ORIGINAL SCIENTIFIC REPORT

Mixed-Methods Assessment of Trauma and Acute Care Surgical Quality Improvement Programs in Peru

Lacey N. LaGrone[1] · Amy K. Fuhs[2] · Eduardo Huaman Egoavil[3] ·
Manuel J. A. Rodriguez Castro[4] · Roberto Valderrama[3] · Leah N. Isquith-Dicker[1] ·
Jaime Herrera-Matta[5] · Charles N. Mock[1]

Abstract

Background Evidence for the positive impact of quality improvement (QI) programs on morbidity, mortality, patient satisfaction, and cost is strong. Data regarding the status of QI programs in low- and middle-income countries, as well as in-depth examination of barriers and facilitators to their implementation, are limited.

Methods This cross-sectional, descriptive study employed a mixed-methods design, including distribution of an anonymous quantitative survey and individual interviews with healthcare providers who participate in the care of the injured at ten large hospitals in Lima, Peru.

Results Key areas identified for improvement in morbidity and mortality (M&M) conferences were the standardization of case selection, incorporation of evidence from the medical literature into case presentation and discussion, case documentation, and the development of a clear plan for case follow-up. The key barriers to QI program implementation were a lack of prioritization of QI, lack of sufficient human and administrative resources, lack of political support, and lack of education on QI practices.

Conclusions A national program that makes QI a required part of all health providers' professional training and responsibilities would effectively address a majority of identified barriers to QI programs in Peru. Specifically, the presence of basic QI elements, such as M&M conferences, should be required at hospitals that train pre-graduate physicians. Alternatively, short of this national-level organization, efforts that capitalize on local examples through apprenticeships between institutions or integration of QI into continuing medical education would be expected to build on the facilitators for QI programs that exist in Peru.

✉ Lacey N. LaGrone
lagronel@uw.edu

Amy K. Fuhs
akfuhs@iupui.edu

Eduardo Huaman Egoavil
edhu562000@gmail.com

Manuel J. A. Rodriguez Castro
manuel.rodriguez@upch.pe

Roberto Valderrama
rovalba@gmail.com

Leah N. Isquith-Dicker
leahi@uw.edu

Jaime Herrera-Matta
juanjaimehpe@yahoo.com

Charles N. Mock
cmock@uw.edu

[1] Harborview Injury Prevention and Research Center, University of Washington, Campus Box #356410, Seattle, WA 98104, USA

[2] Indiana University School of Medicine, Indianapolis, IN, USA

[3] Hospital Nacional Guillermo Almenara, Lima, Peru

[4] Universidad Peruana Cayetano Heredia, Lima, Peru

[5] Hospital de Policía, Lima, Peru

Introduction

There is growing international focus on quality improvement (QI) programs as feasible and effective means to raise the standard of care in diverse clinical settings [1, 2]. These programs include morbidity and mortality (M&M) conferences, preventable death panels, registries, audit filters, and feedback from autopsy results [1]. Implementation of some or all of these elements has been mandated by local governments in both high-income and low- and middle-income countries (LMICs) and has been prioritized in multinational education and policy endeavors by health leaders such as the World Health Organization (WHO) [2–5]. Evidence for the positive impact of QI programs on morbidity, mortality, patient satisfaction, and cost is strong [6].

However, data regarding the current status of QI programs in LMICs, including Latin America, are limited. Furthermore, research on the applicability and acceptability of QI programs and barriers and facilitators to their implementation in LMICs is also lacking. In-depth examination of contextually relevant and responsible QI program application is essential in order to thoughtfully plan future dissemination of QI programs through international courses and multinational policy.

This research describes the current status of QI programs in one middle-income Latin American country, Peru, in order to identify key areas for improvement and highlight barriers and facilitators to QI program maturation in LMICs.

Materials and methods

Study setting

Peru is an upper middle-income country in the Andean region of South America. It has a proportional injury burden that exceeds the global trends: greater than 13% of disability-adjusted life years (DALYs) lost in Peru are attributable to injury, compared to 10% globally [7]. The capital city, Lima, is the third largest city in Latin America, with 8.5 million inhabitants [8]. Large hospitals that participate in definitive care of injured patients are divided between those in the ministry of health ("public") and the ministry of labor ("social security") systems.

