ISQua®

International Journal for Quality in Health Care, 2017, 29(2), 234–242
doi: 10.1093/intqhc/mzx005
Advance Access Publication Date: 2 February 2017
Article

OXFORD

Article

Evaluation of a novel mentor program to improve surgical care for US hospitals

JULIA R. BERIAN, JULIANA M. THOMAS, CHRISTINA A. MINAMI, PAULA R. FARRELL, KEVIN J. O'LEARY, MARK V. WILLIAMS, VIVEK N. PRACHAND, AMY L. HALVERSON, KARL Y. BILIMORIA, and JULIE K. JOHNSON

Illinois Surgical Quality Improvement Collaborative (ISQIC), 633 N. St Clair St., 20th Floor, Chicago, IL 60611, USA

Address reprint requests to: Julie K. Johnson, Illinois Surgical Quality Improvement Collaborative (ISQIC), 633 N. St Clair St., 20th Floor, Chicago, IL 60611, USA. Tel: 312-503-3823; Fax: 312-503-4401; E-mail: julie.k.johnson@northwestern.edu

Editorial Decision 22 December 2016; Accepted 12 January 2017

Abstract

Objective: To evaluate a novel mentor program for 27 US surgeons, charged with improving quality at their respective hospitals, having been paired 1:1 with 27 surgeon mentors through a statewide quality improvement (QI) initiative.
Design: Mixed-methods utilizing quantitative surveys and in-depth semi-structured interviews.
Setting: The Illinois Surgical Quality Improvement Collaborative (ISQIC) utilized a novel Mentor Program to guide surgeons new to QI.
Participants: All mentor–mentee pairs received the survey ($n = 27$). Purposive sampling identified a subset of mentors ($n = 8$) and mentees ($n = 4$) for in-depth semi-structured interviews.
Intervention: Surgeons with expertise in QI mentored surgeons new to QI.
Main outcome measures: (i) Quantitative: self-reported satisfaction with the mentor program; (ii) Qualitative: key themes suggesting actions and strategies to facilitate mentorship in QI.
Results: Mentees expressed satisfaction with the mentor program ($n = 24$, 88.9%) and agreed that mentorship is vital to ISQIC ($n = 24$, 88.9%). Analysis of interview data revealed four key themes: (i) nuances of data management, (ii) culture of quality and safety, (iii) mentor–mentee relationship and (iv) logistics. Strategies from these key themes include: utilize raw data for in-depth QI understanding, facilitate presentations to build QI support, identify opportunities for in-person meetings and establish scheduled conference calls. The mentor's role required sharing experiences and acting as a resource. The mentee's role required actively bringing questions and identifying barriers.
Conclusions: Mentorship plays a vital role in advancing surgeon knowledge and engagement with QI in ISQIC. Key themes in mentorship reflect strategies to best facilitate mentorship, which may serve as a guide to other collaboratives.

Key words: quality improvement, quality culture, surgery, mentors, collaboration, qualitative methods, survey

Introduction

Quality improvement (QI) offers important tools to improve healthcare delivery. Central to any QI activity is tracking and continuously evaluating data; furthermore the ability to compare across hospitals provides a critical tool for improvement in a variety of settings. In Japan, the Breast Cancer Registry has been utilized to evaluate the spread of hospital performance across 224 hospitals providing breast cancer care [1]. In Italy, significant hospital-level variation was identified in 30-day mortality rates across 844 institutions providing medical and surgical care for a defined set of

conditions [2]. Beyond comparative data, multi-hospital collaboration can accelerate improvement by allowing hospitals to learn from one another. In the United Kingdom, collaboration across 30 primary care practices, including benchmarking of audit data and use of facilitator support, resulted in improvement in care for Chronic Kidney Disease [3]. In the Dutch surveillance network for nosocomial infections, 37 hospitals successfully reduced the risk for postoperative surgical site infection over time [4].

In the United States, the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) is a nationally recognized QI program that provides hospitals with surgical outcomes reports that are risk adjusted for patient risk factors and case-mix, and benchmarked against other hospitals, in order to help direct QI efforts [5–8]. To generate these reports, the ACS NSQIP program collects data from patient charts, entered by a trained data abstractor, called the 'Surgical Clinical Reviewer', with oversight from a surgeon, called the 'Surgeon Champion'. Several US states have created multi-hospital collaboratives in order to best improve surgical care. In Michigan, hospitals decreased surgical complications by 2500 general and vascular surgery patients per year (a 2.6% decrease) [9]. Similar benefits were demonstrated in a 10-hospital collaborative in Tennessee, where superficial surgical site infections decreased by 19%, acute renal failure by 25%, wound disruption by 34% and flap failure by 60% [10].

The Illinois Surgical Quality Improvement Collaborative (ISQIC) is a collection of hospitals aiming to improve surgical care across Illinois. The ISQIC developed 21 components to facilitate implementation of a surgical QI program, using ACS NSQIP as the data platform (Appendix). Preliminary interviews with surgeons in Illinois revealed lack of experience and training in QI as an obstacle for joining such initiatives. To address surgeons' concerns, ISQIC applied a physician mentor model [11–14] to hospitals new to the NSQIP platform (27 hospitals). Expert Surgeon Champions (mentors) were paired with Surgeon Champions who were new to QI and ACS NSQIP (mentees). The aim of this study was to evaluate the ISQIC Mentor Program to identify the benefits of mentorship, opportunities for improvement and strategies for mentorship in other quality collaboratives.

