based, argumentative-deductive analysis approach was chosen [12]. The results define the basic framework for further research to develop, demonstrate and evaluate an artefact for utilising QIs in CPs in the course of pay-for-performance and value-based health care.

2. Framework for Pathway-Integrated Quality Indicators

Figure 1 depicts the QI sources (upper left frame), integration (upper right frame) and potential utilisation of QIs in CPs (lower frame) and functions as the basic framework for further considerations. There are a variety of sources that define relevant QIs for health care providers. Responsible institutions prepare national QI sets, such as the QI set for outpatient care provided by the Institute for Applied Quality Improvement and Research in Health Care in Germany [13] or the outcome indicator set prepared by the

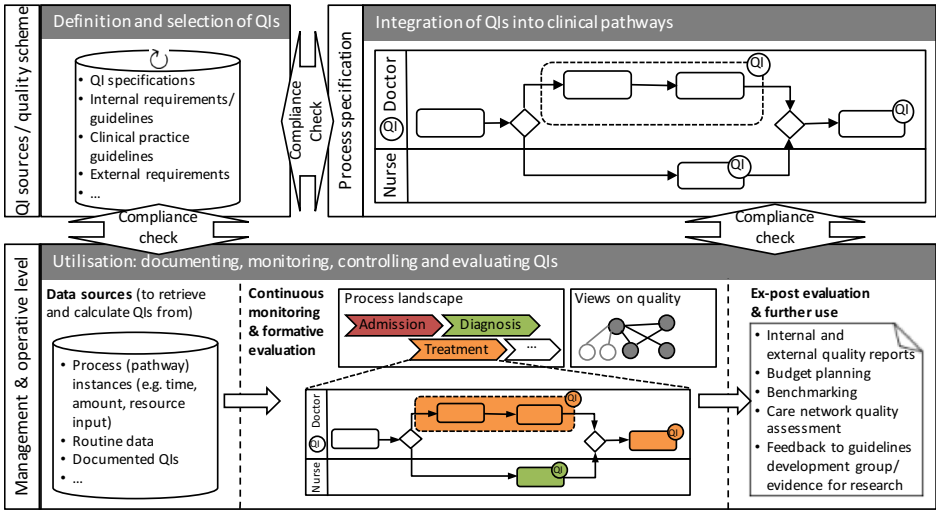

Figure 1. Framework for sources, integration and utilisation of quality indicators in clinical pathways

National Health Service England [14]. QIs can also be derived from clinical practice guidelines or can result from internal (e.g. hospital goals) or external requirements (e.g. patient or supplier requirements). The definition and selection of an adequate set of QIs for a health care institution depend on the intended usage (e.g. certification, internal objectives) and are the first necessary steps for a pathway-based quality management. If the sources hold revised or new QIs, the implemented QI scheme should be adapted correspondingly. This makes it necessary to preserve the link between QI sources and the QIs implemented in CPs. The specified QI scheme then needs to be integrated into the CPs of a health care institution, either during development or ex post. Therefore, it is necessary to analyse how different QI types and elements can be represented within a CP and to extend the existing pathway modelling languages correspondingly. With the integration of QIs in CPs, new utilisation potentials arise.

3. Use Case Scenarios

3.1. Scenario 1: Monitoring the Quality of Care

Monitoring the quality of care holds great similarities to the concept of compliance management, i.e. checking the conformity of the business to regulatory requirements. The relationship needs further examination, but since quality is not a part of the compliance management domain [15], it deserves discrete research. If QIs were integrated in CPs, their current degree of performance on process instance, type and process landscape level could be visualised using heat-maps for example (as used in process compliance management as well [16], see example in Figure 1). The integration with the results of activity-based costing and payments holds the potential to analyse the relation and effects between quality, costs and revenues. Furthermore, users have different information requirements, which could be implemented in terms of a quality view concept (e.g. limiting the view on quality performance to a structural unit or to a specific treatment decision). The approach could further be used on the network level, allowing benchmarking between similar health service providers.

