Evidence-Based Quality Improvement: A recipe for improving medication safety and handover of care

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Citation for published version (APA):
CHAPTER 1

General introduction and outline of thesis
GENERAL INTRODUCTION

In healthcare we strive to provide the highest possible quality of care. The Institute of Medicine defined quality care as: safe, effective, patient centered, timely, efficient, and equitable. The quality aspect safety (“the prevention of harm to patients”) has received considerable attention since the beginning of this century, resulting in quality and safety improvement initiatives worldwide. Even though healthcare professionals work together with the intention to provide safe care, medical errors still threaten patient safety. Medical errors can originate at any moment during the care for a patient and with various underlying causes. In the systems theory the underlying causes for these errors are to be found in the design of the system of care where the healthcare professionals work in. A system that is complex because tasks are divided among several healthcare professionals that have to work together as a team to provide high quality and safe care. This system has to enable the healthcare professionals to deliver safe care. According to the systems theory, errors occur because there has been a breakdown in the defenses, barriers and safeguards that have to prevent errors from occurring. A safe system of care therefore: (1) prevents errors from occurring; (2) learns from the errors that do occur; and (3) is built on a culture of safety that involves healthcare professionals, patients and their families.

Clinical scenario

Imagine a patient that is admitted to the hospital through the Emergency Department (ED). Next, suppose this patient has an operation and postoperatively stays at the Intensive Care Unit (ICU) for one day. The patient is then transferred to a general ward and after three days is discharged home. To ensure continuity of care, clinical information is communicated at least 30 times at: five interdepartmental handovers, 10 physician shift handovers and 15 nursing shift handovers. Next, let’s assume the same patient also gets prescribed six different medications that have to be administered three times a day, this results in 90 medication preparation and administration moments. Together, the communication moments at handover of care and the medication preparation and administration moments add up to a staggering 120 opportunities for error during a 5-day admission to the hospital for these two activities alone.

From research and sentinel event analysis we know that the two processes described in this clinical scenario (1) communication moments at handover of care and (2) the medication process, have a particular high potential
for error. Not surprisingly, a lot of interventions to improve the quality and safety of these processes have emerged.\textsuperscript{11-14} When it comes to improving quality and safety, system changes are most often developed and implemented through a pragmatic approach in reaction to incidents that occur and individual success stories of others.\textsuperscript{15} In clinical care this would not be tolerated. A clinical treatment will only be accepted in practice if rigorous evidence of effectiveness from clinical trials can be presented.\textsuperscript{15, 16} In addition to 120 opportunities for error, the clinical scenario is also about 120 moments where we expect healthcare professionals to ‘do the right things right’. If we ask our healthcare professionals to apply all kinds of safety practices for 120 times without evidence of their effectiveness, this may result in reluctant clinicians as well as wasting valuable resources. Therefore, a structured approach for the development, evaluation and implementation of quality improvement initiatives is needed.

**Evidence-based quality improvement**

To improve the quality and safety of processes in healthcare we need to gain insight into the circumstances and situations that lead to the occurrence of unsafe situations. To analyze the causes of medical errors the Yorkshire contributory factors framework is a useful instrument.\textsuperscript{18} This instrument is an empirically developed framework to identify the factors that contribute to medical errors (Figure 1). The framework presents a variety of possible contributory factors at a number of different levels (active failures, situational factors, local working conditions, and organizational and external latent factors). For example, a medication error that occurs in two different settings may result in the same adverse event, e.g. an overdose, but the underlying causes may differ, or contributory factors. These local circumstances are important factors to consider before designing and implementing a quality and safety improvement intervention.\textsuperscript{19} In one setting the error may be due to a lack of education, where in another setting it may be due to failing equipment. To take this a little further, usually it is not just one factor that causes an error to occur, but a combination of factors. If we are able to determine what combination of factors causes errors to occur in a specific local context, we can tailor the interventions to these specific factors and context. Through iterative development and evaluation of the interventions we can achieve increased evidence of effectiveness of interventions as well as insight in potential barriers and facilitators for implementation.\textsuperscript{20}
Figure 1. Yorkshire Contributory Factors Framework (Lawton et al. BMJ Q&S, 2012)
Just like in clinical care, interventions to improve the quality and safety of healthcare should be based on an analysis of the causes (‘diagnosis’), with evidence of the effectiveness of interventions (‘treatment’) combined with the local context of the environment it is implemented in (‘the individual patient characteristics’). Through monitoring and further adaptation of the system, continuous evidence-based quality improvement (EBQI) can be achieved.

Therefore we hypothesize that effective improvement of quality and safety contains the following ingredients: 1) analysis and insight into the factors that contribute to the causes of errors, 2) the acknowledgement of local circumstances and involvement of clinical leaders and end-users for the development of tailored local interventions, 3) evidence of effectiveness of interventions, and 4) indicators to continuously measure and improve quality and safety.

**Aim of the thesis**
The aim of the research in this thesis is to further explore the required ingredients for EBQI of two processes with a high potential for errors: the medication process and handover of care.

**OUTLINE OF THE THESIS**
This thesis is subdivided into two sections with research on medication safety in part I and research on safe handover of care in part II.

**PART I Medication safety**
The first part of this thesis consists of five studies on medication safety. Given the high number of medication errors, many practices have emerged in the past decade to increase the safety of the medication process. Even though high-quality evidence of effectiveness of these practices is limited, they are increasingly being incorporated into hospital policies. Chapter 2 describes the results of a qualitative study into nurses’ experiences with and perspectives on medication safety practices. An often mentioned causative factor for medication administration errors are interruptions and distractions during medication preparation and administration. In Chapter 3 we present the results of an observational study that examines the frequency and duration of interruptions and distractions during medication administration rounds, identifies the causes of the interruptions and distractions
and compares whether or not there are any differences between surgical and non-surgical units. Wearing drug round tabards during medication rounds is a widespread, inexpensive intervention that is thought to reduce the number of interruptions during drug rounds and medication administration errors, however robust evidence for their effectiveness is lacking. In Chapter 4 the effectiveness of drug round tabards on interruptions, distractions and medication administration errors is evaluated in a mixed method before-after study. Finally, in order to monitor and further improve the safety of the medication process it is necessary to be able to continuously measure performance in a feasible way. In Chapters 5 and 6 two instruments to monitor the safety of the medication process are explored. Chapter 5 explores the availability of indicators (structure, process and outcome) for the safety of the medication preparation and administration process through a systematic review of the literature. In Chapter 6, the diagnostic accuracy of (a pediatric) trigger tool to detect medication errors is examined in a cross-sectional study.

PART II Safe handover of care
The second part of the thesis contains three studies on nursing handover. Communication failures threaten patient safety, especially at moments when care is handed over from one healthcare professional to another. Nursing shift handover is such a moment when adequate communication is critical for continuity of care. If clinically relevant information is shared accurately and in a timely manner it may prevent adverse events, errors, inappropriate treatment and delay and omission of care. Therefore it is important to find out what constitutes an effective nursing handover style. Chapter 7 describes the results of a Cochrane systematic literature review into the effectiveness of different nursing handover styles. Chapter 8 presents the development of a evidence-based local blueprint for nursing shift handover using a formal evidence-based consensus procedure. In Chapter 9 the The effectiveness of the blueprint is evaluated in an implementation study using an interrupted time series design.

Chapter 10 concludes this thesis with a summary of the findings and a general discussion on future perspectives that puts the results of the studies on medication safety and handover of care into the broader context of EBQI.
REFERENCES