Methods

The ISQIC mentor program solicited applications from ACS NSQIP Surgeon Champions around the country. Mentors were selected by the ISQIC Coordinating Center based on prior experience utilizing ACS NSQIP data for QI. Mentors were required to complete a formal 'Mentor training session' at the 2014 ACS NSQIP Annual Conference. The session detailed the expectations of mentorship, provided guidance and standardized questions for each conference call, and outlined the strategy and timeline for the first year in ISQIC, including expected benchmarks and deliverables. Online, interactive, educational video modules were provided, focused on the Define-Measure-Analyze-Improve-Control (or DMAIC) method for quality and process improvement, to ensure baseline familiarity with methodologic principles. Mentors were tasked with guiding mentees and their hospitals through the NSQIP enrollment process, examining ISQIC and NSQIP benchmarking data, and implementing solutions for improvement. Quarterly mentorship calls were required and mentors received a stipend for their services.

We employed a mixed-methods approach for an in-depth assessment of the ISQIC Mentor Program. All surgeon mentors and mentees completed a quantitative survey; a select group was recruited for semi-structured interviews through an embedded design [15, 16] (Fig. 1).

Survey

The ISQIC Coordinating Center created and administered a survey to all ISQIC mentors (n = 27) and mentees (n = 27). Mentor surveys evaluated the mentee on domains including leadership, hospital culture and available resources. Mentee surveys evaluated overall satisfaction with the mentorship program and extent to which mentors facilitated QI. Surveys were delivered electronically and completion was required as part of the ISQIC contract. The survey was pre-tested among individuals on the ISQIC leadership team and revised accordingly.

Qualitative interviews

Review of ISQIC 6-month progress reports facilitated emergent subgroup sampling [17] of mentors and mentees with self-reported good or poor mentorship experiences. Interviews were conducted in-person during the Annual NSQIP meeting, July 2015. All eight mentors

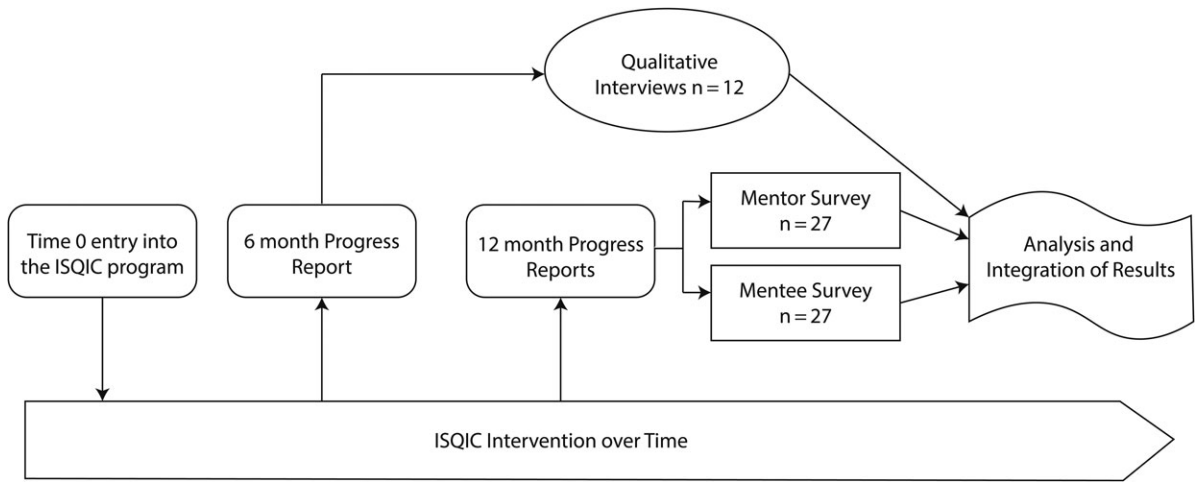

Figure 1 Study methods. The ISQIC Mentor Program occurred over time, with 27 surgeons new to QI paired with 27 surgeons with expertise in QI. The 6-month progress reports were utilized for selection of a subset of mentors and mentees for qualitative interviews. The 12-month progress reports contained quantitative surveys for mentors and mentees, respectively. The results were analyzed and integrated for an evaluation of the Mentor Program in ISQIC.

contacted were willing to participate in interviews. Of eight mentees contacted, four agreed to participate. Of the non-participants, three were non-responders to email and one was unavailable due to scheduling difficulty. The mentees participating in interviews reflected the overall sample, coming from small (< 300 bed) or moderate (300–500) size hospitals, with the majority performing General Surgery procedures.

The interview guide was designed to focus on: (i) experiences with the ISQIC mentor program; (ii) conference call content; (iii) perceptions of challenges and (iv) identification of areas for improvement. The guide included follow-up probes to facilitate participant answers and was pilot tested by surgeons in the ISQIC Coordinating Center and revised accordingly.

