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“And I think that we can fix it”: Mental Models used in High-Risk Surgical Decision Making

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Abstract

Objective—To examine how surgeons use the “fix-it” model to communicate with patients before high-risk operations.

Background—The “fix-it” model characterizes disease as an isolated abnormality that can be restored to normal form and function through medical intervention. This mental model is familiar to patients and physicians, but it is ineffective for chronic conditions and treatments that cannot achieve normalcy. Overuse may lead to permissive decision making favoring intervention. Efforts to improve surgical decision making will need to consider how mental models function in clinical practice, including “fix-it”.

Methods—We observed surgeons who routinely perform high-risk surgery during preoperative discussions with patients. We used qualitative content analysis to explore the use of “fix-it” in 48 audio-recorded conversations.

Results—Surgeons used the “fix-it” model for two separate purposes during preoperative conversations; 1) as an explanatory tool to facilitate patient understanding of disease and surgery and 2) as a deliberation framework to assist in decision making. Although surgeons commonly

used “fix-it” as an explanatory model, surgeons explicitly discussed limitations of the “fix-it” model as an independent rationale for operating as they deliberated about the value of surgery.

Conclusions—While the use of “fix-it” is familiar for explaining medical information to patients, surgeons recognize that the model can be problematic for determining the value of an operation. Whether patients can transition between understanding *how* their disease is fixed with surgery to a subsequent deliberation about *whether* they should have surgery is unclear and may have broader implications for surgical decision making.

Introduction

A “fix-it” approach to medical decisions was described in 1991 by Lynn and DeGrazia as a decision making framework that presumes the role of health care is to provide medical interventions that restore normalcy in the face of any aberration from normal form or function, thereby fixing the problem.¹ The model is characterized by an acute, easily defined medical problem (for example, acute appendicitis), with an available treatment option (surgery) that can effectively restore normal function, thereby “fixing” the problem and returning the patient to normal. Although most medical decisions do not adhere completely to this framework, elements of the “fix-it” model are often used to structure medical decisions^{2,3} and the model has been observed to play a significant role in contemporary health care delivery.^{4,5}

The concept of fixing an acute abnormality with return to normalcy is especially familiar to surgeons. However, focus on fixing an isolated problem may lead surgeons and patients quickly down the path of intervention, without adequate consideration of alternative treatment options. Concern about the “fix-it” model was exposed in a recent animated video parody that received widespread attention through social media. In this video an orthopedic surgeon insists he needs to fix the fractured femur of a 97 year-old woman who had already died.⁶ As one commentator notes, “It is as if, on some level, a decision-making process has been passed over, and an inevitable operative course, however absurd, [has been] set in motion not by a patient, but by the fractured bone itself.”⁷ Reliance on the “fix-it” model can isolate an individual medical problem (a broken femur) from the broader context of a patient’s overall health (asystole), leading to a path of surgical intervention before considering the consequences of operating beyond having the problem fixed. The far-reaching appeal of this video in the medical community suggests that this extreme example resonates, to some extent, with everyday clinical practice.

While “fix-it” may be reasonably employed for some common surgical scenarios, such as an appendectomy for appendicitis in a young healthy patient, it is unknown how surgeons who regularly encounter high levels of surgical risk approach and use this model when discussing surgical treatment options with patients. Whether the risks of surgery are associated with a patient’s health status, the underlying disease process, or the invasive nature of the operative intervention, a high level of risk may impede the use of “fix-it” as an independent justification for operative intervention. We performed a qualitative study of surgeons during preoperative discussions with patients who present for consideration of high-risk surgery.

The objective of this study was to consider whether and how “fix-it” is used by surgeons when discussing high-risk, complex surgical decisions with patients.

