



Exploring the landscape: Data use in quality improvement

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inSCALE – Innovations at Scale for Community Access and Lasting Effects

The inSCALE programme, a collaboration between Malaria Consortium, London School of Hygiene and Tropical Medicine (LSHTM) and University College of London (UCL), aims to increase coverage of integrated community case management (ICCM) of children with diarrhoea, pneumonia and malaria in Uganda and Mozambique. inSCALE is funded by Bill & Melinda Gates Foundation and sets out to better understand community based agent (CBA) motivation and attrition, and to find feasible and acceptable solutions to CBA retention and performance which are vital for successful implementation of ICCM at scale.

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Preface

This document was prepared for an internal meeting of the inSCALE project. It does not aim to be a comprehensive systematic review of the topic. Rather, it pictures the landscape based on review articles and informal discussions with expert colleagues. This document is not an official inSCALE publication but rather an internal working document.

None of this document may therefore be quoted, copied or referenced.

Discussions about the content of this document are welcomed.

Guus ten Asbroek, September 2010.

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Executive Summary

During planning for the inSCALE project data use was identified as a key area that could improve the retention, motivation and performance of community based agents. One area of data use is within the arena of quality improvement. To explore the landscape of data use in quality improvement a literature review was conducted and selected experts were consulted. The literature on data use in quality improvement is mainly focused on high income countries and there is little literature on research or program experiences from low-income countries.

Quality improvement activities include: Training; Supervision; Accreditation, Certification, Licensing; Implementing Clinical Standards and Evidence-based Guidelines; Audit; Peer review, Feed back; Patient and Community Engagement; Process Improvement and Redesign; Performance-based Incentives (; Development and measurement of Performance Indicators, Benchmarking. Details on several of these areas can be found in other inSCALE reviews.

Of these activities Audit; Feedback of performance information; and performance measurement were mentioned as innovative activities not yet used to their full potential in low income countries.

Different **Quality Improvement Approaches** have been described: Total Quality Management / Continuous Quality Improvement; Business Process Reengineering (BPR); Lean Thinking; Six Sigma; IHI and rapid cycle change / Breakthrough series /Improvement Collaborative Networks.

Of these approaches the **rapid cycle change** – adopted and promoted by the Institute of Healthcare Improvement and USAID, seems most appropriate for addressing quality issues at community based agent level (e.g. Village Health Team in Uganda, Agente Polivalente Elementar in Mozambique).

Others have suggested the introduction of knowledge based agents to support the exchange of performance information between community and other levels in the health system.

This landscape review concluded that the following should be considered for an innovation that includes a focus on data use in quality improvement:

- Develop and implement a feedback system for CBA performance information
- Consider implementing rapid cycle change as a quality improvement approach
- Develop and implement audit for CCM at community level
- Look at ways to facilitate data dissemination in communities, such as through knowledge based agents, or specially assigned supervisors.

1. Introduction

A part of the formative research in the inSCALE project, this 'exploration of landscape' seeks to picture the field of quality improvement, in particular in data use in quality improvement. The aim of this exploration is to arrive at potential innovations that may increase motivation, performance and retention of community based health agents.

This report discusses the most common activities and approaches associated with quality improvement, list papers that address these approaches in developing countries, and will then focus on the specifics of data use in these approaches.

2. Methods

To explore the landscape a literature review was conducted and selected experts were consulted.

This exploration used as a starting point multiple discussions with Johan de Koning, a colleague who specialized in Quality and Safety in Health Care in developing countries. He teaches quality and safety of health care at Martyr's University in Uganda and is involved in the implementation of medical error registration in over 30 hospitals in Uganda.

Medline, using Pub Med, was searched using combinations of the following terms: quality improvement health [MESH] /reviews; data use ; feedback ; technology; community health[MESH]; run chart*, control chart*; statistical process control;

In addition, general background information was used from the publicly accessible information from the Institute of Healthcare Improvement (Institute for Healthcare Improvement, 2010) and the USAID healthcare improvement project (USAID, 2010b).