3.2. Scenario 2: Quality Assessment of Integrated Care Networks

Integrated care aims at ensuring quality of care given a multitude of challenging circumstances in western health care systems, such as the demographic change, an increase of chronic diseases, a lack of cooperation among health and social care providers as well as fragmented service delivery [17]-[19]. With integrated care continuity, quality and efficiency of care for multidimensional, long-term and costly health needs shall be improved by integrating services of professional and informal caregivers across a range of organisation types along all phases of the care process [20]-[22]. However, the implementation of the approach is difficult due to its high complexity and it requires a coherent set of models and methods to enable the connection, alignment and collaboration between the involved stakeholders [20]. In order to develop a quality management system for integrated care, integrated care pathways and performance management (e.g. gathering patient-related performance and logistics data, establishing and monitoring quality targets) were identified as vital elements [23]. Enhancing such integrated care pathways with QIs allows an easier monitoring and assessment of the provided care and the progress of a patient across the borders of single institutions.

Therefore, it is necessary to identify network quality indicators and how they can be represented in clinical/ integrated care pathways.

3.3. Scenario 3: Implications for Clinical Practice Guidelines and Medical Research

CPGs are systematically developed recommendations for health care providers and patients about the appropriate care provision for specific diseases [24] and intent to improve the quality of clinical practice by reducing medical errors and the number of inappropriate treatments [25]. The translation of the rather prosaically described, generic recommendations of CPGs into CPs is supported by methods such as proposed in [26] or [27]. However, the relationship between both is not preserved and thus not assessable in practice. Research addresses this issue with studies on guideline compliance using disease specific indicators (e.g. [28], [29]), with methods for the vertical integration of CPGs and CP models (e.g. [30]) as well as with domain-specific modelling languages that integrate CPGs into CPs, but do not detail QIs so far (e.g. [31]). Adapting such approaches for the purpose of quality management could detect prevalent systematic deviations from quality goals defined in CPG recommendations, which in turn could reveal potentials for improvements in the guideline development process or for revision of recommendations. Thus, it eases guideline monitoring in practice which is assumed to be a key element to also improve guideline implementability and usage [32]. Furthermore, results of evaluating QIs on the basis of process instances and routine data could be used to generate knowledge and hypotheses for future medical research activities.

4. Conclusion and Further Research

The research comprises the initial steps of a design-oriented research agenda and argues the necessity and utilisation of integrating QIs into CPs in the course of pay-for-performance and value-based health care. The developed framework and use case scenarios point out the great potentials for quality management on institutional and network level and for bridging the gap between medical research and practice. Further research will address the following topics that derive from the conducted analysis: (1) What concepts and methods can be adopted from current process compliance management practices? (2) What are descriptive elements of QIs? (3) How can QIs be systematised and modelled? (4) What are user and QI-specific requirements? (5) To what extend do existing (CP) modelling languages meet the requirement? (6) How can QIs be integrated into CPs? (7) What is a corresponding QI monitoring and evaluation method? The construction of the artefact (a method for the integration of QIs in CPs and a corresponding monitoring and evaluation method) will be followed by an evaluation [11], i.e. the application to practice and the assessment by domain experts.

References

[1] Institute of Medicine (US) Roundtable on Value & Science-Driven Health Care, *Value in Health Care: Accounting for Cost, Quality, Safety, Outcomes, and Innovation*. Washington (DC): National Academies Press (US) (2010).

