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Thematic analysis of barriers and facilitators to implementation of neonatal resuscitation guideline changes

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Abstract

OBJECTIVE—To evaluate experiences regarding implementation of Neonatal Resuscitation Program (NRP) guideline changes in the context of a collaborative quality improvement (QI) project.

STUDY DESIGN—Focus groups were conducted with local QI leaders and providers from 9 sites that participated in a QI collaborative. Thematic analysis identified facilitators and barriers to implementation of NRP guideline changes and quality improvement in general.

RESULTS—Facilitators for QI included comparative process measurement and data tracking. Barriers to QI were shifting priorities and aspects of the project that seemed inefficient. Specific to NRP, implementation strategies that worked involved rapid feedback, and education on rationale for change. Changes that interrupted traditional workflow proved challenging to implement. Limited resources and perceptions of increased workload were also barriers to implementation.

CONCLUSIONS—Collaborative QI methods are generally well accepted, particularly data tracking, sharing experience, and education. Strategies to increase efficiency and manage workload may facilitate improved staff attitudes toward change.

Keywords

quality improvement; Neonatal Resuscitation Program; implementation science; barriers and facilitators

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CONFLICT OF INTEREST

No conflicts of interest to disclose. No financial relationships relevant to this study.

INTRODUCTION

Approximately 10% of newborns require some resuscitative effort at birth to begin breathing, with about 1% of newborns requiring more extensive resuscitative efforts.(1, 2) The Neonatal Resuscitation Program (NRP) of the American Academy of Pediatrics is widely used to teach neonatal resuscitation. Revised guidelines were published in 2010 based on the consensus statement from the International Consensus statement on resuscitation.(3, 4) Those guidelines had an increased emphasis on thermal regulation, use of pulse oximetry to guide use of supplemental oxygen, and use of simulation, briefing and debriefing of resuscitation teams to improve communication and teamwork. A key component of the updated guidelines was an emphasis on communication and behavioral skills.

Collaborative QI, based on the model from the Institute of Healthcare Improvement (IHI), is a learning system that brings teams from different hospitals to seek improvement in a specified topic area.(5) This model has been used previously by the California Perinatal Quality Care Collaborative (CPQCC) to improve antenatal steroid administration to mothers giving birth prematurely, reduce nosocomial infections in neonatal intensive care, and improve breastmilk feeding rates in premature neonates.(5–9) Participation in a formal IHI-style collaborative QI initiative led to better outcomes than single-site QI projects that were also seeking to improve delivery room management.(10)

In 2010, the CPQCC planned a year-long collaborative quality improvement (QI) project to improve management of high-risk deliveries.(10) The collaborative QI model used several modalities including in-person learning sessions, an expert panel, email group communication, and data tracking and sharing of data across centers. An evidence-based change package was implemented in participating centers during the project and focused on several aspects of neonatal resuscitation: thermal regulation (preventing hypothermia), reducing invasive respiratory support for preterm neonates, and the use of checklists, briefing, and debriefing in order to improve communication and teamwork.

Quality improvement is a growing area of medical practice. Qualitative research methods have been successfully employed to identify important aspects of successful and unsuccessful safety and quality management.(11–15) Although qualitative research has been traditionally used in the behavioral and sociologic sciences, it is increasingly being used in the health professions to explore behavior and communication, including in patient safety and teamwork in the labor and delivery setting. (11–15) Studies describing the quantitative outcomes of quality improvement projects are useful for those embarking on similar projects and the addition of qualitative research findings add critical implementation knowledge.(15, 16) Analyzing the thought processes of clinicians as they actively participate in a quality improvement project may provide insight into key components of intervention that will help improve behavior and communication.

We solicited the views of NICU clinicians involved in statewide collaborative project involving the implementation of new NRP guidelines, in order to understand the facilitators and barriers to implementing the desired change in clinical practice.

