



Barriers and Facilitators in Implementation of an Esophagectomy Care Pathway: a Qualitative Analysis

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Abstract

Introduction A new postoperative esophagectomy care pathway was recently implemented at our institution. Practice pattern change among provider teams can prove challenging; therefore, we sought to study the barriers and facilitators toward pathway implementation at the provider level.

Methods This qualitative study was guided by the Theoretical Domains Framework (TDF) to study the adoption and implementation of a post-esophagectomy care pathway. Sixteen in-depth interviews were conducted with providers involved with the pathway. Matrix analysis was used to analyze the data.

Results Providers included attending surgeons ($n=6$), advanced practice providers ($n=8$), registered dietitian ($n=1$), and clinic staff ($n=1$). TDF domains that were salient across our findings included knowledge, beliefs about consequences, social influences, and environmental context and resources. Identified facilitators included were electronic health record tools, such as note templates including pathway components and a pathway-specific order set, patient satisfaction, and preliminary data indicating clinical benefits such as a reduced anastomotic leak rate. The major barrier reported was a hesitance to abandon previous practice patterns, most prevalent at the attending surgeon level.

Conclusion The TDF enabled us to identify and understand the individuals' perceived barriers and facilitators toward adoption and implementation of a postoperative esophagectomy pathway. This analysis can help guide and improve adoption of surgical patient care pathways among providers.

Keywords Esophagectomy · Postoperative pathway · Qualitative study · Implementation

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Introduction

Postoperative clinical pathways are frequently created to characterize and standardize the critical steps in caring for patients who have undergone a specific operation. Clinical pathways have been shown to have several benefits, including reducing hospital length of stay (LOS), improving patient quality of life and satisfaction, reducing postoperative complications, organizing and standardizing care, and minimizing delays in care and resource waste.^{1–3} However, the implementation of actual practice change among provider teams can prove challenging. In order to accomplish practice change, medical providers have to both de-implement, e.g., “unlearn,” the old practice as well as to adapt the new practice.⁴ Practice change in surgery can be particularly difficult as randomized controlled trials of surgical procedures are infrequent, and there is

often a volume-based learning curve that can impact outcomes.^{5,6} While many studies have described patient outcomes after implementation of new clinical care pathways, there is a paucity of studies that detail the actual implementation and practice change process.^{2,5}

Esophagectomy is the surgical cornerstone of multimodal therapy for esophageal carcinoma, yet this operation is associated with high morbidity.^{7,8} Leak from the esophagogastric anastomosis is one of the most dreaded complications.^{9,10} After careful evaluation of clinical outcomes at our institution, we saw the opportunity to improve patient outcomes by implementing a revised evidence-based clinical care pathway for patients undergoing esophagectomy. This pathway was primarily aimed at reduction of the anastomotic leak rate. This pathway entails the steps in caring for the patient perioperatively, with time- and criteria-based progression through the components of the pathway. The pathway also involves a major surgical change from the conventional one stage esophagectomy to a staged procedure where gastric preconditioning is followed by esophagectomy. A diagnostic laparoscopy with gastric ischemic preconditioning involves partial devascularization of the proximal stomach by division of the short gastric vessels and the left gastric artery and vein to and from the fundus, carefully preserving the right gastroepiploic arcade, intended to improve perfusion of the gastric conduit and esophagogastric anastomosis and consequently reduce anastomotic leakage.^{11,12}

In order to assess the success of the implementation process, we interviewed providers to understand their perspectives on the roll-out of a new clinical pathway. Interviews were analyzed using the theoretical domains framework (TDF), a widely used and validated theoretical framework for understanding facilitators and barriers associated with the implementation of evidence-based practices.¹³ The purpose of this study was to describe the process of implementing a surgical practice change at our institution centered on a clinical care pathway for esophagectomy. The results from this study illustrate the utility of TDF as a powerful tool to enable and improve the implementation of future practice change and interventions.

Methods

This study was approved by the Colorado Multiple Institutional Review Board (#21–3164).