Study design and theoretical framework

This cross-sectional, descriptive study was approved by the University of Washington and the Universidad Peruana Cayetano Heredia ethical committees. A mixed-methods design was selected to triangulate the primary research objectives. A grounded theory approach was employed to allow for exploration and expansion of themes previously identified in the literature and informed by the authors' experiences [9]. For the purpose of this study, an M&M conference was defined as any organized meeting in which providers addressed morbidity and mortality among their patients.

Sampling, recruitment, data collection, data management and analysis: survey

We distributed an anonymous 22 question survey about trauma QI practices to Peruvian healthcare providers who participate in the care of injured patients through a variety of clinical roles. Potential subjects were approached between July 2015 and January 2016, either at their place of employment or at a regional academic conference. The Spanish language questionnaire contained both closed- and open-ended questions. The questionnaire was based on the current literature and underwent several modifications, including after initiation of data collection. Thus, sample size for some questions varies.

STATA (StataCorp. 2015, College Station, TX) was used for data analysis, including descriptive statistics on all items. Continuous variables were converted to categorical variables to facilitate interpretation. Responses to open-ended questions were inductively coded, and the frequency of coded responses is presented.

Sampling, recruitment, data collection, data management and analysis: interview

We conducted anonymous individual interviews with healthcare providers who participate in the care of the injured at ten large public and social security hospitals in Lima. We employed purposive and snowball sampling through identification of key informants at each hospital and their subsequent referrals. Data collection was continued until at least one interview had been conducted at each of the ten hospitals and theoretical saturation was achieved.

Interviews were conducted by LNL and three research assistants with bilingual fluency and post-graduate educations in medicine or the literature. Interviews were conducted using a semi-structured interview guide, with open exploration of themes through probing to elaborate when novel topics arose. Transcripts were coded in ATLAS.ti 7 (Berlin, Scientific Software Development

GmbH) through simultaneous data collection and analysis.

Open coding was implemented for theme identification, and subsequent rounds of coding were used to develop themes and apply structural coding. Memos and network diagrams were utilized to create the codebook, record insights and areas for further exploration, and provide a visual organization of themes in a hierarchical fashion. The codebook and network diagram were developed through collaboration between LNL and AKF.

Results

One hundred and one quantitative surveys were collected, representing primarily urban general surgeons working at large public institutions (Table 1). Fifty qualitative interviews were conducted at ten hospitals.

Current status

M&M conferences

Quantitative data revealed that up to a quarter of reported conferences occurred only annually or "rarely," 14% of participants reported standardized criteria were used for case selection, and 35% of participants reported that the majority of case presentations included essential elements of the clinical history. Thirty-two percent of respondents reported notes were taken during the conference, and 58% of participants could not identify any specific way in which the conference discussions were followed-up. Fifty-one percent of participants had seen a change at their institution as a result of an M&M conference (Table 2).

Similar areas for improvement were emphasized in qualitative interviews. Participant reports revealed only three hospitals represented had dedicated M&M conferences at least monthly, five had only impromptu or infrequent discussions, and the remaining two hospitals did not have M&M conferences. Participants frequently stated that attendance at the conference was inadequate. Six participants volunteered that selection of cases was a source of conflict due to a perception that it was conducted in order to shame a person who is disliked. Additional interviews revealed cases were selected based on what is rare or interesting rather than common and high impact. Inadequacy of case presentations was attributed to an inability to access relevant medical literature, lack of inclusion of a discussion of an educational topic, lack of key patient history elements (due to such factors as absence of the treating physician during the presentation and inability to

Table 1 Characteristics of respondents

	N	%
Location of hospital where you work		
Urban	89	88
Rural	8	8
Blank	4	4
Total	101	100
Your specialty[a]		
General practice/internal medicine	14	18
General surgery	44	57
Other surgery	1	1
Intensive care	3	4
Other/blank	15	19
Total	77	100
Your level of clinical training[a]		
Medical student	4	5
Resident	2	3
Attending	56	73
Other/blank	15	19
Total	77	100
Size of hospital where you work (number of beds)		
<100	30	30
100–499	40	40
≥500	17	17
Blank	14	14
Total	101	100
Type of hospital where you work[a]		
Public/social security	65	69
Private	10	11
Other/blank	19	20
Total	94	100

[a] These questions were added to subsequent versions of the survey; hence, the denominators vary compared to the total sample

access patient charts including radiology), and variable competence of presenting residents.