METHODS

Focus groups were conducted at nine hospitals that had participated in the aforementioned CPQCC QI project. These focus groups were conducted over the course of 6 months toward the end of the collaborative project. The study was reviewed and approved by the Institutional Review Boards of Stanford University and University of California San Francisco.

One or two members of the research team moderated these focus groups. There was one focus group discussion per hospital. Approximately 8 to 10 personnel were recruited for the focus groups from each institution. We asked the local project leaders to ask for volunteers to come to the meeting and they arranged for this group to meet with the interviewer for each visit. Informed consent was obtained from all participants. Groups were composed of both the team leaders at each hospital as well as front-line workers working in the delivery room, including physicians (neonatologists and pediatric hospitalists), neonatal nurse practitioners, nurses, and respiratory therapists. The focus group discussions were recorded, and the recordings were then sent to a professional transcriptionist where they were de-identified as to the individual speaking, and transcribed for further analysis.

We analyzed the data using thematic analysis following the methods of Braun and Clarke. (17) This analytic process involves reading and re-reading the transcripts; systematically identifying and naming unit of meaning with codes (words or sets of words that provide a meaning label); and then searching for patterns in the data and organizing the data into larger themes representing the main ideas and their relationships. Themes are reviewed by the team and representative data elements are selected to demonstrate the salient themes. For this study, four investigators analyzed the transcripts. Two investigators (TB and VA) performed the initial coding of the first transcript independently. This coding was then reviewed by two senior investigators (AL and HL) and discussed with the team. TB and VA then re-coded all transcripts, integrating feedback from senior investigators into the coding structure. This was given further feedback by AL and HL. A final codebook was created based on the consensus of the four investigators. Any discrepancies in coding were discussed and resolved among all investigators. HL, VA, and AL are clinician investigators with experience in neonatal resuscitation. TB is a research student who provided non-clinical perspectives. Questions about meaning and interpretation were discussed among the team and resolved through consensus.

The transcripts of the focus groups were analyzed on two levels. First they were read for themes that addressed the broader issue of conducting collaborative QI projects, and then secondly, more specifically at the level of implementation of the NRP guidelines. The coding structure comprised four major categories addressing the barriers and facilitators to implementation at the level of the QI project and at the level of the NRP guidelines. Investigators coded these as QI Facilitators, QI Barriers, NRP Facilitators, and NRP Barriers respectively. Thematic saturation was achieved at the sixth focus group as determined by the two main coders. Additional focus groups were still conducted as they had been scheduled, and in order to ensure range of variation of participating hospitals.

RESULTS

Nine focus groups were conducted, with one group at each participating hospital. By neonatal level of care as categorized by the American Academy of Pediatrics' most recent specifications, two hospitals were the equivalent of Level 2, four were Level 3, and three were Level 4.(18) All would be considered urban hospitals. They represented hospitals in Northern, Central, and Southern California. Based on 2012 data, the median number of NICU beds per institution was 40, ranging from 15 to 74. A summary of the findings in regard to the main recurring themes is presented in Table 1. We present further descriptions and examples of the key themes in regard to collaborative QI facilitators and barriers, and then specifically in relation to implementation of NRP.

QI Facilitators

The collaborative process provided a platform for tracking both local data and comparing local data to that of other facilities. Having these data to substantiate proposed changes and monitor progress was seen as one of the major facilitators of the quality improvement project.

Comparative Performance Measures—The ability to benchmark hospital performance relative to others participating in the collaborative was viewed as beneficial. Participants expressed that the comparative data was both competitive and supportive in nature. Participants felt the need to keep up and meet deadlines, but were also reassured to see other hospitals face similar challenges and were able to incorporate best practices based on other institutions' struggles and missteps. Comparative performance measures made participants feel as though they were "contributing to something bigger."