Study Setting and Participants

The study was conducted at the University of Colorado Hospital, an academic medical center that serves as a

tertiary care referral center for local hospitals as well as surrounding states. The esophagectomy pathway was developed to replace an existing esophagectomy pathway. It was created by a panel of surgeon experts at our institution who performed a collaborative review of the literature to develop an evidence-based clinical care pathway for patients undergoing esophagectomy. This revised pathway was discussed and approved by the thoracic, general, and surgical oncology attending surgeons. The major changes were as follows: addition of a diagnostic laparoscopy with gastric ischemic preconditioning procedure (4 weeks prior to esophagectomy) in all patients, routine placement of feeding jejunostomy tube (J-tube) during the esophagectomy in all patients, initiation of tube feeds on all patients postoperative day (POD) zero, allowance of comfort ice chips by mouth on POD 1 (250 cc), removal of nasogastric tube on POD 2 if output < 200 ml (previously recommended but left to attending preference), goal to remove all chest tubes by POD 4 to 7 if output < 200 ml total, and standardization of the oral diet regimen with staged advancement by postoperative day. This pathway was implemented on January 1, 2021. Quarterly review meetings were held to review patient outcomes data and to review compliance with the protocol components and to facilitate discussion about provider concerns with the pathway.

The study included providers and personnel involved in creating or implementing the new postoperative esophagectomy pathway. Providers came from both inpatient and outpatient settings, and included physicians, advanced practice providers, registered nurse, and dietitian (Table 1).

Pathway Compliance

At the time of the interviews, the new pathway had been implemented for 1 year. At this time, 37 patients had been evaluated for the pathway. Of these, 29 patients had gastric preconditioning with the pathway. The patients who did not have gastric preconditioning were for the following reasons: one scheduled but had not yet had preconditioning surgery, four patients decided they wanted no surgical treatment whatsoever, two had progressive disease and were no longer surgical candidates, and one had surgery at an outside hospital. Of the 29 patients, 22 had completed their esophagectomy at the 1-year mark. Compliance with pathway components in January 2022 (toward the end of the interviews) was the following (Table 2): 9% started J-tube feeds on POD zero, 68% had J-tube feeds advanced as intended (by 10 ml every 4 h), 54.5% had removal of the nasogastric tube by POD 2, the average day the last chest tube was removed was day 8.5 (goal day 4–7), 59% did not

Table 1 Provider roles and demographics

Provider role	Sex	Years in practice
Attending surgeon (thoracic)	M	26
Attending surgeon (thoracic)	M	10
Attending surgeon (thoracic)	F	1
Attending surgeon (surgical oncology)	F	2
Attending surgeon (surgical oncology)	M	21
Attending surgeon (surgical oncology)	M	5
Advanced practice provider (thoracic inpatient)	F	8
Advanced practice provider (thoracic inpatient)	F	5
Advanced practice provider (thoracic inpatient)	F	10
Advanced practice provider (ICU)	F	12
Advanced practice provider (ICU)	F	12
Advanced practice provider (surgical oncology inpatient)	F	2
Advanced practice provider (surgical oncology inpatient)	F	9
Advanced practice provider (oncology outpatient)	F	10
Registered nurse (outpatient)	F	24
Registered dietitian	F	13

ICU intensive care unit

have a routine esophagram, and 68% were discharged on the appropriate diet for their postoperative day.

Recruitment

A purposive sample of providers were recruited via an email that was sent in September 2021 to all Department of Surgery faculty providers involved with the esophagectomy pathway asking for voluntary participation in a qualitative study analyzing the implementation of the new esophagectomy care pathway. One additional reminder email was sent in October 2021. Those who chose to partake in the study were sent a postcard consent form to review.