Further guidance was obtained in informal discussions with other experts in this field: Nana Twum Danso (Fives Alive project, IHI/NCHS Ghana) and Lloyd Provost. (improvement advisor supporting IHI's innovation and improvement programs. are Supports IHI's programs in developing countries). They both provided information on current and past projects that they had been involved in, and they made suggestions for further reading. The views expressed in this document are not necessarily theirs and are the sole responsibility of the author. Other expert were approached but appointments could not yet materialize, despite multiple attempts.

3. Findings

The literature on quality improvement in health care focuses on healthcare processes in institutions, mainly in developed countries. The literature on quality improvement in developing countries is limited, on community health care in developing countries scarce.

3.1. Quality Improvement

Origin in industry. Important authors: Deming(Deming, 1986), Berwick(Berwick, 1989)

“A quality Improvement project is a structured team effort to either address a problem, respond to an opportunity, or design a new process. [...] typically conducted by a multidisciplinary team, using concepts of modern quality management and employing a set of simple process- and data-analysis tools. “ (Plsek, 1993)

Activities that are often part of quality improvement processes are:

[list adapted from USAID 2010b:]

- Training (see review on training)
- Supervision (see review on Supervision)
- Accreditation, Certification, Licensing,
 - These three activities are managed at National level to standardize and guarantee quality of care. Literature from developing countries focuses on accreditation of laboratories, professional training, and hospitals (Bukonda et al., 2002; Cueto, Jr. et al., 2006; El-Jardali et al., 2008; Gershby-Damet et al., 2010; Jimenez et al., 2006; Nandraj et al., 2001; Opio et al., 2010; van et al., 2009; Yao et al., 2010).
- Implementing Clinical Standards and Evidence-based Guidelines
 - These activities focus on the level of the individual care provider. The literature is extensive,(Grol, 2000; Grol et al., 2003; Grol & Grimshaw, 1999; Hulscher M et al., 2000; Hulscher et al., 2001; Wensing et al., 1998; Wensing M et al., 1999; Woolf et al., 1999; Eccles & Grimshaw, 2004; Flottorp & Oxman, 2003; Grimshaw et al., 1998; Grimshaw & Hutchinson, 1995; Thorsen & Mäkelä, 1999) and includes examples and reviews from developing countries.(Heiby, 1998; Bhagat & Nyazema, 2001; Harford et al., 2008).
- Audit
 - The literature on audits in developing countries (Filippi et al., 2009; Graham et al., 2000; Wagaarachchi et al., 2001; Drife, 2006), focuses mainly on clinical processes. For example, maternal deaths, stillbirths and neonatal deaths are reported to be audited as routine practice in the hospitals managed by the Catholic National Health Secretariat in Ghana. Also, when conducting audits,

practice is compared with existing protocols, standards or guidelines. It's primary aim doesn't seem to be the development of innovations, such as is the case with the breakthrough series. However, audits of non-clinical processes can also be considered. From the expert consultation it was indicated that audits at community level, involving community elders for example, could also be done, particularly where there was clear a well functioning traditional leadership in place.

- Peer review, Feed back (feed back see also data use on page 11)
- Patient and Community Engagement (See also review on motivation)
- Process Improvement and Redesign (Establishing clinical pathways)
- Performance-based Incentives (See review on incentives and P4P)
- Development and measurement of Performance Indicators, Benchmarking (see also review from Management literature)

Different approaches (or models) to quality improvement include:

- Total Quality Management / Continuous Quality Improvement
- Business Process Reengineering (BPR)
- Lean Thinking
- Six Sigma
- IHI and rapid cycle change / Breakthrough series /Improvement Collaborative Networks

The following description of these models can be found in Powell (2009):

”

3.1.1. Total Quality Management / Continuous Quality Improvement

The approaches TQM and CQI are often used interchangeably. Developed in Japan in the 1950s, their use in health care increased in the 1990s. Key components include an emphasis on quality improvement as an ongoing activity aimed at continuous improvement focused on the needs of internal and external customers. Quality improvement is data-driven and is led by managers but carried out by 'empowered' cross-functional teams. Although TQM/CQI has been widely adopted in health care (in name at least), there have been significant problems in embedding the core approach in health care organisations. In particular, TQM/CQI has had little impact on the work of medical staff.