Multiple participants reported a climate of "shaming" in case discussions, which contributed to a complete cessation of M&M conferences at two hospitals. Interviews revealed a few excellent examples of systems-oriented change as a result of an M&M conference; however, the majority of conferences were described as informal and without methodical documentation or dissemination of conclusions, or follow-up in the form of corrective actions.
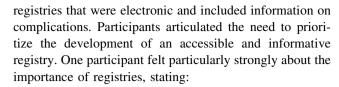
Registries

Half of survey respondents reported the presence of a registry at their hospital (Table 1). Of the ten hospitals where qualitative interviews were conducted, four had

Table 2 Basic characteristics of M&M conferences

	N	%
M&M conferences occur		
Yes	98	97
No	2	2
I don't know/blank	1	1
Total	101	100
Frequency		
Weekly	38	39
Monthly	30	31
Quarterly/annually	6	6
Rarely	21	21
I don't know/other/blank	3	3
Total	98	100
Average number of attending physicians in attendance[a]		
3–5	30	42
5–10	27	38
>10	14	20
I don't know/blank	4	6
Total	71	100
Case selection[ab]		
Standardized criteria	11	14
Designated personnel/the chief decides	57	75
Anyone can select a case	4	5
I don't know/other/blank	4	5
Total	76	100
What percentage of case presentations have missing information[b]		
≤25%	34	52
25–75%	22	34
>75%	2	3
I don't know/blank	7	11
Total	65	100
Does someone take notes?[b]		
Yes	24	32
No	38	51
I don't know/blank	13	17
Total	75	100
How is the discussion of the meeting followed-up?[ab]		
Nothing	14	18
Stored	24	31
The chief decides	21	27
Discussed in other conference as indicated	9	12%
Applied to patient management	2	3%
I don't know/other/blank	7	9%
Total	77	100%
Change as a result of M&M[b]		
Yes	39	51%
No	28	36%
I don't know/blank	10	13%
Total	77	100%

[a] Respondents selected one or more of the following

[b] These questions were added to subsequent versions of the survey; hence, the denominators vary compared to the total sample

registries that were electronic and included information on complications. Participants articulated the need to prioritize the development of an accessible and informative registry. One participant felt particularly strongly about the importance of registries, stating:

> Without a database, the chief is blind.

Barriers to QI program maturation

Lack of prioritization of QI programs

Lack of interest was identified both in surveys (21% of survey respondents) and interviews as a barrier to QI program implementation. Interview participants voiced a lack of incentives for participation in QI, an institutional and national prioritization of other patient care objectives, and physicians' distaste for participating in what they consider to be administrative tasks. When asked whether attendings had time for M&M meetings, one surgeon stated:

> Yes, there is time. But there is no education, and people don't like it, so we justify not doing it with other things… The majority of activities take four hours, for instance clinic is from 8 am to 12 pm. This leaves 12 pm–2 pm for administration, but people do not do it.
> [Between 12 pm and 2 pm doctors usually] take a coffee. Or simply leave the hospital.

The prevalence of dual practice, surgeons working in both a public institution and one or more private institutions, was cited as the primary incentive for a surgeon leaving the public hospital before completing his scheduled shift. Dual practice was thus described as having a negative impact on QI and academic endeavors.

A lack of prioritization of QI was also voiced as coming from the "top:"

> We implemented an improvement program to do early discharge… Nobody cares if you do or you do not. If you did it, no one cares. It did not matter to anyone. We have too many patients for too few rooms. A patient admitted today waits [a long time to have their operation].

Lack of sufficient human and administrative resources

Lack of staff time, or human resources, was also identified in both surveys (34% of survey respondents) and interviews. In addition to recognizing the need for specialized

QI personnel (such as someone to build a trauma registry), some participants stated that the average physician does not have sufficient time to attend an M&M conference. Participants' comments revealed two primary areas, outside of principal clinical responsibilities, where physician time was being consumed.