Study Design

The study team developed the interview guide to evaluate participant opinions and beliefs surrounding the

implementation of a new esophagectomy clinical care pathway. Each volunteer participated in a single semi-structured interview lasting between 10 and 30 min. All interviews were conducted individually via Zoom by team members experienced in qualitative methodology (ALK, HJM). The interviews were audio recorded with participant permission for transcription. One member of the study team (EOM) transcribed verbatim the audio for the interviews. Transcriptions were not returned to participants for comment. The Consolidated Criteria for Reporting Qualitative Research (COREQ) guided the rigor of this study.¹⁴

Study Team

The study team was made up of the four of the authors: RAM, MD MPH is a thoracic surgeon and was the principal investigator. ALK, PhD MSPH is a health services researcher and was the principal qualitative methodologist. HJM, MD is a general surgery resident. EM, GED is a transcriptionist. All team members were trained in qualitative interviewing and analysis by ALK. All interviews were conducted by the first author (HJM). The first author utilized field notes throughout the interviews.

Data Analysis

The 10–30-min individual interviews were audio recorded and transcribed verbatim by the transcriptionist. The analyses were conducted by a qualitative methodologist, ALK, and the first author trained in such analysis, HJM. The study team performed an inductive

Table 2 Compliance with pathway components

Pathway component	Patients with pathway component compliance
J-Tube feeds (POD zero)	9.0% ($n = 2/22$)
J-Tube feed advancement as planned	68.2% ($n = 15/22$)
Nasogastric tube removal (POD 2)	54.5% ($n = 12/22$)
Chest tube removal (POD 3–7)	Mean day 8.5
No routine esophagram ordered	59.1% ($n = 13/22$)
Appropriate discharge diet	68.2% ($n = 15/22$)

J-tube feeding jejunostomy tube

and deductive team-based analytical approach, drawing primarily on matrix analysis⁸, and the data was organized with Microsoft Excel version 16.59 (Microsoft Inc, Redmond, WA). A matrix analysis is a tabular format that arranges data for easy viewing in one place, permits detailed analysis, and sets the stage for later cross-case analysis.⁸ Matrix analyses provide a visual format for showing and telling simultaneously. Two members of the research team (HJD, ALK) first independently coded the initial interviews and then reviewed the documents together to reach a consensus, thus defining the initial codebook. During the coding process, the data were examined and organized into categories, domains, and themes. Emergent codes (those that are newly found in the subsequent interviews or further data collection from medical records) were added to the codebook until thematic saturation occurred, e.g., no new concepts were identified.^{15,16} All analyses and findings were integrated and documented with an audit trail.¹⁴

After matrix analysis completion, TDF was used to interpret the data. TDF is a framework that was developed by a multi-disciplinary group of psychological theorists, psychologists, and health service researchers. TDF includes 14 different domains and 84 constructs within these domains. The domains are knowledge, skills, social/professional role and identity, beliefs about capabilities, optimism, beliefs about consequences, reinforcement, intentions, goals, memory and attention and decision processes, environmental context and resources, social influences, emotion, and behavioral regulation.¹³ The purpose of these domains and constructs is to provide a framework for analyzing and explaining behavior (e.g., practice) change in a standardized fashion. Creation of the TDF from the matrix analysis was performed by ALK.

Results

A total of 16 out of 17 invited providers (94%) were recruited and completed qualitative interviews regarding their thoughts and opinions on the implementation of this pathway from September 2021 to February 2022 (Table 1). Interview participants included attending surgeons who perform esophagectomies (thoracic surgeons, general surgeons, and surgical oncologists) ($n = 6$), and inpatient advanced practice providers (APPs) from both thoracic surgery and surgical oncology ($n = 5$). We also interviewed intensive care unit (ICU) APPs from the cardiothoracic surgery ICU ($n = 2$), a registered dietitian ($n = 1$), and outpatient clinical staff from thoracic and surgical oncology clinics ($n = 2$).

TDF Domains

Interviews were used to identify facilitators and barriers to adoption and implementation. The main TDF domains that were relevant to implementation of the clinical pathway in this study were knowledge, beliefs about consequences, environmental context and resources, and social influences (Table 3). These domains will be discussed within the context of facilitators and barriers to pathway implementation (Fig. 1).