3.1.2. Business Process Reengineering (BPR)

Classical BPR emerged in the US in the 1990s. It emphasised a radical 'clean break' approach to organisational change, but has rarely been implemented to its full extent, whether in health care or in other settings. Two substantial three-year NHS re-engineering pilots in the 1990s produced only modest changes. The enduring legacy of BPR has been its emphasis on the importance of examining and redesigning processes: this (together with TQM/CQI) has contributed to a range of more recent redesign initiatives in the UK (and internationally) around patient-centred care (e.g. redesigning care pathways).

3.1.3. Lean Thinking

Lean thinking was developed by Toyota in the 1950s. It emphasises streamlining processes to provide what the internal or external customer wants with minimal wasted time, effort or cost. The approach uses a range of tools including 5S or CANDO (a series of five steps to enable workforce teams to look at the environment they work in and to start to identify the blocks in current processes) alongside 'value stream mapping' (to remove any unnecessary steps in a process). Lean thinking approaches have been applied in health care settings with some success in reducing waste. The approaches appear to be particularly useful in streamlining processes in support departments rather than mainstream clinical services. Wholesale application has not yet been demonstrated in health care settings.

3.1.4. Six Sigma

Six Sigma has been used in industry since around 1980 and in health care only in the last decade. Six Sigma uses a structured approach (DMAIC – Define Measure Analyse Improve Control) and statistical tools (e.g. statistical process control) to identify variations in a process and to distinguish between 'chance' (or 'common cause') variation and assignable (or 'special cause') variation. Six Sigma has been applied to a limited extent in health care, and has some potential for wider application. However, the approach does require statistical expertise (to provide advice and direction on statistical approaches and analysis) alongside reliable local data collection. There has been increasing use of a combination of lean thinking and Six Sigma in the NHS (Lean Six Sigma) in recognition of the need to streamline many health care processes (through lean approaches) before the more exacting tools of Six Sigma can be applied.

3.1.5. Institute for Healthcare Improvement (IHI) and rapid cycle change

Rapid cycle change is based on Langley's Model for Improvement which asks three questions: What are we trying to accomplish? How will we know that a change is an improvement? What changes can we make that will result in improvement? These questions are put into action by front-line staff through Plan-Do-Study-Act cycles (PDSAs), which provide a framework for repeated short-cycle small-scale tests of change linked to reflection. PDSA cycles have been widely used in the initiatives promoted by the US Institute for Healthcare Improvement, and particularly in quality improvement collaboratives (e.g. the National Primary Care Collaborative in the NHS). They enable low-risk tests of change based on the proposals of front line staff and may therefore encourage useful staff engagement in quality improvement. As yet, however, there is only limited evidence in the peer-reviewed literature in terms of changes in outcome or practice patterns from the rapid cycle change

approach and quality improvement collaboratives. It is likely that ongoing work at various sites will begin to address these evidence gaps.” (Powell AE et al., 2009) [see also: (IHI, 2003) (USAID, 2010a)]

Powell et al. further state that: “the success or otherwise of implementation depends crucially on the interaction between the local context and the approach as it is applied. The studies reviewed in this report show that although the models vary in their emphases and underlying principles, the different models have considerable similarities in implementation. Importantly, there is no one right method or approach that emerges above the others as the most effective.”

Marshall (Marshall, 2009) comments:

“ despite the weird and wonderful names given to the different approaches [...] they are based on simple common principles. These core principles are that the customer must be central to everything; work processes should be categorised, redesigned if necessary, and understood as components of a wider system; measuring components of the process and understanding the importance of variation in these measures is fundamental; and the expertise of people who work in the front line should be recognised and valued.

The approaches vary in their focus on these core principles and the extent to which they advocate incremental or radical change. Nevertheless, although a small number of purists will stick to their preferred technique (sometimes for commercial reasons), most practitioners are highly realistic in their application, drawing on the best of different techniques and adapting the methods to suit local needs.

Agreement exists about the conditions—sometimes described as the “organisational context”—under which the approaches are most likely to be effective. Leaders of organisations need to show sustained personal commitment and ensure alignment between the improvement method and the wider organisational strategy. Health professionals, especially doctors, need to be involved. Organisations that have invested in training and supporting their staff, and in the development of high quality information systems, are more likely to achieve success.

