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The Use of Sequential Surveys to Shorten Implementation Time for Healthcare System-Level Enhanced Recovery After Surgery (ERAS) Pathways

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Abstract

Background: Enhanced Recovery After Surgery (ERAS) pathways improve healthcare quality, safety, and cost-effectiveness. We hypothesized that the RAND Method (a hybrid Delphi approach), involving anonymous sequential surveys and face-to-face meetings, would allow for more rapid agreement and initiation of new ERAS pathways.

Methods: Using the ERAS Society guidelines for cesarean section as a baseline, our institution's ERAS Leadership Team (ELT) compiled published literature and institutional practices to design a 32-component survey that was sent to obstetricians, nurse midwives, anesthesiologists, pharmacists, and nurses. Components that did not reach 90% consensus were included in a second survey the following week, and meetings were held to review results. **At the conclusion of this process, time to agreement was retrospectively compared to the colorectal ERAS pathway process at this institution.**

Results: ERAS pathway components were compiled and reviewed by 121 stakeholders at 7 hospitals using iterative surveys with review meetings over a 13-week period. Survey response rates were 61% and 50% in the initial and follow-up surveys, respectively. There was agreement on 28/32 and 32/32 items on the initial and follow-up surveys. Using the RAND Method, time to agreement decreased by 54.1% (24 vs 13 weeks) compared to prior system-wide efforts to standardize the colorectal surgery ERAS pathway.

Discussion: With rapidly expanding healthcare systems, effective methods to gain consensus and adopt ERAS pathways are critical to implementation of ERAS guidelines. We demonstrate that the RAND Method allows for a transparent and efficient means of agreement across a diverse group of clinicians practicing in several settings.

Keywords

enhanced recovery after surgery, general surgery, OBGYN, Surgical Quality

Key Takeaways

- System-wide education and consensus are necessary for adoption of Enhanced Recovery After Surgery (ERAS) pathways.
- We found that by combining sequential surveys with in-person meetings to discuss survey, we decreased implementation time across a larger number of hospitals within our health system.
- This technique, known as the RAND Method, is an excellent template for more rapid adoption of best clinical practice by all members of the healthcare team and will be used in future implementations across our system.

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Introduction

Years pass between translational research discoveries and the implementation of those findings into clinical practice.[1] Although it is well established that patient outcomes improve with adherence to evidence-based guidelines, there is limited data on methods to expedite adoption of new practices.[2]

A four-step model was proposed by Pathman et al to improve the utilization of clinical guidelines: awareness, agreement, adoption, and adherence.[3] The initial steps of awareness and agreement require reconciliation of clinical practice with published guidelines across institutions with variable personnel, medication formularies, and workflows. Several methods have been described to gain consensus among groups, including informal consensus meetings (ICM), the Delphi method, and the RAND Method (a Delphi method hybrid).[4]

The Delphi method is a commonly used consensus method that consists of six steps: (1) identifying a research question; (2) summarizing the literature; (3) designing a survey; (4) conducting anonymous iterative survey rounds; (5) providing individual or group feedback between rounds; and (6) summarizing the findings.[4] The RAND Method is a hybrid approach **that includes the first three steps of the Delphi method, but between steps 4 and 5 includes face-to-face meetings between iterative survey rounds**. Cited advantages include both the potential to survey geographically diverse specialties with the opportunity for real-time clarification and discussion. Face-to-face meetings between survey rounds give panelists the opportunity to discuss their survey responses with knowledge of how all the other participants responded. **Disadvantages of this approach have cited increased logistic considerations with meeting scheduling and pressure for opinion convergence during face-to-face meetings.**[4]

An Enhanced Recovery After Surgery (ERAS) pathway is a multi-disciplinary approach to standardization of the preoperative, intraoperative, and postoperative phases of care for specific surgical procedures.[5] Models for implementing and disseminating these pathways within large healthcare systems are currently under examination.[6] Our health care system is in the process of standardizing ERAS pathways across institutions, which requires input from up to 12 member hospitals, each with unique geography, patient demographics, and hospital settings. Recent implementation of a healthcare system ERAS pathway for colorectal surgery required 24 weeks for a multi-disciplinary content review group to reach agreement on the details of the pathway components.

We hypothesized that the RAND Method would allow more rapid evaluation and agreement on pertinent elements of complex ERAS pathways across a health care system. This study compares the development of two, separate health care system-level ERAS pathways with and without utilization of the RAND Method to reach consensus.