Facilitators

Overall, participants felt cautiously optimistic about the efficacy of the pathway. Five participants reported an overall mixed opinion and 10 shared a positive opinion of the pathway. A major reason for a positive opinion was an impression of favorable outcomes for patients with the pathway: “I actually like it. I think overall we’ve seen less complications and patients seem to go home quicker and I think just tend to be doing a little bit better” (#11). *TDF domains: beliefs about consequences.*

Supportive Data Providers acknowledged the critical role of supporting data for the pathway, mainly evidence behind pathway interventions: “I think that probably what would be the most effective at enabling the protocol to be successful, would be to... review that data... if we get everyone in a room and here’s the data... To say... you’re either doing this or not doing this without a clear reason” (#13).

For providers who were reluctant with the initial roll-out of the pathway, data was a main contributor for altering their initial opinion: “I was initially anxious about it [no routine esophagram] but the more data I’ve looked... it has shown that esophagrams can be erroneously normal” (#2). Provider opinions were also changed in a positive direction by favorable preliminary patient outcomes data. One provider who reported an initial negative opinion of the pathway changed their opinion based on patient outcomes: “My impression, anecdotally, is that gastric preconditioning has made a big difference... it seems to me that we’re dealing with fewer leaks than we did a year ago” (#6). Another provider shared that patient outcomes supported their belief in the pathway: “At least just subjectively looking at the quality of the stomach and the conduits when we go to do the definitive operation, looking much healthier, just by the eyeball test” (#3). *TDF domains: knowledge, social influences, emotion, beliefs about consequences.*

Perception of Patient Opinion Overall, providers perceived patient opinion of the new pathway to be positive, which served as a critical support for implementation of the

Table 3 Examples of major TDF domains and associated quotes from participants (barriers to implementation are in bolded text, and facilitators of implementation are in italicized text)

TDF domain [Constructs]	Sample quote
Knowledge [– Knowledge of esophagectomy care/scientific rationale – Knowledge of pathway components]	<p>“I’m not really sure why that’s [discharge on incorrect diet] been happening, possibly just confusion about what is supposed to happen.” (#4)</p> <p><i>“I think that probably what would be the most effective at enabling the protocol to be successful, would be to... review that data... if we get everyone in a room and here’s the data... To say... you’re either doing this or not doing this without a clear reason. Other than that you feel like it” (#13)</i></p> <p><i>“I was initially anxious about it [no routine esophagram] but the more data I’ve looked... it has shown that esophagrams can be erroneously normal.” (#2)</i></p> <p><i>“I do think the APPs are the ones who really understand the pathway and are consistent and don’t change all of the time.” (#5)</i></p>
Beliefs about capabilities/self-confidence [– Perceived competence – Professional confidence]	<p>“I think that it was a challenge for the person who views themselves as in charge and then ask them to produce data to support a decision that they’re making because we make tons of decisions without any data all the time” (#13)</p> <p><i>“I think that we did a good job on the front end, creating patient education materials. I think those have been super helpful to patients” (#12)</i></p>
Beliefs about consequences [– Beliefs – Characteristics of outcome expectancies]	<p>“I think that’s [not starting tube feeds on POD0] just attending preference and historically what the attendings have done” (#1)</p> <p>“I know two of our attendings are kind of like I don’t care what the data shows I need the esophagram” (#1)</p> <p>“I just don’t think it’s a good idea, and the attendings don’t like it. No one seems comfortable with it” (#5)</p> <p>“I don’t always look at something that someone publishes and automatically say, ‘Oh, you can do this. Oh, great. And now we’ll just dive in.’ If it doesn’t make sense to me, I’m less accepting of doing it. I don’t believe everybody” (#6)</p> <p><i>“I really think that it’s really a good thing. I think the patients are more prepared when they go to the MIE” (#9)</i></p> <p><i>“And actually, patients are way more accepting than I thought they would be of having another procedure” (#12)</i></p> <p><i>“Yeah, so I would say, I’m very encouraged. At least just subjectively looking at the quality of the stomach and the conduits when we go to do the definitive operation, looking much healthier, just by the eyeball test” (#3)</i></p> <p><i>“My impression, anecdotally, is that gastric preconditioning has made a big difference” (#6)</i></p>
Environmental context and resources [– Resources – Organization culture/climate]	<p>“Especially with the ICU, I know that they’ve had such turnover with their staffing, that getting on the same page with this new pathway has taken a little bit longer” (#1)</p> <p>“I think that’s the main barrier and one of the challenges I see is the high rotation of trainees through the teams” (#2)</p> <p>“But there’s been PA turnover as well” (#3)</p> <p>“Nurses know there’s a pathway and want to stick to it, but it ultimately still must be verified by the surgical team. ICU nurses are for all for using it” (#14, #15)</p> <p>“I think that communication has to be improved. I just need to know when the patient is going to be discharged” (#8)</p> <p><i>“We have a printout in our office (of the pathway). The note is super helpful too, the template helps us say okay this patient’s here this is what we should be doing as a little reminder” (#1)</i></p> <p><i>“The PAs are the ones that really keep track of all this stuff [pathway components]... even if a resident knows about the pathway, they may not remember it and it’s just hard for them to implement something that they don’t know much about” (#13)</i></p> <p><i>“I mean, all of them end up on the sixth floor, which I think is good. They’re [nurses] pretty good at keeping track... on other floors, they don’t really keep track” (#16)</i></p>