Tracking Individual Performance—The ability to track local, institution-specific performance data facilitated QI initiatives. Participants expressed multiple uses for the data including the ability to focus resources on identifiable problem areas. Performance data for the individual hospitals allowed each institution to identify which of the collaborative goals they would need to devote the most resources to achieving. Participants also used the data and visual representation of the data to motivate other staff members.

> Nothing speaks louder than data to anybody, including your own staff, so they're resistant, and then you show them the data that says oh, well, yeah, I guess this is working here, so you ought to pay attention and jump in. So the data actually is important, not just as the conclusion.

QI Barriers

Barriers to the overall QI project centered on the institution's inability to commit resources to the project, and the structure of the project itself, which strained those limited resources.

Shifting Priorities—For a variety of reasons cited by participants, this QI project did not always take top priority over other NICU projects. Institutions that had many ongoing QI projects found challenges in that a new project might supplant an old one and remove previous gains. Additionally, individual clinicians may have differing priorities, and

sometimes did not see participation in the project as critical. This sometimes made getting everyone together difficult.

> This is again one of our several quality improvement projects and one of the things that we've kind of learned is that this [collaborative] in particular represents a wide range of disciplines for better or for worse. […] and getting all those disciplines at the table […] has not been a particularly high priority.

Collaborative Structure Gaps—The structure of the collaborative was often seen as a barrier to its effectiveness. The main criticisms centered on an inefficient use of time. Monthly webcasts were seen to be sometimes irrelevant and repetitive when each institution would present their results individually. Some participants viewed the meetings related to the collaborative as inefficient and time-consuming, so organizers had trouble incentivizing key personnel to attend.

NRP Facilitators

The adoption of NRP guidelines was heavily influenced by the perceived immediate benefits and staff buy-in facilitated by educational sessions explaining clinical changes.

Visible Benefits of Suggested Changes—The suggested changes were well received when they produced visible and immediate results. Participants were receptive to the idea of using physical checklists, as checklists served as a cognitive aid and reminder in emergent situations. The collaborative participants responded positively to the suggestion of briefing, or taking time to discuss deliveries beforehand. They cited benefits such as increased organization, a sense of security in having explicitly defined roles, improved teamwork, and improved confidence. All of these visible and immediate benefits to the proposed changes facilitated their implementation.

> In the beginning [the new guidelines] were hard for them to accept, but since they've been through the program, they're seeing more and more that it's useful and it works. Again, you have some people that doubt it but you have other people that say, "Yeah, I see now where when I used to slap oxygen on this kid, it took five minutes for the saturation to come up. Now I'm using CPAP and it's coming up within 30 to 40 seconds." So they do see a difference. When they do see a difference, they accept it more.

As the new guidelines were implemented, the team members were able to see benefits to the patients and the visible benefits of less oxygen use, fewer intubations, and better team communications served as positive feedback.

Education on Evidence—Placing emphasis on explaining why changes are being made and educating staff on the evidence behind the changes was helpful in implementing the changes. Institutions that devoted time to the education of staff members expressed greater staff buy-in and participation than those that did not stress staff education. The extra work required to educate staff member was in the end seen as beneficial as it facilitated the transition to new clinical practice. One participant expressed that his staff were receptive to the educational meetings:

> I've found [having the evidence made] it easier to get buy-in from the staff. It meant that I had to prepare some sort of educational presentation […]. I was able to show them the evidence and say, "This is what the evidence shows and this is why we're changing our practice and this is what we're going to be doing." And they're like, "Cool. We'll do it."

NRP Barriers

The main barriers to adopting the proposed changes stemmed from disruptions in the existing workflow, and the perception of extra work. Additionally, smaller institutions found the changes harder to implement.

Disruption of Existing Workflow—Implementing changes that disrupted the existing workflow was problematic. For example, the suggestion of systematically debriefing after deliveries interfered with previous clinical workflow. Clinicians frequently cited they were more concerned with stabilizing the patient and moving on to other patient care responsibilities, so they had trouble making time to debrief.