All interviews were conducted by a single physician (JB), trained in qualitative methods. Interviews ranged from 9 min to 47 min (mean 24 min, std dev 10 min). Interviews were audio recorded, de-identified and analyzed with a grounded theory approach [18] using MaxQDA audio transcript analysis [19]. Four independent reviewers (JB, JJ, CM, JT) developed the codebook through open-line coding, with iterative revision of codes until theoretical saturation was achieved using the constant-comparison method [18]. The same authors performed secondary coding; JB coded all interviews, the other three coded approximately four interviews each (i.e. each interview was coded by two separate authors). Reconciliation of secondary coding was performed until consensus was reached.

The ISQIC program has been identified as a QI activity by the Northwestern University IRB office (#STU000103428).

Results

Quantitative survey results

The majority of mentors practiced at academic or teaching hospitals (n = 23, 85.2%) compared to fewer mentees (n = 7, 25.9%) (Table 1). Mentor (n = 26, 96.3%) and mentee surgeons (n = 25, 92.6%) were predominantly male, practicing general surgery and trauma/critical care.

The response rate was 27 out of 27 (100%) for mentee and mentor surveys. The majority of mentees strongly agreed or agreed that the mentor developed a positive relationship with them (n = 26, 96.3%) (Table 2). Mentees had high overall satisfaction with the mentor program (n = 24, 88.9%) and agreed that mentorship is a vital part of ISQIC (n = 24, 88.9%).

Mentors were asked to evaluate the mentee leadership support, and robustness of the hospital's data infrastructure and other resources. Mentors believed their mentees had strong leadership support (n = 20, 74.0%) but were challenged with regard to data infrastructure and resources (Table 3). Mentors perceived that mentees had appropriately set expectations for their teams (n = 23, 85.1%), yet may be challenged with regard to hospital QI culture (n = 10, 37.0%) and employee engagement (n = 12, 44.4%).

Table 1 Mentee and mentor surgeon and hospital characteristics

	Mentees (n = 27) N (%)	Mentors (n = 27) N (%)
Surgeon characteristics		
Male	25 (92.59)	26 (96.30)
Surgeon specialty: general surgery	15 (55.56)	12 (44.44)
Trauma/critical care	2 (7.41)	7 (25.93)
Surgical oncology	2 (7.41)	2 (7.41)
Endocrine surgery	0 (0)	2 (7.41)
Cardiothoracic surgery	4 (14.81)	0 (0)
Orthopedic surgery	2 (7.41)	0 (0)
Urology	1 (3.70)	0 (0)
Otolaryngology	1 (3.70)	0 (0)
Colorectal surgery	0 (0)	1 (3.70)
Pediatric surgery	0 (0)	2 (7.41)
Vascular surgery	0 (0)	1 (3.70)
Hospital characteristics		
Hospital size < 100 beds	1 (3.70)	1 (3.70)
100–299 beds	12 (44.44)	3 (11.11)
300–499 beds	12 (44.44)	7 (25.93)
> 500 beds	2 (7.41)	16 (59.26)
Academic/teaching affiliation	7 (25.93)	23 (85.19)

Qualitative interview results

Iterative, qualitative analysis identified four major themes: (i) nuances of data management, (ii) the culture of quality and safety, (iii) the mentor–mentee relationship and (iv) logistics. Each of these themes had several subthemes (Table 4).

Nuances of data management

Waiting for data: Because it takes up to 1 year before the ACS NSQIP has sufficient data to release risk adjusted reports, mentors and mentees expressed frustration when insufficient data were available. However, mentors identified critical first steps to be taken while collecting baseline data. One mentor encouraged the mentee to examine the process for assigning 'wound classification' at the end of the operation, a critical data point for accurate risk adjustment (Mentor 3).

Using raw data: Though great benefit is derived from risk adjusted, benchmarked reports, mentors consistently pointed out the value of looking at the so-called 'raw', or unadjusted data, examining individual cases in detail to identify problem areas. 'They had data, they just didn't have risk-adjusted data. […] You don't have to wait until you see if it's risk adjusted' (Mentor 5).

Pitfalls in data use: Despite the benefits of using raw data internally, pre-mature dissemination was viewed as risky. With such small numbers, event rates could change with subsequent additional cases or due to risk adjustment. Therefore, raw data had the potential to be misunderstood: 'the opportunity to lose credibility was too great' (Mentor 4).

Interpreting data: Mentees appreciated the educational packages through ISQIC, mentor advice and in-person statistics sessions offered at the annual NSQIP conference to enhance their understanding of the data and analytics. One mentee noted 'the surgeons I work with, they're smart guys, they want to know "well why's this, why's that, what's this mean" and if you don't know those answers your credibility kind of goes out the window' (Mentee 1).

Culture of quality and safety

Engagement and building up a team: Mentors consistently emphasized the need to build support at the hospital. 'The challenge at a leadership level is to get people to understand […] This is not saying "you're bad" it's saying what is it that we need to do to make this work better' (Mentor 5).