Table 3 (continued)

TDF domain [Constructs]	Sample quote
Social influences [- Social norms - Group norms - Intergroup conflict]	<p>“It feels like it’s hard to follow the pathway for us, because you still have to ask the surgical team permission to do things on the pathway so even if we want to stick to the pathway it’s not our choice” (#14, #15)</p> <p>“In non-procedural fields it usually will go when you try something as a part of a study where you look for a difference better than the standard of care, but within surgical technique, it’s almost never that way... You just start trying it out, you see if you like it, if you kind of like it, then you do it a little more, than you publish a retrospective paper about how you did it, and then if somebody feels like it then they’ll compare, or it’ll just become your new standard practice” (#13)</p> <p>“We’re just trying to kind of toe that line of sticking with the pathway but also making sure the attendings are happy” (#1)</p> <p>“Trying to get all the attendings on board with a consistent pathway. That’s been a problem” (#3)</p> <p>“It should be patient by patient and surgeon to surgeon... I think because I have been trained that way, I will be doing that for a while. It makes it even more complicated that we have two teams operating with opinions” (#6)</p> <p><i>“I think we [surgical oncology and thoracic surgery] both give insight into things and talk about things... we do a good job of being collaborative about it (#16)</i></p> <p><i>“Discussing this with other providers and other institutions and finding out what they do and what they found, it has shown that esophagrams can be erroneously normal” (#2)</i></p>

pathway. The addition of routine feeding J-tube placement allowing early initiation of tube feeds was felt to be beneficial for patients: “Patients seem overall way more prepared

to be without food and to feel better with the tube feeds” (#4), and: “I think the feeding tube helps them. It’s reassuring, you know, if you’re not eating by mouth, you have a