Materials and Methods

This study was exempted from the University of North Carolina IRB review as surveys were issued and completed for the purpose of improving services and programs. Privacy of participants was protected, confidentiality of individual responses was maintained, and survey participation was voluntary.

Our health care system currently is composed of 12 hospitals across the 9th most populous state in the US. To decrease care variation and improve clinical outcomes, we developed a system-level ERAS program. The first system-level ERAS pathway was created using ICM between two hospitals that had existing colorectal ERAS programs. **Although other hospitals offer colorectal services, the two selected hospitals had colorectal programs with existing ERAS Pathways and at least two colorectal-trained surgeons.** Later, using the RAND Method, the seven hospitals within the health care system that perform cesarean section operations developed another system-level pathway. Two of these hospitals are located in urban areas and five are in rural settings. These hospitals range from 25 to 950 inpatient beds and perform anywhere from 2 to 1420 cesarean sections per year.

RAND Method

Using the recently published ERAS Society guidelines for the care of patients undergoing cesarean section,[7–9] we used the RAND Method to reach health care system-level consensus on this novel system-level ERAS pathway.[10,11]

The health system uses a three-tiered approach to pathway implementation, consisting of: the ERAS Leadership Team (ELT), the Pathway Core Teams (PCT), and Subject Matter Experts (SME) made up of pathway end-users (Figure 1). **Overall number of participants were determined based on hospital procedural volume within the system at time of pathway development. Specifically, member hospitals were each queried to determine whether they performed planned caesarean deliveries. Hospital leadership at each institution identified team members from each category currently involved in these deliveries. After an explanation of the objective of the project, Pathway Core Teams consisting of a surgeon, an anesthesiologist, and a nursing leader were identified as PCT members, but all providers involved in the care of these patients were included as SMEs. Groups were mutually exclusive, meaning individuals designated to one team could not also be part of another team.** During four, one-hour meetings held once weekly, the ELT and PCT compiled

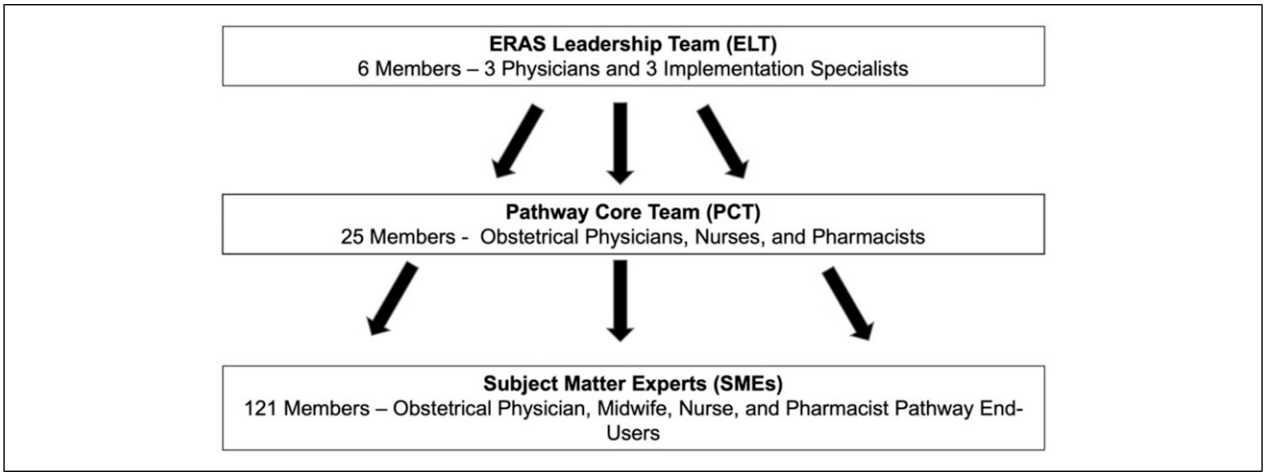

Figure 1. Leadership structure for system-level Enhanced Recovery After Surgery (ERAS) pathway development.

the ERAS Society guidelines for cesarean section, published literature, and known institutional practices to design a 32-component survey of specific evidence-based practices organized within the ERAS framework.[12] The survey was structured by phase of care—preoperative, intraoperative, and postoperative—and designed to capture stakeholder input while minimizing time needed to provide complete responses.