Evidence shows that the approaches can engage and enthuse many of the staff who use them, and that they often lead to changes in working practices. However, there is little rigorous evidence that they have a significant or sustained effect on clinical or patient outcomes.” (Marshall, 2009)

Breakthrough series, are increasingly applied in developed but also developing countries, probably due to push by IHI and USAID. Typically, this approach involves a team that identifies issues and chooses one that seems amendable for change in a relatively short time period and relatively little input of resources. One of the weaknesses of this approach is that it doesn't seem to be able to address issues that are more complex or that are interlinked with other processes (such as bureaucratic processes)

“Successful quality improvement is likely to need a broad range of actions and supportive contextual factors, many of which are outside the reach of collaborative members and their

support team in the organisation. The support team can help by facilitating accurate recognition and diagnosis of quality problems and by generating energy to tackle them and provide the team with the knowledge and skills to address problems but that may not be enough to achieve lasting change” (Mittman, 2004).

3.2. Data use in Quality Improvement

Measurement and analysis of change is at the core of all quality improvement approaches. “The key to identifying beneficial change is measurement” (Benneyan et al., 2003).

3.2.1. Feedback

“To be effective, Quality Improvement processes need to be focused on the ‘customers’ actors in the targeted care process. This implies that data of the care processes need to find their way to the involved actors (CBAs) but also should include the community. This feedback of information to the most important stakeholders is considered as very important.” ((Benneyan et al., 2003); expert consultation).

The feedback of data should not be an isolated activity but is part of a broader engagement in data collection, analysis and result interpretation. This can subsequently increase the community engagement in the work of the CBAs. The development of a Community Health Information System was flagged in the international stakeholder review (Strachan & Benton, 2010) and could be developed to further facilitate this engagement.

However, data collection at community level is now often limited to obligatory compilation of monthly reports that need to be send to higher levels. In-country feedback (Aurelio, Mozambique presentation, 27-9-2010) tells us that rarely these data are used to interact with the actors and discuss performance.

The data to inform the work process and to inform us about the changes made, can be used in various ways, from elegant to more complex.

For example, one the of the consulted experts pointed out that CBA’s in an Ethiopian project have collected baseline household data and have drawn maps (together with their supervisor) that depict the households and icons for the characteristics of that household characteristics in the CBA’s



catchment area (see picture). This facilitates both action (Whom should I visit this week?) as well as reporting: the (presence of) the map can assist the CBA to report on all households. It was mentioned that this may work particularly well when CBA's have a limited number of household s cover (approx 25 in Ethiopia) .

3.2.2. Statistical Process Control

More complex, and widely used, is Statistical Process Control . This “combines rigorous times series analysis methods with graphical presentation of data, often yielding insights into the data more quickly and in a way more understandable to lay decision makers more. Standard Process Control and its primary tool – the control chart- provide researchers and practitioners with a method of better understanding and communicating data from healthcare improvement efforts”. (Benneyan et al., 2003). As such, SPC can play a crucial part in any quality improvement effort. (Including CQI/TQM, Six Sigma and Breakthrough approaches).

Shewhart developed the idea of using control charts in quality management already in 1931 (Shewhart, 1931). Later applications into health care were developed since the 70's. One of the key authors on the methodology of data use in quality improvement is Plsek (Plsek, 1995; Plsek, 1993b; Plsek, 1994; Plsek, 1993a; Plsek, 1992)

From USAID (2010b):

“When creating graphic displays, we need to keep in mind the following questions:

What am I trying to communicate?

- Who is my audience?
- What might prevent them from understanding this display?
- Does the display tell the entire story?

Several types of statistical/data presentation tools exist, including: (a) charts displaying frequencies (bar, pie, and Pareto charts, (b) charts displaying trends (run and control charts), (c) charts displaying distributions (histograms), and (d) charts displaying associations (scatter diagrams).

Different types of data require different kinds of statistical tools. There are two types of data. *Attribute data* are countable data or data that can be put into categories: e.g., the number of people willing to pay, the number of complaints, percentage who want blue/percentage who want red/percentage who want yellow. *Variable data* are measurement data, based on some continuous scale: e.g., length, time, cost.