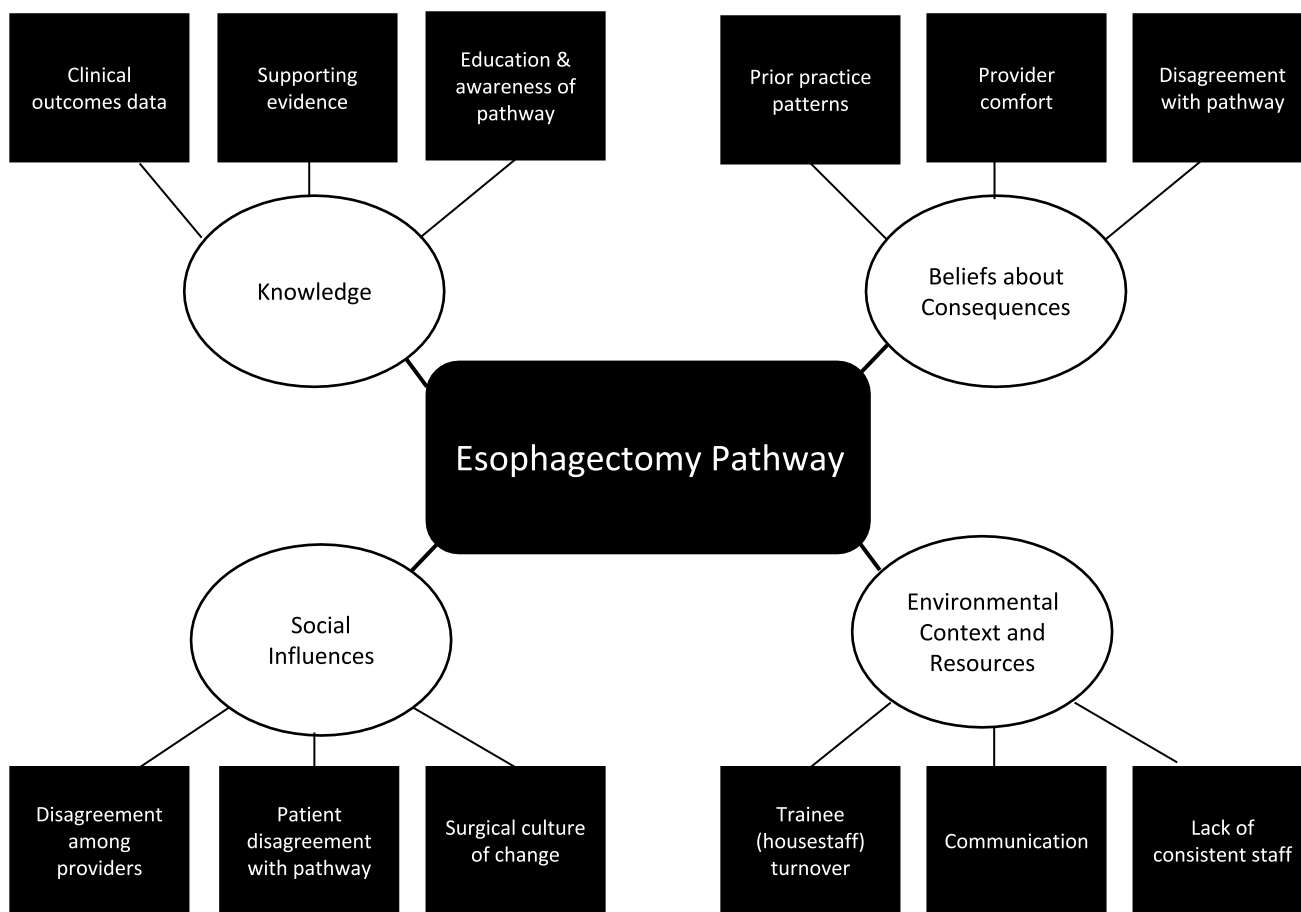


Fig. 1 Barriers to pathway implementation, categorized by the four major TDF domains

feeding tube” (#8). Improved preoperative patient education was also felt to have a positive impact with patients being perceived as more prepared for the procedure: “They also show the J-tube and what the J-tube looks like, and then the flush and all that other stuff. And also with the education part, they feel better about it because we give them the whole packet [explains post-operative care] and it’s posted out day one to seven... and week by week” (#9). Patients seemed to be more accepting of a long hospital stay postoperatively, accepting of the plan for tube feeds with delayed oral nutrition, and to not have significant resistance to the additional gastric preconditioning procedure. *TDF domains: knowledge, beliefs about consequences, social influences.* “So far, I have not had any patient resist or reject the idea of doing gastric preconditioning... there’s the well, here’s what we’re doing to try to prevent these complications of leaks, so that has added significant time to the discussion” (#3).