The survey was sent to a team of 121 SMEs with members from each system hospital that performs cesarean deliveries, including obstetricians, family medicine physicians, anesthesiologists, nurse midwives, pharmacists, and nurses who planned to be involved in the Enhanced Recovery Programs across the hospital system. Participants were required only to complete the sections for which they routinely provide care. The survey allowed votes to include, exclude, or revise each component. If a clinician voted to exclude or revise a component, the clinician was asked to provide rationale. The two open-ended questions "What did we forget?" and "What questions do you have for the ERAS team?" were included at the end of the survey to promote communication.

Areas of disagreement prompted face-to-face meetings. These focused on areas lacking consensus to align clinical content and verbiage of pathway metrics.[10] **The ERAS Leadership Team and Pathway Core Teams, as well as representatives from the SMEs were invited to attend face-to-face meetings. Attendance was not taken, but meeting minutes were distributed to survey participants. Pre-specified goals for survey response rates have not been described in the literature but will be considered in future efforts using this method.**

Prior to survey distribution, a threshold of 75% agreement was created by the ELT, and the decision was made to include each item below that threshold in subsequent surveys until consensus could be achieved. After the first survey distribution, greater than 75% consensus was reached on all items. To ensure agreement across the system, the ELT, in discussion with the PCT, increased the threshold to 90% for consensus. **There are no standard, recommended consensus thresholds in either the Delphi or RAND methodology. Instead, recommendations are to determine thresholds based on participant numbers as well as institutional and process aims. Our institution thresholds were selected based on recommendations from the ELT and PCT.** Components that did not reach the threshold of 90% consensus were resurveyed the following week. The survey design and distribution process took place over a period of 13 weeks (Figure 1).

Informal Consensus Meetings

The health care system-wide adult colorectal ERAS pathway was developed by the same ELT, and a PCT composed of colorectal surgeons, anesthesiologists, nurses, pharmacists, and ERAS program managers at the two hospitals with existing colorectal ERAS programs. These pathway development meetings took place in person when possible. **Because this process was the first system-wide ERAS pathway development and implementation, best practices from system hospitals familiar with ERAS pathways were sought. This process did not include representation from other system hospitals not yet using ERAS for the colorectal patient population. This was viewed as a weakness of this approach, and why a larger group of member hospitals was chosen for the RAND Method. Spreading the colorectal ERAS Pathway to other hospitals performing colorectal surgery has since been accomplished through educational outreach to those hospitals.** The existing pathways from each institution

were examined jointly, and consensus was reached using ICM. The PCT was then responsible for site specific education of SMEs.

Analysis

Following completion of the health care system-level cesarean pathway for ERAS, the timeline was compared to health care system-level development of our adult colorectal ERAS pathway. The primary endpoint was time to gain clinician consensus.

Results

RAND Method

Survey respondents were multidisciplinary, and responses reflected the diversity of stakeholders. **The largest percentage of respondents were non-physicians (56%). Most respondents included certified registered nurse anesthetists, pharmacists, and nurses from labor and delivery, postpartum, and other units** (Table 1). Time to complete the survey varied by staff type. The majority of stakeholders took between 2 and 35 minutes to complete the Round 1 survey; **minimum and maximum times to completion are displayed in** Figure 2**. The second-round survey was significantly shorter, and every respondent completed it in under 10 minutes, so times were not recorded.** Time to complete by staff type corresponded to the number of pathway items reviewed and the complexity of the review.

The initial survey was distributed to 116 stakeholders, and the second round was distributed to 121. **Between survey rounds, five additional SME members were recommended for inclusion by pathway participants.** The response rate was similar between the two rounds with 71/116 (61%) and 61/121 (50%) responding to the first and second surveys, respectively (Table 2). Rates of response from seven hospitals ranged from 20 to 100% during the first round of surveys and 40 to 67% during the second round.

There were thirty-two elements included in the initial pathway based on the ERAS Society guidelines and the institutional practices. After the first survey, 28/32 pathway elements met the 90% threshold for consensus (Table 3), as well as two additional elements that exceeded the 90% approval threshold but had a high degree of concern from some stakeholders. The ERAS implementation team summarized the rationale behind pathway components not meeting consensus as well as comments provided in the qualitative portion of the surveys. This information and the six elements designated for inclusion in the second survey were distributed.

After the second survey, one remaining item did not meet the 90% threshold. Following review, a group decision was made to retain this item (pre-operative analgesia) within the pathway. This decision was based on standardizing the cesarean section pathway with the existing metrics in the adult colorectal surgery pathway and to decrease care variation between ERAS pathways. Following this final meeting, a final system-level ERAS pathway for cesarean sections was agreed upon with nearly unanimous consensus. This occurred over the course of 13 weeks. (Figure 3)

Table 1. Subject Matter Expert survey responses, by health care job-type.