Local politics and structure of the organization: Mentors and mentees consistently pointed to local politics and hierarchies within their institutions as barriers to QI. 'When there's multiple surgical groups, then whoever's leading the thing there's always a little bit of

Table 2 Mentee survey results

Survey item	*N* (%) agree or strongly agree
Our mentor developed a positive relationship with our group	26 (96.3)
Our mentor routinely identified clear next steps for each call	21 (77.8)
Our mentor understood our local issues	25 (92.6)
Our mentor helped identify potential challenges	25 (92.6)
Our mentor helped us overcome barriers	18 (66.6)
Our mentor provided support in helping navigate NSQIP	26 (96.3)
Rate your overall satisfaction with the mentor program	24 (88.9)
The mentorship program is a vital part of ISQIC to continue	24 (88.9)

Potential responses, 5-point scale: Strongly disagree, disagree, neither disagree nor agree, agree, or strongly agree.

Table 3 Mentor survey results

Characteristics of the mentee's hospital	Mentor perceived mentee/hospital as strong (minimal challenges)	Mentor perceived mentee/hospital as experiencing greater than minimal challenges
Leadership support	20 (74.0%)	7 (26.0%)
Data and infrastructure	14 (51.9%)	13 (48.1%)
Resources	16 (59.3%)	11 (40.7%)
QI team leadership	24 (88.9%)	3 (11.1%)
QI team diversity	20 (74.0%)	7 (26.0%)
QI team communication	23 (85.2%)	4 (14.8%)
QI team expectations and understanding	23 (85.2%)	4 (14.8%)
Perioperative system: hospital QI culture	15 (55.6%)	12 (44.4%)
Perioperative system: employee engagement	13 (48.1%)	14 (51.9%)

Potential responses, 5-point scale where 1 = 'serious challenges' and 5 = 'strong or excellent with minimal challenges'.

suspicion about whether this is truly quality or is it politics and maneuvering your group' (Mentor 6).

Role and authority of the surgeon champion: The 'surgeon champion' role often requires authority to effectively implement change. Mentors recognized variable dedication to the role and noted the ideal surgeon champion is mid-career, with 'the respect garnered from being around long enough to not be some "new guy"' (Mentor 2). One mentee observed: 'You can't replace being older and having respect' (Mentee 1).

The mentor–mentee relationship

Relevance of the mentor to the mentee: Despite differences in teaching status and hospital size, mentors and mentees recognized a shared purpose in QI. 'We're in the thick of it here as well, and our challenges might be a little bit different but I suspect there's substantial overlap. And there are lessons to be learned. You may have things that I can learn from you. It's not a one-way street' (Mentor 6). One mentee observed: 'a message from [Mentor] of acceptance, and non-judgmental nature, and "hey we're all in this together"' (Mentee 4).

The importance of face-to-face interactions: Mentors and mentees expressed a desire to meet in person. Several mentors reflected: 'If I had to do it over again I would definitely visit the site as a mentor' (Mentor 4). The value of a face-to-face visit was echoed by mentees.

Understanding the local context: Mentors consistently described the need to understand the mentee's organizational structure, available resources, hospital culture and institutional values (the 'local context'). 'Once I understand the system better I'll be able to help them work through the system' (Mentor 3). Mentors used this understanding to tailor experiences to the mentee. Among smaller, rural hospitals, one mentor noted: 'They weren't having enough general surgery cases to get meaningful data on VTE prophylaxis, but they are having orthopedic cases, so we said "we can include those"' (Mentor 8).

Mentor role: *Share your experience/be a resource*: Most mentors and mentees described the mentor role as one of a resource, sharing tips and tricks for QI, and making themselves available as issues arise. 'If they're doing the same thing you've already done and you know the pitfalls you really can help them and I think that is really of value' (Mentor 5).

Mentee role: Bring questions/Identify your own challenges: Mentors stated that a mentee should bring their own questions and several mentors prompted their mentees to do so in order to best make use of the calls: 'I asked them actually to send me the topic materials in advance. Because if they wanted me to help them with understanding something, I had to see what it is they needed me to help them understand' (Mentor 5).

Logistics

Scheduling calls: The importance and challenge of scheduling calls was described by both mentors and mentees. Routine calls, scheduled in advance, were viewed positively. 'I think it's helpful to have a scheduled meeting in advance, that way all our schedules are cleared for it' (Mentor 1). Scheduling calls one-at-a-time, according to surgeon availability instead of establishing a standing meeting time, was often cited as problematic.

Strategies for improvement

Quantitative and qualitative data informed improvements to the ISQIC Mentor Program. Within each theme, discrete action items were identified. In response to the mentor requests for more communication, the ISQIC central office conducted several structured webinars to provide