Resources Consistency of informed staff provided immense support for the pathway. APPs were noted to be essential advocates, especially given the high turnover of housestaff, who rotate through teams on a monthly to semimonthly basis: “I do think the APPs are the ones who really understand the pathway and are consistent and don’t change all of the time” (#5). Another important resource was the development of electronic health record (EHR) tools to assist with implementation. These include an EHR order set for the pathway and a templated note to be used each day detailing the steps of the pathway. *TDF domains: knowledge, environmental context and resources.*

Barriers

Practice Patterns and Emotional Influence A commonly cited barrier was friction between the new pathway and previous provider practice patterns. Discordance with practice patterns, at the attending surgeon level specifically, was cited as a barrier to several specific pathway components, including J-tube feeds starting on POD zero ($n=6$), early chest tube removal prior to beginning oral intake ($n=4$), and not obtaining a routine esophagram postoperatively ($n=5$). While practice patterns were a major barrier, the ability for practice to slowly shift was also acknowledged: “I’m becoming more and more comfortable with that. Again, it’s my slow acceptance of things that make sense on paper, but I haven’t done clinically, and so these barriers are more emotional than intellectual” (#2).

Prior clinical experiences leading to disagreement with certain aspects of the pathway was also a barrier: “Attendings again have their practice patterns they’re used to and have been doing for a long time. However, I do think the attendings are starting to change and getting more used to it” (#4).

Providers reported hesitancy starting J-tube feeds on POD zero due to the risk of conduit distention ($n=4$). In addition, not obtaining a routine esophagram precludes assessment of conduit emptying function ($n=2$). The combination of early nasogastric tube removal and allowance of ice chips with no gastric emptying procedure was felt to be an issue among two attendings. *TDF domains: knowledge, emotion, social influences, beliefs about consequences.*

Pathway Education Some elements of the pathway were not adhered to simply due to poor awareness of the pathway. This issue is compounded by new providers (e.g., housestaff): “The main barrier and one of the challenges I see is the high rotation of trainees through the teams, it seems like the deviation that I see early on is not necessarily mindful but it’s people not being aware of the pathway and adhering to it” (#2). Through interviews, it was also revealed that the order for a routine esophagram study was still pre-checked in the order set, causing it to be unintentionally performed in some patients. Also, it was found that outpatient and inpatient clinical staff were often not communicating clearly about a patient’s discharge diet, causing some difficulty with clinic follow-up. *TDF domains: knowledge, environmental context and resources.*

Patient Disagreement Overall, while most providers indicated that patients seemed accepting of the pathway and gastric preconditioning, one provider did mention patients pushing back against a second operation: “Let’s say somebody comes in sees us and he’s already looked into Google... nobody talks about preconditioning operation... this is hard for them to understand why we’re doing this two-part operation” (#10). *TDF domains: beliefs about consequences, social influences.*

Discussion

This study presents a qualitative assessment using matrix and TDF analysis of the facilitators and barriers to the implementation of a new esophagectomy clinical care pathway. The main TDF domains that were salient to implementation were knowledge, beliefs about consequences, environmental context and resources, and social influences. Facilitators of pathway implementation included positive preliminary patient outcomes data, supporting evidence for pathway interventions, perception of patient satisfaction with the pathway, and resources such as consistent provider staffing and EHR tools. The main reported barriers were discordance with prior practice patterns, particularly at the attending level, disagreement with pathway components, and staffing turnover combined with lack of knowledge and education about the pathway components.