First, as previously stated, almost all interviewed surgeons reported having clinical responsibilities at one to three private hospitals in addition to their primary hospital of employment-dual practice. Second, participants frequently cited the inefficient and time-consuming nature of the hospital system:

> The mechanisms to fix the endoscope are long, I am supposed to send a letter to [administrative staff member] who sends a letter to the logistical department, who sends a letter to a technician, who confirms it's broken, who then maybe can fix it in two months.

Finally, though participants often cited patient volume as being overwhelming, almost all who expressed concerns regarding patient volume asserted that the bottleneck in provision of care was at the level of the infrastructure (e.g., bed or operating room availability), not at that of the individual physician's time.

Attitudes, beliefs, and customs

Interview participants frequently responded to questions regarding why QI elements were difficult to implement with comments about their perception of a fundamental characteristic of themselves or their colleagues. Participants complained of an informal approach to work and a lack of sense of responsibility, teamwork, diligence, and professionalism as reasons why excellence was not pursued through QI programs in their hospitals. One surgeon offered:

> We have smart traffic lights… you push the button on this side, then, when you get to the other side you are supposed to push the button again so that the traffic can go through again. Here we push the button, walk through, and do not ever touch it again. It is a problem of the formation of the brain, the home, the family. When you look at this you see something unsolvable.

Cultural norms were further cited as barriers to QI, and surgical culture was referenced with the repeated comment that:

> surgeons don't read,

and with the assertion of a surgeon's preference for autonomy and self-reliance over standardization:

> I do it my way, you do it yours.

Described professional norms included in a systematic tendency for staff to remain in their positions for long periods of time, to acquire respect due to this longevity rather than aptitude or contribution, and to be unwilling to ask for help or learn from others once in this position of respectability.

> [Persons in management positions] don't do anything that would call attention to themselves. They don't want to make waves or say they need anything. [They think to themselves:] "If I don't spend, I don't do anything, we keep going this so way so that I stay in charge." … They aren't making waves, they're quiet, and there they stay.

When participants were asked to propose solutions to an array of problems they had identified, they often asserted that the personnel had to be replaced. When probed as to whether the personnel's perspective, attitude, or capacity could instead be modified, participants responded that "people don't change." This perception was often cited alongside an emphasis on generational differences, with younger staff complaining that older staff is unresponsive to new evidence or technology.

Lack of institutional, regional, and national political support

The overall lack of confidence in the institution and national health system's capacity to systematically and sustainably improve appeared to be one of the most crippling factors deterring participation in QI:

> … I'll tell you how the hospital functions… We have computer screens in the OR's… but it didn't work. I went to the other room, and it didn't work there either. I took off everything, gown, mask, and asked x-ray to bring the films. They said it would be about an hour. I had to go downstairs to the x-ray… They tell me to go to IT. I go. Even now, four days later, it doesn't work. If we can't get this working, how can we make a database?

Lack of accepted definition of ideal QI practices

Participants' definition of "quality improvement programs" and description of their successful implementation varied widely. During one interview, the participant was unable to identify areas for improvement in the M&M conference, because he felt it was:

…excellent, and functional, and the only way to improve it would be to do it more frequently.

At the same hospital visit, his colleagues reported that the M&M conferences had been canceled three months prior due to inter-provider conflict and lack of professionalism.

QI and the role of the chief

When asked what would be the next step to improve the QI program at their hospital, most participants stated that the support of the chief would be necessary. As articulated by one participant when asked what is the first thing he/she would do to improve the QI program at his/her hospital:

I would be chief.

Many participants said that the support of the chief would be impossible or difficult to obtain. Further, several participants stated that their clinical services' ability to reach international standards was limited by the chief's own technical skill or familiarity with the literature, as subordinates were not permitted to pursue training opportunities or expertise not already accessed by the chief.

Participants further stated that the previously mentioned phenomenon of senior staff attempting to maintain the status quo in order to fly under the radar was common among service and department chiefs. Several participants asserted that this tendency limited the service's ability to respond to errors and even to criminality or corruption. Finally, participants stated that chiefs were often elected either by friends in positions of power, or in the best case, based on their clinical experience. In either case, participants reported that chiefs were rarely elected based on their managerial skills.