Table 4 Mentorship themes and selected quotes

Theme	Subtheme	Selected mentor and mentee quotes
Theme 1. Nuances of data management	Waiting for data	**Mentor 8**: 'Part of what they're doing is waiting to get some data collected to see what stands out as their strength and weaknesses'.**Mentee 3**: 'I think the mentors want to take you to year 3. They're ready to start dialing into problems and we're just trying to collect data. We're meeting with the mentor before we have any reports!'
	Using raw data	**Mentor 3**: 'I suggested that [wound class] be their first kind of internal PI project to determine through sampling whether the wound classification on their cases is in fact accurate and to report back. So they did… Individually review [the cases] to see if the wound class that was reported was consistent with their understanding of the wound class'. **Mentee 4**: 'I was going through and seeing "who's got this, who's got that." And the worksheets that the [data abstractor] fills out are nice […] You can get a little more in depth look at the data if you're not just having the computer pull it out'.
	Pitfalls in data use	**Mentor 5**: 'I went through my own personal experience. […] I told the person I reported to that they could not use this data for anything. "We haven't validated the data, we don't understand the data. For the first year I didn't even send the data out, I just kept looking at the data myself"'. **Mentee 4**: 'For instance, the upcoming board presentation I was going to delve into our first 6 months results, and give them a copy of our project charter, and talk about our process maps and all these targets that we're doing. And he said "back up, tell them what NSQIP is to begin with"'.
	Interpreting data	**Mentee 4**: 'This is great to have this data, to know that we can trust this data, to be able to tell our colleagues 'Yes, this is data we can trust'.
Theme 2. Culture of quality and safety	Engagement/building up a team	**Mentor 3**: 'I talk with the [mentee] a lot about the work he's doing to get the message out to the organization about the program itself and how it works and encourage him to meet with all the stakeholders – the surgeons of course, but also the nursing staff, the board of trustees, the leadership of the organization. And to set up regular meetings with those groups to keep them informed of progress'. **Mentee 3**: 'I presented to the board, I presented to the Dept of Surgery, I presented to the nurses in the OR. I probably had six or seven presentations. […]'
	Local politics/structure of the organization	**Mentor 6**: 'The hospital that I'm mentoring is a small/smaller community hospital, and so I think that the local politics [plays] perhaps more of a role in terms of the challenges they face, rather than sort of systems-based issues'. **Mentee 1**: 'You know we have meetings, but we have groups of surgeons that are really not active staff […] Its kind of hard to reach them, and even if you do, they just don't want to be bothered with it. But it's not anything I've given up on, I think we can do better in that'.
	Role and authority of surgeon champion	**Mentor 7**: 'I think the mentees are probably all over the board. You've got some that are truly passionate about it. And you've got some that are doing this because their chairman said "you do it." And then you got some where the hospital thought "well, maybe this is a good thing – who wants to be mentored? Who wants to be surgeon champion? Okay somebody hold up their hand"'. **Mentee 2**: 'To carry sway with surgeons you gotta be a surgeon, and you gotta be not a retired surgeon. A retired surgeon can run the OR. I'm not running the OR I'm an active surgeon who's helping improve things'.
Theme 3. Mentor–mentee relationship	Relevance of mentor to mentee	**Mentor 1**: 'Whether I was mentoring [a person at] a private hospital or an academic center I don't know that it would be that much different. I think the things you need to know from a PI standpoint, creating teams, and helping initiatives move along are the same at every facility'. **Mentee 4**: 'It's clear that the guy does it too. He's got clear experience clinically and with doing QI. So I don't have QI experience. It's good for me to go to someone who has QI experience to say "here's some tips and tricks"'.
	The importance of face-to-face interactions	**Mentor 5**: 'One of the challenges is that I've never met these people. […] I've been talking to them now for the better part of a year but I don't know who they are'. **Mentee 3**: 'I think it'd be good for a mentor to visit. […] Most relationships in business are face-to-face, you know nobody wants to sign a contract until you look at someone in the face and I think that helps with mentoring'.
	Understanding the local context	**Mentor 6**: 'It's always a little bit tricky to suggest quality improvement when you don't have any direct knowledge of what is physically and actually taking place. […] I think that that's why quality efforts fail – it's that people who aren't the end executors sort of think they know all the answers'

Table continued

Table 4 Continued

Theme	Subtheme	Selected mentor and mentee quotes
		Mentee 1: 'In the very beginning he asked a lot of questions about the size of the hospital and how different processes are done and certainly made an effort to understand, you know, how things kinda work at our place. And I'd say every conversation there's some questions basically trying to understand how things are and where we're at and so forth'.
	Connect the team, include everyone	**Mentor 6**: 'Logistically it might be a bit more of a challenge to do – but from the standpoint of actual usefulness […] If it's truly hospital-to-hospital mentorship you probably should have the whole hospital team to the whole hospital team'
		Mentee 2: 'Of course the SCR [NSQIP data abstractor] and the other abstracters were on the phone too and we were able to talk to their data people. I think that was very helpful for them [SCRs]'.
	Mentor role: share your experience/be a resource	**Mentor 6**: 'I told them my story briefly a little bit and explained I'm not here to tell you what to do, I'm not here to impose anything, I'm not the big city guy here telling you this is how you should do it. I'm here to be a resource. I'm here to help'.
		Mentee 4: 'So I mean, just helping in terms of scope and what the best thing is to focus on. That sort of thing – the big picture stuff down to the nitty gritty, like 'how did you guys implement this workflow in terms of postop ambulation'. […] Very very practical stuff and that's what I need. I think that's what all of us need. Nobody wants to reinvent the wheel. Nobody wants to make this more complicated than it has to be'.
	Mentee role: ID your own challenges and bring questions	**Mentor 3**: 'They've had lots of questions about the how mechanics of the program, how it works, how to interpret the data once they get it, how to develop a PI program once they identify a problem, so we talked a little about that. And they're working on the state-wide program right now, which is a VTE event reduction program'.
		Mentee 1: 'A feeling I had taking on this job is like "what am I supposed to be doing" and these targeted phone calls are really helpful with that. Probably if anything I'll be using this relationship more if not less in the upcoming years in the program'.
Theme 4. Logistics	Scheduling calls	**Mentor 8**: 'The biggest hurdle is actually getting the teams together and being able to schedule a conference call'.
		Mentee 2: 'I think on both sides, we had a hard time sometimes coordinating. He's a very busy surgeon, I'm pretty busy. We had to find a day that works for both of us'.
	Communication from Coordinating Center	**Mentor 4**: 'The other thing that would be helpful for me as a mentor is to get more feedback from the collaborative. I feel like I'm working in a vacuum'