	Round 1	Round 2
Role	**# Responses**	**# Responses**
Physician, obstetrician	20	14
Physician, anesthesiologist	9	7
CRNA	2	3
Nurse midwife	0	3
Nurse, labor and delivery	14	15
Nurse, postpartum	11	8
Nurse, other	7	2
Pharmacist	3	4
Other[a]	5	5
Total	**71**	**61**

[a]Includes: 2 Family Medicine physicians, 1 perinatal director, 2 administrators.

Informal Consensus Meetings

Immediately prior to the development of the health care system-level ERAS pathway for cesarean section, the same ELT developed a health care system-level adult colorectal surgery ERAS pathway using ICM. Aside from this team, there were no additional colorectal pathway members that also participated in the cesarean pathway implementation. This difference was due to the limited number of hospitals where the pathway was implemented and noted after initial pathway development to be a limitation to the rapid spread of this innovation. These meetings included both process development and development of the pathway components, but SME education was performed following consensus. Pathway pre-work consisted of six one-hour meetings of the ELT over the span of 12 weeks to review ERAS Society guidelines for colorectal surgery and to align existing colorectal pathways to a single shared colorectal pathway. Following this pre-work, a meeting was held with the PCT colorectal team that included two dedicated teams of surgeons, anesthesiologists, CRNAs, advanced practice providers, nurses, and leaders from the Information System Department (ISD). Incremental refinement among this group occurred using as-needed ICM over

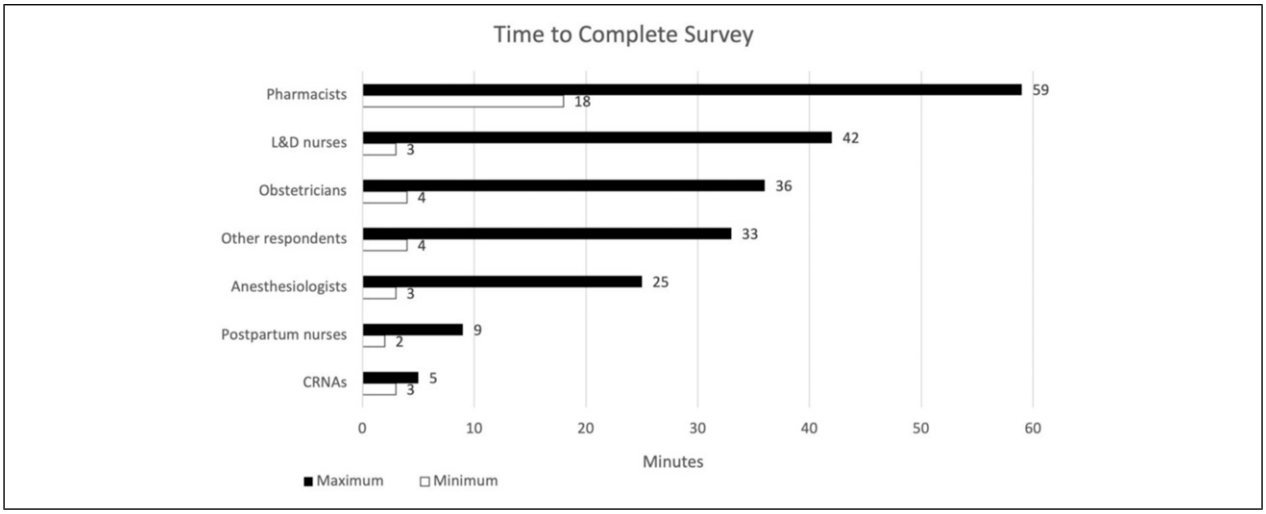

Figure 2. Range of time spent in survey completion by job-type.

Table 2. Response rate by participating hospital with hospitals deidentified and designated randomly A-G.

	Round 1			Round 2		
Hospital	**Total # sent**	**Total # replied**	**Response rate**	**Total # sent**	**Total # replied**	**Response rate**
A	43	24	56%	44	23	52%
B	48	30	63%	48	22	46%
C	7	5	71%	7	4	57%
D	5	1	20%	5	2	40%
E	6	6	100%	9	6	67%
F	4	2	50%	5	2	40%
G	3	3	100%	3	2	67%
Total	**116**	**71**	**61%**	**121**	**61**	**50%**

a 12-week period to build, refine, and discuss potential changes to pathway components with stakeholders. In the end, consensus was reached on 26 pathway elements. The total process took 24 weeks.