[2] M. E. Porter, What Is Value in Health Care?, *New England Journal of Medicine* **363(26)** (2010), 2477-2481.
[3] A. Donabedian, The quality of care: How can it be assessed?, *JAMA* **260(12)** (1988), 1743-1748.
[4] N. Soderlund et al., Progress Toward Value-Based Health Care - Lessons from 12 Countries, The Boston Consulting Group (2012).
[5] J. Clawson et al., Competing on Outcomes: Winning Strategies for Value-Based Health Care, The Boston Consulting Group (2014).
[6] J. Mainz, Defining and classifying clinical indicators for quality improvement, *International Journal for Quality in Health Care* **15(6)** (2003), 523-530.
[7] H. Campbell et al., Integrated care pathways, *British Medical Journal* **316(7125)** (1998), 133-137.
[8] L. Kinsman et al., What is a clinical pathway? Development of a definition to inform the debate, *BMC Medicine* **8** (2010), 31-33.
[9] M. Panella and K. Vanhaecht, Is there still need for confusion about pathways?, *International Journal of Care Pathways* **14(1)** (2010), 1-3.
[10] T. Rotter et al., Clinical pathways: effects on professional practice, patient outcomes, length of stay and hospital costs, *Cochrane Database of Systematic Reviews* **3** (2010).
[11] K. Peffers et al., A Design Science Research Methodology for Information Systems Research, *Journal of Management Information Systems* **24(3)** (2007), 45-77.
[12] T. Wilde and T. Hess, Methodenspektrum der Wirtschaftsinformatik: Überblick und Portfoliobildung, *Arbeitspapiere des Instituts für Wirtschaftsinformatik und Neue Medien* (2006).
[13] J. Szecsenyi, B. Broge, and J. Stock (Eds.), QiSA - Das Qualitätsindikatorensystem für die ambulante Versorgung, KomPart, Berlin (2009).
[14] CCG Outcomes Indicator Set 2015/16: At-A-Glance Guide. NHS England (2015).
[15] N. S. Abdullah, S. Sadiq, and M. Indulska, A Compliance Management Ontology: Developing Shared Understanding through Models, *Advanced Information Systems Engineering*, J. Ralyté et al. (Eds), Springer, Berlin, Heidelberg (2012) 429-444.
[16] M. Schneider and J. Auer, *Prozess-Compliance, Prozessmanagement für Experten*, F. Bayer and H. Kühn (Eds.), Springer, Berlin, Heidelberg (2013), 115-133.
[17] V. Antunes and J. P. Moreira, Approaches to developing integrated care in Europe: a systematic literature review, *Journal of Management & Marketing in Healthcare* **4(2)** (2011), 129-135.
[18] S. V. Lerum and J. C. Frich, Normative assumptions in integrated care: A conceptual discussion, *International Journal of Healthcare Management* **5(1)** (2012), 32-39.
[19] E. Nolte and E. Pitchforth, What is the evidence on the economic impacts of integrated care?, World Health Organization (2014).
[20] D. Kodner and C. Spreeuwenberg, Integrated care: meaning, logic, applications, and implications – a discussion paper, *International Journal of Integrated Care* **2**, (2002), 1-5.
[21] J. Billings, What do we Mean by Integrated Care? A European Interpretation, *Journal of Integrated Care* **13(5)** (2005), 13-20.
[22] D. Kodner, All Together Now: A Conceptual Exploration of Integrated Care, *Healthcare Quarterly* **13** (2009), 6-15.
[23] M. Minkman et al., A quality management model for integrated care: results of a Delphi and Concept Mapping study, *International Journal for Quality in Health Care* **21(1)** (2009), 66-75.
[24] M. J. Field and K. N. Lohr, *Clinical Practice Guidelines: Directions for a New Program*. Washington, DC: National Academy Press (1990).
[25] M. Lugtenberg, J. S. Burgers, and G. P. Westert, Effects of evidence-based clinical practice guidelines on quality of care: a systematic review, *Quality & Safety in Health Care* **18(5)** (2009), 385-392.
[26] B. Böckmann and K. Heiden, Extracting and transforming clinical guidelines into pathway models for different hospital information systems, *Health Information Science and Systems* **1(1)** (2013), 1-8.
[27] H. Schlieter, *Ableitung von Klinischen Pfaden aus Medizinischen Leitlinien – Ein Modellbasierter Ansatz*, Dissertation kummulativ, Dresden (2012).
[28] M. Leone et al., Variable compliance with clinical practice guidelines identified in a 1-day audit at 66 French adult intensive care units, *Critical Care Medicine* **40(12)** (2012), 3189-3195.
[29] E. Goldbraich et al., Understanding Deviations from Clinical Practice Guidelines in Adult Soft Tissue Sarcoma, *Studies in Health Technology and Informatics* **216** (2015), 280-284.
[30] S. Bögel, H. Schlieter, and W. Esswein, Compliance Check of Health Care Process Models, *Proceeding of AMCIS 2011* (2011).
[31] M. Burwitz, H. Schlieter, and W. Esswein, Modeling Clinical Pathways - Design and Application of a Domain-Specific Modeling Language, *Wirtschaftsinformatik Proceedings 2013* (2013).
[32] A. R. Gigliardi et al., How can we improve guideline use? A conceptual framework of implementability, *Implementation Science* **6(26)** (2011)