PI, process improvement; OR, operating room; SCR, surgical clinical reviewer (data abstractor for ACS NSQIP program); VTE, venous thromboembolism.

feedback to mentors. Several travel grants were offered to facilitate face-to-face interaction with the mentors. Finally, recommended actions for new mentors were identified in order to provide a set of well-defined strategies for future mentor programs (Table 5).

Discussion

Mentorship has the potential to facilitate QI for surgeons unfamiliar with key concepts. This mixed-method evaluation revealed high levels of satisfaction with the ISQIC mentor program. Mentees believed that the mentor program was vital to ISQIC. In qualitative interviews with mentors and mentees, themes emerged about the nuances of data management, building a culture of quality and safety, and developing the mentor–mentee relationship. Mentors were valuable to mentees in navigating the complexities of understanding, interpreting, troubleshooting and communicating data. Mentors encouraged mentees to use raw data to guide QI activities, and internally audit data accuracy; yet mentors also discouraged mentees from disseminating data until it was fully understood and accurate. To build a culture of quality and safety, mentors provided perspective on engaging stakeholders, managing local politics, and the importance of embracing the role of the surgeon champion position in NSQIP. Finally, important elements of the mentor–mentee relationship were identified: relevance of the mentor to the mentee, the value of face-to-face encounters and understanding the mentee's local context. Steps for the mentor to take included being a resource and sharing experiences, while the mentee needed to identify his/her own challenges and bring questions to the mentor.

Lessons from the evaluation prompted internal improvements in the ISQIC Mentor Program. The qualitative interviews identified areas for improvement not otherwise observed in the survey responses. Based on mentor requests, the ISQIC Coordinating Center conducted several informational web-ex conferences. The importance of face-to-face interaction, a key theme from the semi-structured interviews, prompted the ISQIC team to designate travel grants to facilitate in-person meetings. Because mentors themselves are a limited resource, the themes from this evaluation were examined to develop a set of strategies for effective mentorship. These strategies may be used to guide new mentors, or might provide sufficient structure to pair one mentor with multiple mentees.

Mentorship plays a key role in a variety of fields. Mentorship is viewed as an essential component in academic medicine [20, 21]. Elements that facilitate mentorship include reciprocity, mutual respect, clear expectations, personal connection and shared values, while failed mentorship often involves the opposite characteristics (poor communication, lack of commitment, personality differences) [22]. Barriers to mentorship extend beyond personal factors to include structural and institutional barriers [23]. These findings are consistent with the current study, in which relevance, face-to-face interaction, an understanding of the mentee's local context and acting as a resource were important in building the mentor–mentee relationship.

Table 5 Strategies for effective mentorship

Key mentorship themes	Subthemes	Recommended actions
Logistics	Scheduling	Establish a standing call-time with your mentee
Mentor–mentee relationship	Face-to-face interactions	Identify opportunities to meet your mentee in person
	Understand the local context	Read about the mentee's hospital online Ask questions about the political and organizational structure for your mentee Understand your mentee's motivation for participating in QI, and your mentee's role/authority within the hospital
	Connect the team, include everyone	Offer to connect your own data abstractor with the mentee's data abstractor
	Be a resource	Share your story with the mentee, including what are you currently working on to improve quality at your hospital Encourage your mentee to bring questions and identify their own challenges
Nuances of data management	Prepare for QI while waiting for data	Encourage your mentee to evaluate anticipated processes for documenting and abstracting important variables *before* data abstraction commences (e.g. how is wound classification assigned and documented?)
	Use raw data	Guide your mentee to examine early ('raw') data even if it is not risk adjusted Help your mentee evaluate morbidity events by doing a 'deep dive' on a case-by-case basis
	Interpret the data	Coach your mentee to build a deep understanding of the data before disseminating it to others
Culture of quality and safety	Build up support	Encourage your mentee to present to different groups within the hospital (administration, OR staff, surgical specialties, etc.)

Mentorship as applied to QI is a recent development. The QI literature describes a third party acting as a 'facilitator' or 'coach' [24], and one QI pilot successfully utilized hospital administrators as mentors to improve the quality of hospital management across 14 hospitals [25]. However, the use of physicians mentoring other physicians has been a novel application of this concept. In the Society of Hospital Medicine's Mentored Implementation Program [11], hospitalist mentors worked with teams in guiding them through a QI project. One of these, Project BOOST, aimed to improve the discharge process; a post-implementation evaluation revealed mentorship as an essential component of the program [12, 14]. Mentorship in QI has shown promise in general medicine, and the current study demonstrates it may provide similar benefits in surgical care.