Methods

Setting and Participants

To address geographical and institutional variation, we conducted this study at academic hospitals in three different locations (Madison, WI, Boston, MA, and Toronto, Ontario, Canada). The Institutional Review Board at each hospital approved this study. We used purposive sampling to identify 9 attending surgeons who frequently perform high-risk operations, including 1 vascular surgeon, 1 thoracic surgeon, 1 hepatobiliary surgeon, 2 neurosurgeons, and 4 cardiac surgeons. To capture preoperative conversations with explicit high-stakes decision making including the use of postoperative life supporting treatments we deliberately oversampled cardiac surgeons. We selected surgeons described as good communicators by their peers to capture high quality communication that was most likely to include explicit decision-making. A total of 58 patients were invited to participate; 4 declined, 5 audiotapes could not be transcribed due to technical problems, and 1 patient withdrew from the study. Of the remaining 48 participants, 28 patients were male and 40 had had previous surgery. The average age was 59, and ranged from 26 to 94. Ten participants had some high-school education or less, nine participants had a high-school diploma or GED, and twenty-nine participants had education beyond high school, including vocational, college, graduate or professional degrees.

Data Collection

We audio recorded one preoperative outpatient clinic visit between each participating surgeon and three to seven patients and their family members. We then transcribed verbatim the audio recording into text for analysis. All names including patients', surgeons' and any referring or other physicians mentioned during the visit were de-identified. We collected data and completed analysis concurrently and concluded the process when data from subsequent transcripts became redundant with developed concepts.

Analysis

To enrich the coding process and attend to professional biases, the investigators involved in analysis included one nurse and three physicians from diverse clinical backgrounds (JMK- internal medicine; KEP- critical care nursing; KJB- trauma surgery and palliative care; MLS- vascular surgery). Using conventional qualitative content analysis,⁸ the investigators independently reviewed each transcript without predefined hypotheses, generating codes to describe and classify events, processes, and concepts in the text. After the “fix-it” theme was identified, we conducted a second level of analysis to evaluate how “fix-it” was used in each surgeon-patient interaction. At least three of the researchers jointly reviewed each transcript until consensus about all codes was reached. The final coding taxonomy was used and revised in an iterative fashion throughout the analytic process. We used qualitative research software, Nvivo 10 (QSR International), to organize and store codes, facilitate comparison of cases, and access data that supported themes and patterns.

Results

Operations under consideration included aortic aneurysm repair, aorto-bifemoral bypass, brain and spine tumor resection, a variety of neurosurgical procedures, coronary artery bypass grafting (CABG), cardiac valve replacement or repair, other miscellaneous cardiac procedures, esophagectomy, lung volume reduction surgery (LVRS), hepatic and gastric tumor resection, and pancreatectomy. Surgeons reported an operative mortality greater than 3% for 23 patients, between 1% and 3% for 12 patients, less than 1% for 9 patients, and did not characterize risk of mortality for 4 patients.

The preoperative conversations followed a pattern starting with a brief assessment of the patient's symptoms and medical history, a description of the underlying disease process, and details about the proposed operative intervention. This was followed by an explicit deliberation during which the surgeon described the rationale for offering or not offering surgery (Figure). This surgeon-initiated discussion was the primary component of a larger decision making process. Surgeons presented explicit details of their own evaluation of the trade-offs of the proposed intervention. Although deliberation occurred in front of patients and families, assumptions about the value of outcomes were surgeon generated and not specifically linked to patient preferences. Some surgeons sought subsequent confirmation of their reasoning, "The single most important thing is that it has to make sense to you. Does what I'm saying make sense to you?" When patients indicated interest in surgery, surgeons transitioned to informed consent language, specifically listing discrete perioperative risks.

The Use of "Fix-It" to Facilitate Patients' Understanding of Disease

As a strategy to describe the patient's underlying disease process, surgeons regularly used language consistent with Lynn and DeGrazia's "fix-it" model. Surgeons described disease as a deviation from normal structure or function by demonstrating abnormalities on radiographs, presenting analogies, and using descriptive words such as "blocked", "broken", "leaky", "distorted", and "damaged" (Table 1).

Surgeons employed analogies that included reference to both natural phenomena and manufactured objects. For example, to describe trigeminal neuralgia, one surgeon explained, "The nerve is an electrical thing. It is a cable and has insulation. [...] So in other words a break in the insulation causes the short circuit." Using this analogy to electrical insulation, the surgeon first provided a tangible reference to normal nerve function and then illustrated the patient's disease by associating it with the broken insulation.