Despite **a significantly larger volume of stakeholder inclusion than the colorectal ERAS pathway process—approximately 90 more total participants between the PCT and the SMEs—and 5 more participating hospitals,** the time to pathway development was 11 weeks shorter using the RAND Method (24 weeks for adult colorectal pathway vs 13 weeks scheduled cesarean pathway).

Discussion

We found that using the RAND Method to gain system-level consensus was more efficient and reached a larger audience than the use of ICM. The RAND Method shortened the time to consensus on pathway components by 11 weeks in a pathway with a similar number of components but involving far more hospitals within the health care system (7 vs 2 hospitals).

The awareness-to-adherence model described by Pathman includes increasing awareness and reaching consensus among stakeholders as its first two steps.[3] Our formalized use of these steps allow for inclusion of a wide range of knowledge and experience, interaction between members, and stimulation of debate. Additionally, they can prevent vocal and more senior members from overly influencing group decisions when the evidence is insufficient.[13] The RAND Method allows a large number of heterogeneous participants, limits dominance of highly opinionated individuals, and allows substantial time to express ideas and reflect upon answers. Additionally, it is inexpensive, convenient, and there are no geographic constraints.[4,13] Unlike the Delphi technique alone, the RAND Method creates an opportunity for personal contact between experts with face-to-face meetings**, allowing for clarification and consensus building**.[4] In the current study, we found that the use of face-to-face meetings provided advantages over a strict Delphi approach as the initial consensus targets were easily reached and differences of clinical opinion largely revolved around individual interpretation of clinical content and not

Table 3. Survey response rates by pathway component.

Delphi survey results	Round 1	Round 2[a]
ERAS components	**# Included**	**# Included**
Preoperative		
Educate patient on cesarean section	45 (100%)	
Educate on ERAS plan	43 (96%)	
Provide carbohydrate drink and fasting/carb-loading instructions[a]	39 (89%)	42 (95%)
Screen for maternal anemia	40 (93%)	
Screen for and optimize maternal comorbidities	41 (95%)	
Preoperative Day of Surgery		
Confirm patient fasting pre-operatively	46 (96%)	
Verify carbohydrate drink intake	43 (90%)	
Preoperative analgesia[a]	42 (89%)	40 (89%)
Pre-anesthetic medication	49 (100%)	
Intraoperative		
Antibiotic prophylaxis	45 (92%)	
Antiemetic prophylaxis	47 (98%)	
Multimodal anesthesia[a]	40 (89%)	40 (91%)
Uterotonic administration	42 (93%)	
Active warming strategy	45 (98%)	
Avoid abdominal irrigation[a]	38 (84%)	38 (95%)
Early bonding	46 (96%)	
PACU		
Early breastfeeding	47 (94%)	
Diet in PACU	46 (96%)	
VTE prophylaxis	52 (100%)	
POD #0		
Postoperative analgesia POD #0	52 (96%)	
Opioid minimization POD #0[b]	51 (96%)	98% (46)
POD #0 diet	52 (98%)	
VTE prophylaxis POD #0	52 (100%)	
Early mobilization POD #0	50 (96%)	
Scheduled bowel regimen	50 (94%)	
Remove urinary catheter within 12 hours post-op	50 (94%)	
POD #1/2/3		
Post-op analgesia POD #1/2/3	52 (96%)	
Opioid minimization POD #1/2/3[b]	53 (98%)	98% (46)
POD #1/2/3 diet	52 (100%)	
Early mobilization POD #1/2/3	48 (94%)	
Scheduled bowel regimen POD #1/2/3	48 (94%)	
Discharge pain medications per institution Standard Opioid Prescription Schedule	48 (94%)	

[a] Items reviewed in Round 2 did not meet 90% agreement threshold from Round 1.
[b] Outcome criteria changed based on respondent feedback, repeat survey supported. Abbreviations: ERAS, enhanced recovery after surgery; PACU, post-anesthesia care unit; VTE, venous thromboembolism; POD, postoperative day

the content itself. This would have been more difficult to discern without face-to-face reviews. These reviews also allowed for peer network development and better integration in the healthcare system of disparate hospital groups, making implementation easier.