Facilitators for QI program maturation

The results included above reflect the majority opinion. However, it is essential to note that there were participants who prioritized QI and who reported adequate access to human resources for QI. In addition, there were some who experienced local institutional support for QI endeavors, had a clear understanding of the principles of QI, and reported on the chief and others in position of leadership as primary drivers of QI. Participants who reported these facilitators for QI were more often persons with advanced graduate education, persons who reported learning about QI during travel to other countries, persons who reported being inspired by local research and academic conferences, and those who reported working in an environment that is supportive and collegial with a chief whom they respect.

With regard to teamwork, one exemplary participant stated:

I can operate 10 hours per day, seven days a week, all my life and not change the reality of the hospital. We need to do it together.

Discussion

QI programs are being used in Peru, but their use is not optimized in quantity or quality. Key areas identified for improvement in M&M conferences were standardization of case selection, incorporation of evidence from the medical literature into case presentation and discussion, case documentation, and development of a clear plan for case follow-up. Barriers to improving QI programs in general include lack of prioritization of QI programs at the individual, institutional, and national levels, and lack of education regarding QI best practices.

These results are consistent with findings from a 2012 mixed-methods survey from LMICs in the Asia–Pacific region. This study also cited lack of QI prioritization, training, and leadership engagement as barriers to QI maturation. In contrast, participants in the Asia–Pacific study placed a greater emphasis on resource limitations as compared to the Peruvian respondents, who emphasized responsible resource allocation [10]. This highlights the need for early integration of QI programs into developing health systems in order to establish a pattern of high-impact utilization of available resources.

Similar to our findings, researchers in South Africa had previously identified the lack of both standardization and multiservice involvement in M&M conferences to be barriers for error identification and reporting [11]. They also stressed the need for continued administrative oversight in sustaining an electronic registry [12]. Further, a tertiary center in Pakistan was only able to implement QI measures after substantial hospital policy shift, which included instituting a multidisciplinary trauma approach, increasing resources, and emphasizing trauma training for attending physicians and residents [13].

These data suggest that prioritization of QI is the next step in Latin America, possibly through integration of QI responsibilities into the physician's existing work schedule. Such efforts have already been undertaken in national programs in other LMICs and are recommended by WHO policy [2–4]. This prioritization should also manifest as increased education regarding QI best practices. This may take the form of integration into pre-graduate education, courses offered by local and international societies, or local "apprenticeships" in which those institutions with functioning QI programs mentor neighboring institutions

without such programs. In particular, the presence of the basic elements of a functioning QI program should be a requirement for hospitals that host post-graduate programs, such as surgery residency. Finally, participants in this study articulated several barriers they perceived to be cultural in nature. This highlights the need for participation of local leaders in the adaptation and implementation of QI guidelines [1].

This study has several limitations. First, the sampling method employed, by which one participant refers the subsequent participant, may have resulted in over-sampling of certain subpopulations for the qualitative interviews. These same urban, academic, QI-aware subpopulations were also over-sampled in the quantitative data collection, which occurred at academic conferences and urban hospitals. Thus, the results herein likely overestimate QI implementation in the country and may not reflect the barriers experienced by practitioners working at rural, small, or private hospitals. Second, the interviewer's positionality as a foreigner, a young person, a surgical resident, and a non-native Spanish speaker likely influenced the participants' responses, and to some degree, the analysis of those responses. The potential for these factors to influence the validity of the results was mitigated by the inclusion of Peruvian collaborators in all stages of study design, implementation, and analysis by performing dual coding of the data and by including direct quotes from participants in the manuscript. Third, data are subject to recall bias, as subjects were asked to describe details regarding conferences that in some cases occurred only rarely.

This study primarily adds to the literature in identifying barriers and facilitators to QI program implementation in an LMIC. The key barriers to QI implementation identified in Peru were a lack of prioritization of QI, lack of sufficient human and administrative resources, lack of political support, and lack of education on QI practices. The primary facilitator to QI programs identified in this research was the presence of individuals, from a variety of institutions, with QI education, interest, and a desire to improve the system. A national program that makes QI an integral part of all health providers' professional training and responsibilities would effectively address a majority of identified barriers [3]. In the case of Peru, a first step toward this program should be inclusion of QI programs in the qualification of hospitals as secondary or tertiary care [14]. Alternatively, short of this national-level organization, efforts that capitalize on excellent local examples through apprenticeships between institutions or integration of QI into continuing medical education would be expected to build on the facilitators for QI programs that exist in Peru.

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