Surgeons also aimed to create patient understanding of disease by using images such as angiograms and CAT scans to show the patient a picture of normal tissue and then demonstrate the visual contrast between normal and abnormal tissue. For example, to display a hepatic tumor, one surgeon said, "So this is your liver, right? This is the whole thing. [...] So this is all normal liver. And then you could see as you get here, that this doesn't look so normal. See that?"

Surgeons regularly incorporated descriptive terms that defined the patient's condition as a damaged or functionally broken state. To describe valvular heart disease, one cardiac

surgeon said, “[...] they’re thin, supple, but very tough [...]. And if for some reason, if one or more of these cusps becomes restricted or redundant, it prolapses [...] it leaks.” By using descriptive terms to convey a state of being broken, surgeons presented the patient’s disease as a physical defect in an otherwise normal organ.

The Use of “Fix-It” to Facilitate Patients’ Understanding of Procedures

Surgeons regularly used the words “fix-it” and analogues as a strategy to facilitate patient understanding of the proposed operation (Table 2). Just as the disease state was regularly portrayed as a discrete aberration from normal, the operation under consideration was depicted as the relevant action available to remedy the defined problem. For example, “Now you fix that aorta and you bypass those arteries and you do what else, whatever else you needed to fix all of the problems.” Surgeons also used similar concepts such as correcting, replacing, removing, and constructing.

Surgeons described surgery as a corrective action that would be similarly employed for home or car repair. For example, “if the valve is tight, we can loosen it up, or if the valve is too loose, we can tighten it up” and “[...] sometimes we take fat from the belly [...] and use that to plug up the holes.” If corrective actions were inadequate, surgeons noted that complete removal or replacement of the damaged organ or abnormal tissue would be required. When repairing, replacing, or removing was not possible, surgeons described their efforts to circumvent the patient’s problem with construction of an alternative pathway for example, building “bridges” out of veins for vascular bypass.

By using “fix-it” language, surgeons created an explanatory model anchored to the description of a patient’s disease as a physical aberrancy that could be fixed through surgical intervention. Surgeons used “fix-it” to simplify the complex intervention (“fix”) and the complex health problem (“it”), providing patients with two familiar terms to consider.

Embracing the “Fix-it” Model

While surgeons commonly used “fix-it” to explain diseases and operations, only three preoperative conversations closely adhered to the “fix-it” model during deliberation. In these cases, surgeons defined the patient’s surgical problem as an isolated abnormality, directly linked to the patient’s symptoms. Surgeons then described one procedure as the solution to the isolated problem, suggesting that surgery would restore normal function without describing the outcome of surgery beyond having the problem fixed. Surgeons and patients quickly decided to proceed with surgery and did not discuss alternative treatments. Through this description of disease and intervention, the rationale to proceed with surgery flowed naturally and there was little distinction between the description of surgery and the decision to operate.

For example, for a patient with a cerebral spinal fluid (CSF) leak, the presenting problem was defined as a leak in the normal barrier function of the bone and dura. The surgeon told the patient that during surgery he would “just block everything off” and “plug up the holes” because the patient’s leaking fluid, “tested positive for CSF, and we have to stop that.” The goal of surgery was to fix the leak, and potential outcomes, apart from stopping the leak, were not discussed. In each of these cases, the surgeon did not deliberate about why the

patient might chose to not fix the problem or what the outcome of surgery would be aside from the problem being fixed. One surgeon reflected that, “Unless you’re a fellow who’s really, really old or very sick, dying of cancer, on home oxygen, stuff like that, [...], unless they’re like that, we operate.” While each surgeon transitioned to informed consent language and disclosed the risks of surgery, there was no explicit deliberation about the value of surgery, the trade-offs involved, or alternative strategies. In one instance, a family member expressed worry about the gravity of the situation, and the surgeon reassured her noting, “But the difference now though will be he’s fixed.”

Rejecting the “Fix-it” Model

In contrast, most surgeons explicitly discussed the disadvantages of using “fix-it” as an independent rationale to proceed with surgery. Surgeons often explained that the patient’s problem could or should not be fixed or that the patient’s problem could be fixed but the outcome of surgery might be imperfect or unwanted (Table 3). By constraining the use of the “fix-it” model, surgeons actively worked to demonstrate the oversimplification inherent in the mental-model of disease and treatment they had previously employed.