While the Delphi method has been used to create an international consensus on an ERAS training curriculum and to reach consensus on topics related to perioperative fluid management, no other study describes the use of the Delphi method for initial pathway alignment across multiple hospitals.[14,15] While the Delphi method allowed for asynchronous review of guidelines and multiple iterations, it did not afford a transparent review of the disagreements between stakeholders provided by the RAND Method. A recent study described the design, development, and implementation of ERAS pathways at Kaiser Permanente in Northern California. To create and align pathways, a multi-disciplinary workgroup compiled

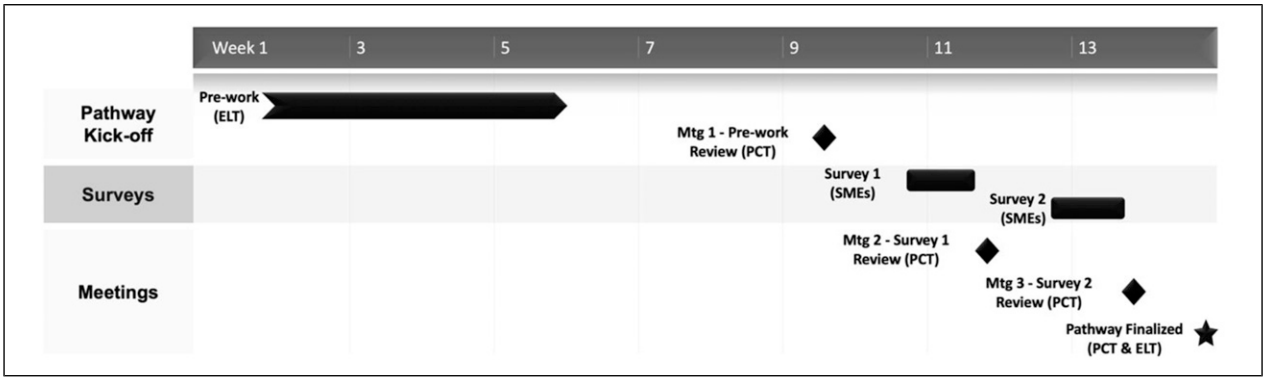

Figure 3. Timeline to reach consensus on system-level Enhanced Recovery After Surgery (ERAS) pathway for cesarean section surgery.

guidelines and held an in-person panel-based summit attended by 400 stakeholders, using ICM methods for their health care system (19). Additional large health systems have described their experience using large ICM with commercially available programs.[6] While those studies provide a difficult comparator because they include analysis of the entire implementation, our process of education and consensus utilized similar ICM methods of all involved stakeholders, but without extremely high resource requirements.

Because of its retrospective nature, one limitation of our study is a precise measurement of time to consensus on an individual and group level. Additionally, the pathways implemented were examined within different groups of clinicians and no baseline examination of pre-ERAS practice variation was performed to compare how disparate the clinical practice was before and after ERAS implementation. Specifically, it is unclear how clinical practice differed from ERAS principles in adult colorectal and scheduled cesarean sections prior to implementation. This could be responsible for differences in the time taken to gain pathway consensus. Additionally, while the survey participation was voluntary, and response rates were 61% and 50% for each round of surveys, it is unknown if non-respondents agree and whether potential disagreements would lead to variations in clinical care after pathway implementation. Thus, it remains to be determined what impact these developed pathways will have on clinician pathway compliance and patient outcomes. Lastly, it is difficult to estimate the degree to which ELT experience in pathway implementation vs consensus methodology had on the time to consensus.

One of the benefits of the RAND approach is that education occurs during pathway development and consensus building. More than half of stakeholders provided specific feedback on the pathway components, so less education was needed after implementation. The increased participation in pathway development enabled by the RAND Method has improved clinician enthusiasm and willingness to adopt new protocols at each site. We hypothesize that this will beget wider adoption, stronger adherence, and improved outcomes data.

Strengths of this study include engagement of diverse stakeholders from geographically disparate hospitals, with survey participation at all seven hospitals. An additional benefit to utilization of the RAND Method is that rapid consensus among variable institutions was obtained using a 6-member central ELT. The ELT was able to obtain input from the existing obstetrics staff without putting undue demands on busy clinicians.

Overall, based on the parameters of consensus opinion agreed upon by our ERAS leadership, the utilization of the RAND Method greatly expedited pathway development and will be used in implementation of additional pathways in the future. The use of sequential surveys and the RAND Method was time-efficient, effective at capturing input and areas of disagreement, easy to administer, while generating concrete action areas for discussion at more focused meetings.

Declaration of conflicting interests

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