Considering Context in Quality Improvement Interventions and Implementation: Concepts, Frameworks, and Application

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The views expressed in this report are those of the authors and do not necessarily represent those of the US Department of Health and Human Services, the Agency for Healthcare Research and Quality or the American Board of Pediatrics Foundation.
The author declares that she has no conflict of interest.
Publication of this article was supported by the Agency for Healthcare Research and Quality and the American Board of Pediatrics Foundation.
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Received for publication December 12, 2012; accepted April 23, 2013.

ABSTRACT

Growing consensus within the health care field suggests that context matters and needs more concerted study for helping those who implement and conduct research on quality improvement interventions. Health care delivery system decision makers require information about whether an intervention tested in one context will work in another with some differences from the original site. We aimed to define key terms, enumerate candidate domains for the study of context, provide examples from the pediatric quality improvement literature, and identify potential measures for selected contexts. Key sources include the organizational literature, broad evaluation frameworks, and a recent project in the patient safety area on context sensitivity. The article concludes with limitations and next steps for developments in this area.

KEYWORDS: context sensitivity; implementation science; pediatrics; quality improvement interventions; quality of care; realist evaluation

ACADEMIC PEDIATRICS 2013;13:S45–S53

Making mental connections is our most crucial learning tool, the essence of human intelligence; to forge links; to go beyond the given; to see patterns, relationships, context.

Marilyn Ferguson

HEALTH CARE DELIVERY is highly complex, from the patient–clinician encounter to the organizations in which these encounters occur, and is ultimately embedded in and affected by an even more varied environment. This situation makes delivering consistently high-quality care challenging for its participants and ripe for opportunities for improvement. Researchers and practitioners together develop and test quality improvement (QI) strategies, often inside of organizations, common test beds for QI research. Delivery organizations also implement strategies that have succeeded elsewhere. What evidence does an organization (eg, a children's hospital, a patient-centered medical home) need to know about whether a strategy researched in one place will work in another? Efforts to improve quality of health care occur in many different situations and may work better in some and worse in others.[1–3] Just as medical treatment is indicated for some patients and not others, interventions aimed at quality improvement may be indicated for some organizations and not others. Appropriate selection of quality improvement strategies requires information about context. But what exactly is context, and how should it be measured to be useful in research and for interpretation in organizational decision making about quality improvement investments?

Drawing from growing consensus that context matters and needs more concerted study for helping quality improvement decision makers, we sought to define key concepts for the study of context, offer approaches to measure and report context in pediatric quality improvement research, and assess limitations and next steps for future research in this area.

Early research on improving quality and safety focused on efficacy, without much consideration of context, sparking debates about the relative value of different approaches.[4,5] The efficacy paradigm prioritizes internal validity over external validity, factoring out contextual variables, simplifying the job for an evaluator.[6] For concrete, easily packaged, and describable quality improvement interventions (QII), such a traditional evidence-based medicine approach, may be applicable: observe a system, introduce a perturbation (the intervention) to some participants but not others, and then observe again. The experiment is designed to determine if the changes in outcome are attributable to the perturbation (with statistical confidence limits). Yet most experiments are short on details about how the intervention works, including the influence of context. For more complex interventions developed to improve quality, the field is moving to incorporate complementary research paradigms that study how context enables, thwarts, and interacts with interventions.

A useful alternative evaluation model comes from Pawson and Tilley's realist evaluation framework of context, mechanism, and outcome (ie, the CMO model), where "programs work (have successful 'outcomes') only insofar as they introduce the appropriate ideas and opportunities ('mechanisms') to groups in the appropriate social and cultural conditions ('contexts')."[7] This model makes the context sensitivity of many QIIs explicit and applies whenever local adaptations are expected to influence outcome patterns. Defining context and considering when and how to study this concept effectively become paramount for assessing transferability of an intervention package from one context to another.[8]

WHAT IS A QII?