In some cases, surgeons expressed concern that the problem was too broken to fix and the patient’s condition may be too severe for the proposed surgical procedure to successfully return the body to normal. They counterbalanced the advantages of operating by noting that some patients have too much scar, have hearts that are too big or have too widespread cancer to fix the problem. One surgeon said, “It could be that there’s been so much damage that it only heals partly. That’s possible. [...] We could do this whole surgery and it might not work.” Conversely, surgeons noted that some health conditions were *not broken enough* to warrant surgery and given the risks, there should be a more compelling reason to operate beyond the simple observation that the tissue or function was broken. “The best piece of information we have is, how is the person feeling? [...] In other words, if it’s not causing you any trouble, we still feel that the [problem] that [the disease] gives you is minimal.”

Some surgeons described the possibility that the damaged tissue or dysfunction identified was not the *right* problem to fix. They expressed concern that the patient’s most bothersome symptoms were unrelated or incompletely explained by the visualized defect, and thus would not be fixed by the proposed intervention. One surgeon commented, “I would certainly not want to put him through a great, big heart operation if we didn’t really know that this was the problem.” Surgeons clarified that they were capable of performing a technically successful operation that would fix the identified abnormality, but the surgery might not remedy the patient’s concerns or symptoms. For example, “we could do the surgery, take out the tumor, stabilize your spine by putting some little screws and rods here. We can do that. [...] But...I am concerned that it is not going to address the problem that is affecting you most, which is the dizziness.”

For some patients, surgeons expressed confidence that the problem could be technically fixed but cautioned that a serious complication could leave the patient in a worse state than the initial condition. Surgeons also noted that the individual response to surgery is variable; even in the setting of a technically successful operation without complications the patient’s problem may not be completely or permanently fixed. One cardiac surgeon told his patient,

“So I can certainly do an operation and repair the valve and make it leak less. [...] The question I’ll then have after that is have I done you any good? [...] And I can tell you that there’s patients that I’ve done this operation to who’ve done very well and they’ve done great, and there’s others who felt better for a year or two, and then five years later they’re on the transplant list.”

By explicitly discounting “fix-it” as a rationale to proceed with surgery, surgeons narrated a deliberation that exposed the complexity of the decision to undertake high-risk surgery. Surgeons were careful to buffer expectations for a return to normalcy by describing possible outcomes that were undesirable or imperfect. “Sure, he’s got a leaky valve. There’s no question. Is it affecting his heart? It is. It’s starting to make his heart a little bit bigger. And in theory, all the textbooks tell you, okay, when it gets to this size, you fix it. Okay, that’s easy. That’s the easy part. That’s forgetting about the whole patient with, who’s maybe older and their lifestyle, what they’re capable of doing, what the dangers are, the time to recover from surgery. Like it’s a big, big decision.”

Discussion

Surgeons who perform high-risk operations regularly used the “fix-it” model as a communication strategy to create patient understanding about their disease and potential surgical interventions. Surgeons portrayed medical conditions as broken parts and defective organ functions, and then proposed an operation as a way to fix or repair the problem. They rarely used the “fix-it” model as the only decision making framework and rationale for operating. When they did so, the conversations about high-risk operations lacked deliberation; the sole outcome and reason for operating was to fix what had been identified as broken. In contrast, after using the “fix-it” model to describe the patient’s disease and operation, most surgeons articulated their own deliberation about surgery that included explicit exposure of the hazards of using the “fix-it” model to justify operating. They described potential outcomes after surgery that may be unwanted and explained that some medical conditions should not or could not be fixed.