> I think we just all get very focused on the baby and getting whoever that kid is settled in, whatever he or she needs, getting that done, and we're so focused on that part that it's hard to step back and say oh, yeah, we are supposed to debrief.

Deliveries that occurred around change of shift posed an additional challenge, as staff members perceived debriefs would make them stay late.

Staff Attitudes—When the participants expressed negative staff attitudes towards changes in the NRP guidelines, they stemmed from the perception that the suggestions would fall on them as an additional responsibility. It was difficult to ask busy clinicians to incorporate additional tasks and responsibilities into their ongoing work.

> It's like you're adding the 100th thing onto their list of 99 that they've already got to do for the day. And I think that's what makes it really hard, not that people don't want to improve. It's just one more task that they already have on a full plate.

Variation in Resources—Smaller institutions reported having less equipment and staff, and potentially less funding to implement changes. These limitations in resources were a barrier to adopting the NRP guidelines. In addition to limited resources, smaller institutions saw smaller birth volumes and therefore fewer high-risk deliveries.

> One of the other difficulties is that the delivery rate has been lower here than it has been in the past and especially high-risk deliveries where we would assemble the whole resuscitation team. So we don't actually do this on a regular basis or we haven't until the past month, so sometimes it's difficult for everyone to remember that oh, yeah, we have to do this, because it may be three or four weeks between high-risk deliveries at some point.

Participants at smaller institutions like the one above found it difficult to make meaningful change to clinical practice when the clinical cases were infrequent or varied in frequency.

DISCUSSION

Focused efforts on education and support on how to perform QI work reliably leads to improved quality.(19) Large and sustainable strides in understanding QI principles will be made possible through pursuing strong scientific foundations.(14, 19) In our study of clinicians participating in the delivery room management QI collaborative, key facilitators for QI included comparative process measurement, and the ability to track one's own and the whole group's data. Barriers to QI included shifting priorities and aspects of the project that seemed inefficient in terms of time use. Specific to NRP, aspects of collaborative QI that worked well, involved changes that produced immediate feedback and education of staff on the reasons for the changes. These findings are relevant for the most recent guidelines, which will soon be adapted to the revised NRP textbook later this year.(20)

Difficult aspects of implementation involved areas in which traditional workflow was interrupted, such as introduction of briefing and debriefing practices. Other barriers to NRP implementation that would overlap with other QI efforts included variation in local resources available to support implementation and the attitude of some staff that implementation involved 'additional' work, beyond their usual responsibility.

Various participants viewed the challenge of performing at comparable levels to peers as a positive driver for change, however others saw benchmarking negatively, when they perceived that they were being unfairly compared to dissimilar institutions. This dual nature of benchmarking has been observed in other QI projects.(21) When the participants could see that other institutions were facing similar challenges, they did not feel alone or frustrated with the improvement efforts, and there was normative pressure to conform the goals of the QI among the institutions.(14) Additionally, institutions could learn from each other's experiences and overcome challenges by adopting successful strategies from peers. Other studies have shown that emphasis on "learning from each other" and a collegial environment promotes sustainability of collaborative QI results.(14)

QI initiatives have become an integral part of inpatient clinical practice. Therefore, the institutions were usually involved in more than one project simultaneously and also had other NICU projects. These conflicting priorities were seen as a barrier to successful QI efforts due to conflict in priorities and constraint on both personnel time and institutional finances. Collaborative QI is a successful strategy leading to improved clinical practice and better outcomes.(5, 10) But, certain elements of the collaborative were felt to be inefficient or irrelevant. Some webcasts were perceived as repetitive and potentially less relevant when each institution presented their results repeatedly and individually. This might have been a drawback of this particular collaborative structural set-up because it made it hard for clinicians to perceive the problems as relevant to themselves or their institution, which is a documented barrier in collaborative QI research.(15) On the other hand, this perception needs to be balanced by the benefit that comes from sharing data with collaborative participants.