The table below provides an overview of the different types of charts and when to use them.

Table 1. Choosing Data Display Tools

To Show	Use	Data Needed
Frequency of occurrence: Simple percentages or comparisons of magnitude	Bar chart Pie chart Pareto chart	Tallies by category (data can be attribute data or variable data divided into categories)
Trends over time	Line graph Run chart Control Chart	Measurements taken in chronological order (attribute or variable data can be used)
Distribution: Variation not related to time (distributions)	Histograms	Forty or more measurements (not necessarily in chronological order, variable data)
Association: Looking for a correlation between two things	Scatter diagram	Forty or more paired measurements (measures of both things of interest, variable data)

Control charts are at the core of SPC. The primary objective of using control charts is to distinguish between common (chance) and special (assignable) causes of variation. The former is generic to any (stable) process and its reduction requires action on the constraints of the process, whereas special cause variation requires investigation to find the cause and, where appropriate, action to eliminate it. The control chart is one of an array of quality improvement techniques that can be used to deliver continual improvement.

When discussing data feedback and SPC, one consulted expert remarked that it is likely that at community level run charts are a good way to feedback and discuss data. This could be data from a specific team(member) in combination with data from a entire district. It was stressed that whatever innovations were going to be implemented it was felt absolutely pivotal to feed back data to community level. The appropriate technology will be determined by the local context. (See also review on m-health).

It is important to note that when data are fed back all levels involved need to be able to participate in their role. The supervisors at the health facility need training and capacity to support the feed back. Ideally they can be facilitating at a point, thus ensuring sustainability.” (USAID 2010b)

Bradley studied data feedback in eight US hospitals and listed common themes about what makes data feedback effective (Bradley et al., 2004):

- Theme 1: Data must be perceived by physicians as valid to motivate change
- Theme 2: It takes time to develop the credibility of data within a hospital
- Theme 3: The source and timeliness of data are critical to perceived validity
- Theme 4: Benchmarking improves the meaningfulness of the data feedback
- Theme 5: Physician leaders can enhance the effectiveness of data feedback
- Theme 6: Data feedback that profiles an individual physician's practices can be effective but may be perceived as punitive
- Theme 7: Data feedback must persist to sustain improved performance

Regarding the timeliness of data, it was suggested to use real-time data, which means that data should be processed promptly and send back to the field. This process will take several weeks, typically around 4 to 8 weeks. If technology allows reliable and fast turnaround of data, then this could be encouraged, otherwise a low-tech (and reliable) paper based system is preferred.

A completely different approach to feedback and interaction at community level is the involvement of a knowledge agent. (I.H.I., 2010) A knowledge agent is a trained person who collects data in the different communities during regular visits. The knowledge agent is actively involved in the entire data management and analysis process, and takes the results back to the community to share and interact with the CBA and the community leaders. The knowledge agent needs to be trained in data collection and management. Eventually the knowledge agent's activities could be expanded to other programmes/projects. This innovative idea is yet to be tested.

4. Potential Innovations

An implicit made argument made by different authors is that there is no 1-solution in quality improvement and data us in quality improvement. Not only the context will influence the range of

choices, also the intervention that is hoped to improve the quality will influence any potential choices. 'Bets Bets' may also depend on what the other innovations are.

Nevertheless, from the above mentioned it is evident that data have to be fed back data to the community. This may or may not be integrated in a CBHIS. If the infrastructure and context allows then it would be very interesting to start audits for certain situations in CBA practice. Assigning a new cadre of staff, the knowledge agent, is intuitively an attractive approach but is still in the development and piloting phase. A likely choice for an improvement model is the IHI Breakthrough model since it can be applied at grass root level, thus increasing a level of empowerment and avoiding the bureaucracy at higher levels (regional, national)

Summary list of potential innovations:

1. Feed back data : to be decided whether this should be wall maps with icons, run charts, control charts, or other, depending on what the content of the innovation is, and depending on the capacity of the participants in the feedback
2. Breakthrough approach
3. Improvement Collaborative Networks
4. Audit at community level
5. Implement a community based health information system
6. Knowledge agents

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