These findings are important because they reveal how surgeons attempt to facilitate understanding of disease and treatment and later work to narrate a deliberative process for high-risk operations. After illustrating the connection between the patient’s medical problem and the surgical solution using “fix-it” imagery, surgeons weigh the trade-offs inherent in high-risk surgery by noting that the outcome may be undesirable or suggesting that the patient’s problem might not be fixable. Although surgeons emphasize that “fix-it” is an overly simplified rationale for surgery, whether patients can transition from an explanatory model about *how* their disease is fixed with surgery to subsequent deliberation about whether they should have surgery is unclear. The technical imagery created by “fix-it” may overshadow subsequent discussions about trade-offs and outcomes. It is notable that the robust deliberation process that we observed was distinctly separated from a more formal informed consent process, which was characterized by simple disclosure of surgical risks and provided opportunity only for informed refusal. Observation of this pattern in preoperative conversations highlights an opportunity to improve decision making for

surgical interventions. Given the consequences of these decisions, our conclusions have important implications for surgeons, patients, and referring physicians.

For surgeons, the desire to create understanding of disease and surgical treatment may interfere with the patient's ability to deliberate about the value of surgical outcomes. It is a daunting task to explain complex operations to patients who have little knowledge of what happens in an operating room; it is thus not surprising that surgeons use "fix-it" imagery to recall a more familiar action like a car or home repair. This may mislead patients if the surgeons' description of *how* surgery would fix the problem is interpreted as an assertion that surgery *can* fix the problem and that the problem simply needs to be fixed. A direct evaluation of how patients use and understand the "fix-it" model is an important area for future research.

In the few cases where surgeons wholly embraced "fix-it" as both an explanatory model and as the rationale to operate, there was no opportunity to deliberate about the value of surgery for the individual patient. Although surgeons sought to create understanding of the disease and treatment with the "fix-it" model and properly disclosed the risks of surgery, surgery was presented as the only solution that would fix the problem and patients quickly agreed to proceed. While this occurred in only a small number of cases, patients in this study were all considering high-risk operations. To the extent that other physicians employ the entire "fix-it" model for lower-risk procedures, without allowing for deliberation or real consideration of alternative strategies, this model may be overly permissive of surgical intervention and potentially lead to unwanted operations. Others have argued that complete adherence to the "fix-it" model as a decision making framework interferes with deliberation and may prevent patients from making decisions that are reflective of their individual values and goals.^{1,3,9}

For patients, it is unknown whether the regular use of "fix-it" as a strategy to facilitate understanding inhibits their ability to appreciate a range of surgical outcomes. Equipped with an incomplete understanding of their postoperative health state, patients may agree to high-risk operations without adequately understanding the limits of what surgery has to offer, specifically when a return to normalcy is unlikely. Others have demonstrated that serious misperceptions about treatment outcomes are common in the setting of life-threatening illness.¹⁰ Although surgical problems in young healthy patients with isolated disease may be appropriate for the "fix-it" model, chronic and complex medical problems with partially effective treatments do not conform to popular conceptions of "fix-it" in modern medicine.¹¹ While the surgeons in our study stressed that some problems could not be fixed or that the patient might not return to normal, this message may have been difficult for patients to reconcile with their previous notions about the role of invasive procedures and the surgeon's description of how surgery could fix their problem.

For physicians who refer patients to surgeons, it is useful to understand how surgeons communicate with patients about high-risk operations. The decision making process for elective surgery often starts with the referring physician¹² and decisions for surgery are rarely the result of an isolated conversation with one physician. Instead, decisions evolve over time and may include multiple interactions with different health care providers.¹³ Furthermore, the structure of the referral process can promote an assumption for both the

patient and the surgeon that the purpose of the surgical consult is to fix, not to deliberate. Because reliance on the “fix-it” model can be instilled prior to the patient’s visit with the surgeon and potentially undermine the deliberation process, referring physicians should assess their own use of the “fix-it” model to describe the need for complex interventions to patients. By framing the surgical consultation as a chance to consider surgery and cautiously avoiding “fix-it” language, referring physicians may be able to prepare patients to engage in the decision making process with their surgeon.