This study has several limitations. The quantitative survey was created de novo and was not previously published or validated. However, it was created using sound methodological principles for survey design and had an exceptional response rate. Furthermore, the survey items were designed for better understanding of mentor and mentee groups, but were not intended for comparison across mentor–mentee pairs, thus limiting the quantitative analysis of mentor–mentee survey performance. The qualitative portion of the study provided detailed data on individual mentor and mentees, however, it is possible that these findings are not generalizable to other mentors and mentees. Purposive sampling of mentors and mentees who demonstrated positive- or negative-relationships according to scores on the 6-month progress report was one attempt to include a wide range of viewpoints. The well-established ISQIC leadership team and contractual obligations of the ISQIC program contributed to the complete response rate for the surveys, however, may also bias the results in favor of the program.

Few surgeons are qualified to lead QI initiatives and, as such, a mentor program may accelerate the availability of such skilled professionals. The current study has identified key, fundamental building blocks for the ISQIC mentor program. These lessons have informed strategies to best leverage skilled mentors. Further research is needed to better understand the most efficient and effective use of surgeon mentors, mentees and how to facilitate maintenance of QI initiatives. Future work will greatly benefit the implementation of large-scale, collaborative QI programs.

Conclusion

Mentorship plays a vital role in the ISQIC, helping surgeons facilitate QI at their hospital under the guidance of experts. Key themes of the mentorship program include the nuances of data management, the culture of quality and safety, and building the mentor–mentee relationship. These findings suggest a broad and deep need for training in QI for surgeons. Themes and subthemes informed the identification of actionable strategies to help guide new mentors and potentially facilitate a mentor program for similar QI collaboratives in the future.

Acknowledgements

The authors would like to acknowledge the work of the surgeon mentors, surgeon mentees and their respective QI teams throughout the Illinois Surgical Quality Improvement Collaborative.

Funding

This work, the Illinois Surgical Quality Improvement Collaborative (ISQIC), is supported by the Health Care Services Corporation and Blue Cross Blue Shield of Illinois. The evaluation of ISQIC is supported by the Agency for Healthcare Research and Quality [R01HS024516].

References

1. Mukai H, Higashi T, Sasaki M *et al*. Quality evaluation of medical care for breast cancer in Japan. *Int J Qual Health Care* 2016;**28**:110–3.
2. Guida P, Iacoviello M, Passantino A *et al*. Intra-hospital correlations among 30-day mortality rates in 18 different clinical and surgical settings. *Int J Qual Health Care* 2016;**28**:1–9.
3. Harvey G, Oliver K, Humphreys J *et al*. Improving the identification and management of chronic kidney disease in primary care: lessons from a staged improvement collaborative. *Int J Qual Health Care* 2015; **27**:10–6.