The salient TDF domains in this study are in agreement with a recent scoping review of surgical practice change, in which the authors similarly identified environmental context and resources, social influence, knowledge, and beliefs about consequences to be critical for practice change.⁵ The authors postulated that in a setting of supportive infrastructure, “It is individual knowledge, technical skill, and personal beliefs that encourage initiation and sustainment of practice change”.⁵ Emotion was an uncommonly cited barrier and facilitator due to difficulty in measuring this factor, but nevertheless was believed to play a major role in practice change. Provider aversion has been shown to be the strongest barrier in the implementation of enhanced recovery after surgery (ERAS) protocols as well.¹⁷ Our study provides evidence that emotion and personal beliefs have a role in surgical practice change (e.g., in providers not feeling “comfortable” with the changes) and demonstrates that over time these may slowly dissipate as barriers.

Prior studies have postulated models for change, which essentially involve several phases of readiness for change from acknowledging the possibility of change, preparation for change, and finally acting on change.^{4,18,19} It was clear in our study that although providers discussed and agreed upon the clinical care pathway, providers fell on a spectrum of readiness for change. Our study provides a unique qualitative assessment of the opinions of attending interviewees who, despite being involved with development of the pathway, experienced hesitancy to change their practice as a barrier to implementation. This is not unexpected, as even published evidence-based guidelines are not always followed after dissemination, indicating that implementation requires a more defined approach to be successful.^{20–22} Movement along the spectrum of change was seen in this study as a result of positive preliminary patient outcomes data shared with the provider group at quarterly meetings. Other studies have shown that evidence behind pathway interventions is critical for successful implementation at the provider level²³, and that providing information on pathway compliance throughout the rollout of a clinical pathway improves implementation.²⁴ However, the significance of providing early patient outcomes data on the provider implementation process has not been previously shown, and it was found to be a facilitator of implementation in our study. Also, we found that improved comfort with interventions appeared to occur as providers gained experience with the pathway over time. On pathway rollout, we planned the quarterly provider meetings to mitigate hesitancy regarding pathway rollout and to create a mechanism for critical discussion of any necessary revisions to the pathway.

While ongoing discussion and staff education can facilitate compliance with clinical pathways²⁵, we found that staffing turnover was a barrier to ongoing pathway education. Interviewees mentioned that both expected staffing changes such

as rotating housestaff and unexpected changes such as higher than typical registered nurse and advanced practice provider (APP) turnover, likely related to COVID-19 changes, made pathway implementation challenging. The presence of consistent staff to educate new providers and ensure pathway compliance was essential to addressing staffing turnover as a barrier. However, in contrast to other studies where education consistency is achieved at the surgeon level,²⁶ our study found this role was more often fulfilled by advanced practice providers. It is likely that the pathway will act as a standardized guide and eventually help to mitigate staffing turnover as a barrier to care of esophagectomy patients, but in the early implementation phase, turnover was a challenge.

The potential limitations of this study include (1) the small sample size; (2) the study which was performed at a single institution; and (3) possible attribution bias, which is interpretation based on judgments and assumptions about behaviors (although as the data analyst was not a surgeon, objectivity was addressed). (4) We acknowledge that the interview results may have been affected by respondent bias given that we interviewed providers who were invested in the success of the postoperative pathway. Finally, interview questions were limited by our selection of determinants and therefore may not have captured all relevant factors influencing implementation. We also did not include housestaff in interviews, but it would be interesting to include this group in future implementation studies. Although the sample size was small, we believe the diversity of provider role, immersion of those who directly participated in the process, and transferability to academic surgical practice are strengths.

Conclusion

Our study illustrates the facilitators and barriers to a surgical practice change of implementing a new clinical care pathway for esophagectomy patients. We found factors such as education on pathway components, consistent provider staffing, EHR order set and note templates, and presence of supporting evidence and data to be important facilitators. However, even in the presence of these facilitators, there were barriers that stymied implementation, namely, surgical attending prior practice patterns and comfort with new interventions. There was evidence that with additional time for adjustment combined with demonstration of positive patient outcomes, providers became more open to change. Implementation of evidence-based interventions requires time and persistence to be successful.

Data Availability The data generated/analyzed during the current study are available in anonymized format from the corresponding author on reasonable request.

Declarations

Conflict of Interest The authors declare no competing interests.

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