To avoid the hazards implicit in the “fix-it” model, Lynn and DeGrazia propose an alternative strategy; an outcomes-based model of medical decision making. They propose a deliberation process that is characterized by envisioning a series of books, each telling an alternate version of a patient’s life story: “Growing from an understanding of the current and past physiologic, anatomic, social, and psychosocial events and trends, the health care provider has to project the possible stories yet to be written by this person’s living. After discerning the likely life stories if the situation is left untouched, then the provider must project the alternative life stories that could occur [...] with the application of each alternative plan of care.”¹ For high-risk operations, surgeons might begin by giving a descriptive account of the alternative futures the patient may experience after each of her treatment choices (surgery, medical treatment, surveillance). We have previously described a framework called “best case/worst case” that may help surgeons structure this type of conversation, and we are now beginning a study to investigate its efficacy.¹⁴ A descriptive account of potential outcomes allows a patient to choose among treatment choices, judging the value of outcomes based on their own individual perspective.

Our observational study is limited by the fact that we captured only one preoperative visit, as decisions about high-risk surgery often happen over an extended period of time and multiple clinic visits.¹⁵ In addition, our sample of surgeons included only those who regularly perform high-risk operations, and the patterns of decision making we describe may be limited to surgical decisions with substantial risk. For this study we selected surgeons regarded as good communicators by their peers, as such we cannot project how our findings about surgeons’ use, endorsement and rejection of the “fix-it” model works across a broad range of surgical practices and styles. Furthermore, our ability to characterize patients’ perceptions of “fix-it” and the full implications of its use as either a descriptive strategy or deliberation model is limited, as surgeons dominated the majority of the audio taped conversations and patient deliberation was rarely observed.

Conclusion

To explain high-risk operations to patients, surgeons often use the “fix-it” model to facilitate understanding of disease and surgical treatment. By describing the disease state as a deviation from normal form or function, and depicting surgical intervention as an action to correct this abnormality, surgeons may promote assumptions that surgery will return the patient to a state of normalcy. Although surgeons retreat from this model as they deliberate about the value of surgery and explicitly stress that some surgical outcomes may be unwanted or that some diseases cannot be fixed, the use of “fix-it” as an explanatory model may foster a permissive approach to surgery and create unrealistic expectations.

Consideration of alternative mental models to characterize surgical therapy may improve decisions about high-risk interventions.

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Figure.

Pre-operative conversations follow a regular pattern. The early phase of the conversation is characterized by the surgeon explaining both the underlying disease and the proposed operation to patients. The subsequent deliberative phase includes a description by the surgeon of the rationale to either choose or not choose surgery.

Table 1

The Use of “Fix-It” to Facilitate Patients’ Understanding of disease

Presentation	Analogues	Surgeon Quote(s)
Images	Radiographs Angiograms	“This is the picture here of the brain which is very normal and I do not see any other changes. [...] This is clearly an abnormality, which is much larger than my thumb top pushing up into the brain [...] So it’s a concern.” “The artery should look nice and smooth. It should look like the wire itself that came up your groin. But you can see it’s not smooth, there’s a blockage here, there’s multiple minor irregularities here.”
Analogies	Natural: Trees Fruit Manufactured: Electrical Structural Mechanical	“So if you think about trees, two trees and the branches are intertwined, here what’s happening is [...] What’s happened is that, you know, somebody’s gone and knocked down that tree trunk. [...] So when this tree falls, it doesn’t hurt you because you’re dead by the time you hit the ground.” “And the left ventricle is the main pumping chamber of your heart and it pumps blood through your body. Okay? [...] And in you, that’s failing.”
Descriptive Words	Blocked Broken Leaky Distorted Damaged	“It’s both leaky and tight now. [...] And so in addition to your valve having difficulty with blood flow going through it, it also leaks.”