4. Geubbels EL, Nagelkerke NJ, Mintjes-De Groot AJ *et al*. Reduced risk of surgical site infections through surveillance in a network. *Int J Qual Health Care* 2006;**18**:127–33.
5. 2014 John M. Eisenberg Patient Safety and Quality Award for Innovation in Patient Safety and Quality at the National Level. The Joint Commission Journal on Quality and Patient Safety. 2015(May 2015).
6. Hall BL, Hamilton BH, Richards K *et al*. Does surgical quality improve in the American College of Surgeons National Surgical Quality Improvement Program: an evaluation of all participating hospitals. *Ann Sur* 2009;**250**: 363–76.
7. Khuri SF, Daley J, Henderson W *et al*. The Department of Veterans Affairs' NSQIP: the first national, validated, outcome-based, risk-adjusted, and peer-controlled program for the measurement and enhancement of the quality of surgical care. National VA Surgical Quality Improvement Program. *Ann Sur* 1998;**228**:491–507.
8. Khuri SF, Henderson WG, Daley J Jr. *et al*. Successful implementation of the Department of Veterans Affairs' National Surgical Quality Improvement Program in the private sector: the patient safety in surgery study. *Ann Sur* 2008;**248**:329–36.
9. Share DA, Campbell DA, Birkmeyer N *et al*. How a regional collaborative of hospitals and physicians in Michigan cut costs and improved the quality of care. *Health Affairs (Project Hope)* 2011;**30**:636–45.
10. Guillamondegui OD, Gunter OL, Hines L *et al*. Using the National Surgical Quality Improvement Program and the Tennessee Surgical Quality Collaborative to improve surgical outcomes. *J Am Coll Surg* 2012;**214**:709–14. discussion 14-6.
11. Maynard GA, Budnitz TL, Nickel WK *et al*. 2011 John M. Eisenberg Patient Safety and Quality Awards. Mentored implementation: building leaders and achieving results through a collaborative improvement model. Innovation in patient safety and quality at the national level. *Jt Comm J Qual Patient Saf/Jt Comm Res* 2012;**38**:301–10.
12. Li J, Hinami K, Hansen LO *et al*. The physician mentored implementation model: a promising quality improvement framework for health care change. *Acad Med* 2015;**90**:303–10.
13. Hansen LO, Greenwald JL, Budnitz T *et al*. Project BOOST: effectiveness of a multihospital effort to reduce rehospitalization. *J Hosp Med* 2013;**8**:421–7.
14. Williams MV, Li J, Hansen LO *et al*. Project BOOST implementation: lessons learned. *South Med J* 2014;**107**:455–65.
15. Zhang W, Creswell J. The use of 'mixing' procedure of mixed methods in health services research. *Medical care* 2013;**51**:e51–7.
16. Creswell J, Klassen A, Plano Clark V, Smith KftOoBaSSR. Best practices for mixed methods research in the health sciences. National Institutes of Health, 2011 August 2011. Report No.
17. Patton MQ. Sequential and Emergence-Driven Sampling Strategies and Options. In: Patton MQ, St. Paul MN (eds). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice*, 4th edn. SAGE Publications, 2015.
18. Glaser B, Strauss A. *The Discovery of Grounded Theory*. Chicago: Aldine, 1967.
19. MAXQDA. *Software for Qualitative Data Analysis*. Berlin, Germany: VERBI Software—Consult—Sozialforschung GmbH, 1989-2016.
20. Sambunjak D, Straus SE, Marusic A. *Mentoring in academic medicine: a systematic review*; **296**. JAMA: the journal of the American Medical Association, 2006: 1103–15.
21. Jackson VA, Palepu A, Szalacha L *et al*. 'Having the right chemistry': a qualitative study of mentoring in academic medicine. *Acad Med* 2003;**78**:328–34.
22. Straus SE, Johnson MO, Marquez C *et al*. Characteristics of successful and failed mentoring relationships: a qualitative study across two academic health centers. *Acad Med* 2013;**88**:82–9.
23. Sambunjak D, Straus SE, Marusic A. A systematic review of qualitative research on the meaning and characteristics of mentoring in academic medicine. *J Gen Intern Med* 2010;**25**:72–8.
24. Godfrey MM, Andersson-Gare B, Nelson EC *et al*. Coaching interprofessional health care improvement teams: the coachee, the coach and the leader perspectives. *J Nurs Manag* 2014;**22**:452–64.
25. Bradley E, Hartwig KA, Rowe LA *et al*. Hospital quality improvement in Ethiopia: a partnership-mentoring model. *Int J Qual Health Care* 2008; **20**:392–9.

Appendix

ISQIC initiatives

Hospitals participating in ISQIC benefit from 21 novel components

ISQIC components		Description
Guided implementation		
1	Surgeon Champion (SC)	Leads NSQIP and ISQIC initiatives for the hospital
2	Surgical Clinical Reviewer(SCR)	Nurse who performs data abstraction and manages QI projects
3	Surgeon Mentor	Surgeon Champion who has successfully lead ACS NSQIP elsewhere and serves as mentor for SC
4	Process Improvement (PI) Coach	Highly trained in PI to coach hospital QI teams through QI/PI projects
5	Coordinating Center (CC)	Provide leadership and support staff for all aspects of ISQIC implementation
6	Annual Statewide Collaborative Quality Improvement Project (CQIP)	QI project that is identified by ISQIC Advisory Committee to address statewide need. Carried out with assistance from Mentor, Coach and Coordinating Center.
7	Annual hospital-specific QI project	QI project identified by individual hospital QI team to address a specific area of poor performance.
Education		
8	Formal QI/PI curriculum	Formal process improvement training through online modules and in-person training sessions
9	Project Management Training	Training SCRs on effective project management skills
10	Hospital Board Engagement Program	Training and guidance for engaging the hospital's board in ISQIC initiatives and surgical QI
11	Best Practice Guidelines	Evidence-based best practices identified by expert panel
12	Surgical QI Case studies	Examples of how other NSQIP previously examined and addressed high rates of common postoperative complications
13	Toolkit for SC/SCR and Administrators	Step-by-step guide on how to be an effective SC/SCR and Administrator focused on QI
Comparative reports		
14	Hospital-level risk adjusted comparative data	Reports that allow hospitals to compare data on process of care and postoperative outcomes benchmarked against hospitals in Illinois and the U.S. Hospital-level return on investment reports are provided as well.
15	Surgeon-level risk adjusted comparative data	Reports that allow surgeons to compare data on process of care and postoperative outcomes benchmarked against hospitals in Illinois and the U.S.
Networking		
16	Conference Meetings	Three in-person conferences (2 ISQIC, 1 NSQIP) to facilitate sharing of experiences, work on common projects, and conduct process improvement training
17	Monthly webinars for SC/SCRs	Webinars to collaborate, share ideas, and trouble shoot issues
18	SCR-SC Meetings	Meetings scheduled to foster communication among hospital team, discuss cases, and implement QI/PI projects
Financial support		
19	Stipend to hospital	Support for data abstractor, Surgeon Champion, NSQIP annual fee, travel to conferences, information technology, coordinating center, mentor, coach, comparative reports, pilot grants, PI curriculum, all resources
20	Pilot Grants for QI Projects	Hospitals may receive additional funding to implement related QI/PI projects
21	Bonus for improved outcomes	Financial bonus to hospitals that significantly improve outcomes by Year 3