For the purpose of our focus on context sensitivity, a broad definition of a QII is used in order to inform research on efforts to improve quality of pediatric care comprehensively. On the basis of the Robert Woods Johnson Foundation's definition used for evaluating training programs in this domain, *quality improvement* is "the formal approach to the analysis of performance and systematic efforts to improve it."[9] This definition of quality improvement is not restricted to any specific level of analysis (eg, performance could be assessed for a doctor's practice, an emergency department, a hospital, or a geographic area). An *intervention* is a newly created attempt to improve the performance of the specified unit over time, and it can be described in terms of what could potentially be packaged and replicated elsewhere.[10] Many QIIs have multiple components designed to change behaviors and actions of people, organizations, and even networks or systems of organizations.[11,12] As such, they are sometimes termed *strategies, initiatives,* or *programs.* Interventions can target any or all of the Institute of Medicine's quality domains (safety, effectiveness, efficiency, timeliness, equity, and patient-centeredness) where performance is lacking.[13] If the point is to improve health care quality, then all of these efforts fall under the QII research umbrella when considering ways to conceptualize, measure, and interpret potential contextual effects. For simplicity's sake, implementation elements that can be described, packaged, and replicated from one environment to another may be considered part of the QII. In this case, the mechanism in the realist CMO model is the QII and its implementation. Another tactic is to distinguish the content of a QII from its implementation, and consider the contextual influences on each (QII and implementation) separately and interactively.

WHAT IS CONTEXT?

Simply put, context (ie, the C in the realist CMO model) is potentially everything else—anything that cannot be described as part of the QII or the outcomes of interest (ie, the M and the O in the CMO model). But only those contextual factors hypothesized to affect the success of the intervention need to be studied for a given QII, after careful consideration of potential factors and competing hypotheses. Which contextual factors are most likely to matter? Which factors may influence the mechanisms and outcomes favorably or unfavorably? How does one tell a priori? What parts of the QII may require adaptation from one local setting to the next, and one time period to another? The overarching question to ask at the outset of a QII evaluation is, what are the local conditions that could influence the outcomes of interest? The line between the QII and the local conditions may be clear initially and blur during implementation of the intervention. For better knowledge translation, those involved in QII implementation and evaluation need to anticipate potential scale-up and spread to other environments as they describe the QII versus the context in which it was tested. Any blurring between context and QII is often related to perspective. If QII developers believe that local leadership engagement is important to QII success, they may spend time up front gaining buy-in for the new program (the QII). If commitment of a certain package of resources is a prerequisite for implementing the intervention, then the presence of that commitment can be seen as a contextual variable (eg, money and personnel time committed). Alternatively, the QII may be designed with an initial leadership intervention component (eg, letter to the hospital CEO from the investigative team noting project backing from a major health plan in the area) aimed at gaining a particular level of commitment.

More concretely, the Figure depicts 3 scenarios that have differing combinations of QII components and contexts, but are all effectively the same. The first scenario (labeled "original hospital") reflects a study by McKee and colleagues,[14] who describe an improvement model to reduce catheter-associated bloodstream infections at a children's hospital with 6 intervention components. Organizational commitment (ie, enthusiastic leadership, adequate resources) is implied as a contextual factor. In addition, the study authors describe a context responsive to catheter product issues occurring during a period of time when infection rates climbed. In one alternative hypothetical scenario (hospital A), a hospital might implement only 2 components (ie, the checklist and the dedicated cart) because their nurses have already received empowerment training and their physicians have already experienced the necessary type of insertion training. They may also have a real-time infection rate feedback system to the unit leadership. Their QII implementation is simplified in response to their local conditions. On the opposite end of the spectrum, another hospital (hospital B) might choose to implement the originally described QII along with extra interventions to compensate for limitations in their context.

Thus, context is what is left over after specifying the QII (with implementation components) and may in fact vary from one location (context) to another.[15,16] Such a simplified definition should not mask the challenges inherent in understanding the interplay between a QII and the context, where components of a QII may be tailored to a particular context, and in turn, the context may adapt during implementation of the intervention. The active aspects of the interaction theoretically may differ in structure and impact depending on specifics of the