Table 2

The Use of “Fix-It” to Facilitate Patients’ Understanding of Procedure

Description	Analogues	Surgeon Quote(s)
Correct	Tie together Fix it Patch Plug Tighten or Loosen	<p>“I’d make an opening in the bone so I could find a vessel that is thirsty in the brain. Then under the microscope I would tie the one to the other.”</p> <p>“I mean, we use the, so we use little plates and screws to fix it down.”</p>
Replace or Remove	Take over Deploy Take out	<p>“We hook the LVAD up to the left ventricle, and there’s a pump that goes there and it pumps back into your heart there. And all it does, it takes over the pumping function of your left side.”</p> <p>“We pass this device up that we’re going to fix the aneurism with and we deploy it. So, we just pull a string and it expands.”</p> <p>“We kind of free this up a little bit so we can move it up to that chest space. And we take out that.”</p> <p>“So we’re going to have to cut either through here or behind, lift the heart up, remove that . . . and rebuild the part of the heart that I have to remove. It’s not working.”</p>
Construct	Build Bypass Create Reconstruct Rebuild	<p>“What we do is we just build a bridge. We take some vein from your leg, that’s why I wanted to see your leg, and build bridges around the blocked areas.”</p> <p>“We do know that doing a bypass, taking a vessel from the scalp and sewing it into the vessel in the brain that is thirsty will increase the blood to that part of the brain. We think that’s what we’re trying to do.”</p> <p>“So what we do is we create a tube with some fancy stapling devices. We create a tube out of the stomach.”</p>

Table 3

How surgeons reject the “Fix-It” model

Problem cannot or should not be fixed	Quotes
Too Broken To Fix	<p>“What you have to realize is that even if I repair your mitral valve and it doesn't leak at all anymore, your heart is still going to be weak. It's not a normal heart.”</p> <p>“And I don't know what the right answer is. I can say that your heart is right on the edge of being too big to have benefit from this.”</p> <p>“Sometimes there can be spread of the tumor to the liver or to the lining of the belly that you can't see on PET scan or CAT scan because it's too small, because it's like little grains of salt. [...] If that's the case, we're not going to do an operation because the horse is out of the barn, in the sense that I know that I can put you through a huge operation but I will not improve your survival.”</p> <p>“There are some valves that at least right now are, not that they're so distorted or damaged that they can't be fixed, at least best we can, with the techniques we have available, can fix them in a durable way. So we still replace those.”</p>
Not broken enough to fix	<p>“And guess what? The best piece of information we have is, how is the person feeling? In other words, if it's not causing you any trouble, we still feel that the risk that it gives you is minimal.”</p>
Not the right problem to fix	<p>“nobody knows [...] how much this causes your headaches how much migraine or something else causes your headaches, but to the extent that this is causing your headaches we can take that away.”</p> <p>“So, you know, I think that the big question of how much of your breathing issue is related to your lungs and how much is related to your heart is, I think, a little bit complicated.”</p> <p>“So the question is what do we do about this valve? Is it causing your feeling of being tired and fatigued? It's, the information I have so far suggests that it may not be, but I don't know for sure. It seems that it's, for a valve to make you really, really tired, you know, it has to be almost closed and not working at all.”</p> <p>“I think I'll get you through the operation. The bigger concern I have is whether or not I make you feel any better, because your symptoms may be more due to the fact that just your heart is weak as opposed to your leaky valve.”</p>
Risk of complications	<p>“But you seem in good, reasonable shape right now, but you have to weigh that against your age and the things we can't predict. The things we can't predict is how you're going to respond to the repair. [...] There are unpredictable things in your age group that we can't foresee: stroke, ruptured artery, any number of things.”</p> <p>“It's the safest thing for you to get it fixed in general terms, you know, so that obviously, if you have a qualification that results in something terrible happening to you not surviving, that doesn't do you any good.”</p>
Outcomes of surgery are variable	<p>“Can I bypass that vessel into the brain. The answer is yes I can do it. The question is, will it help you or not. So we have lots and lots of studies and what we've determined is we're not sure who should have the surgery. We do know that doing a bypass, taking a vessel from the scalp and sewing it into the vessel in the brain that is thirsty will increase the blood to that part of the brain. We think that's what we're trying to do.”</p> <p>“I think it helps a lot of people but again it's important to understand that the response is variable.”</p> <p>“What I worry about just as much is if this is something that is just not going to heal, what's your quality of life going to be after I give you this big physiologic insult, which is surgery?”</p>
Surgery has imperfect outcomes	<p>“The problem with aortic intervention, [...] is that aortic surgery is inherently dangerous and the solutions are never exact, so when we go into fix something like this, we look at it and we plan what we think is the best approach.”</p> <p>“And the stomach, even though it's the best replacement that have, making a tube of the stomach, there are still issues with it [...]”</p>