It is important to understand the mechanism by which clinical changes take hold.(22) The revised NRP guidelines advocated thermoregulation and use of pulse oximetry to guide use

of supplemental oxygen. The teams were able to see immediate results with reduced oxygen use and fewer intubations, which improved compliance with guidelines and were facilitator in NRP. Immediate results in patient outcomes may have been seen as intrinsically rewarding to staff members making their work more gratifying.(22)

Expert panels and educational sessions during the collaborative were felt to increase staff buy-in of the changes in guidelines. Research has shown that successful QI projects rely on the staff accepting the proposed solution, and hard data is a key factor in convincing clinicians.(15) Institutions were also able to track their own data and use it for internal quality improvement and allocate resources based on need identification. These data taken from the institution could be used as a “disciplinary force,” (i.e. a strong motivating factor) if institutions were not sticking to QI goals, or as a method of making the problem relevant to the institution.(14, 15) By observing their own data, they could not ignore the problem at their institution.

Checklists have the potential to improve team function. The use of checklists with debrief in neonatal resuscitation has been shown in study by Katheria et. al to improve overall communication and allow for identification and resolution of problems encountered during resuscitation.(23) In our focus groups, participants thought briefing helped organize the teams and created sense of comfort with clear role assignment and responsibilities prior to the event and briefing checklists served as cognitive aids and also helped team members voice any questions prior to the event.

Debriefings have positive impact on neonatal resuscitation teams.(24) Participants in our study observed that timely debriefing after the event was an important tool for quality improvement. However, time constraints and workflow conflicts were barriers to timely debriefing. We feel that debriefing is a useful strategy for improving care and should be encouraged at the end of every resuscitative effort. Developing strategies for supporting debriefing that does not interfere with existing workflow is an opportunity for further research. While we recommend the practice, implementation may vary on a local basis.

Lack of resources needed for the implementation of NRP guidelines was one potential perceived barrier to quality improvement. For a successful quality improvement effort, it is important to have the necessary equipment, staffing resources, and adequate opportunity to test, practice, and implement the changes. Studies have found a correlation between greater delivery volume and more recent experience with higher confidence in resuscitation skills of physicians and nurses.(25, 26) Therefore, smaller institutions may have limited gains in QI after a collaborative concerning neonatal resuscitation, due to the relative infrequency with which they encounter high-risk deliveries, and therefore the opportunities to practice what they may have learnt. A structure suited to large institutions with high frequency high-risk deliveries, may not benefit a smaller institution. When organizing collaborative QI projects, the relative size and resources of the various institutions should be considered so that the comparative benefits discussed previously are not lost. It may be beneficial to group hospitals with peer institutions with similar resources and patient volume to maximize benefits.

One limitation of our study is that some of the focus group discussions included local leaders of the project along with front-line workers. This may have limited our ability to get completely open answers from the discussion. However, we felt that the discussions seemed fairly balanced in the positive and negative points that were addressed. Another limitation is self-selection: people who did not participate may have different views on QI implementation and the NRP program than those who did participate.

The implementation of complex healthcare practice, such as NRP, can benefit from QI methodologies. In our qualitative study, we asked participants of such a QI project to reflect on what aspects of the collaborative QI project were perceived as favorable and facilitating implementation, and what factors were perceived as barriers. Although the discussions focused on NRP and delivery room practice, most of our findings are applicable to many areas of healthcare improvement projects, such as the importance of educating front-line providers and tracking and sharing data as the project progresses. We encourage similar qualitative investigations of QI projects in order to advance implementation science.

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Table 1

Summary of themes

	Themes
Quality improvement facilitators	Comparative performance measures
	Tracking individual performance
Quality improvement barriers	Shifting priorities
	Collaborative structure gaps
Neonatal Resuscitation Program facilitators	Visible benefits of suggested changes
	Education on evidence
Neonatal Resuscitation Program barriers	Disruption of existing workflow
	Staff attitudes
	Variation in resources