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ORIGINAL ARTICLE

Supporting effective shared decision-making in surgical context: Why framing of choices matters for high-risk patients and clinicians

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Abstract

Aim: In the context of high-risk surgery, shared decision-making (SDM) is important. However, the effectiveness of SDM can be hindered by misalignment between patients and clinicians in their expectations of postoperative outcomes. This study investigated the extent and the effects of this misalignment, as well as its amenability to interventions that encourage perspective-taking.

Method: Lay participants with a Charlson Comorbidity Index of ≥4 (representing patients) and surgeons and anaesthetists (representing doctors) were recruited. During an online experiment, subjects in both groups forecast their expectations regarding short-term (0, 1 and 3 months after treatment) and long-term (6, 9 and 12 months after treatment) outcomes of different treatment options for one of three hypothetical clinical scenarios – ischaemic heart disease, colorectal cancer or osteoarthritis of the hip – and then chose between surgical or non-surgical treatment. Subjects in both groups were asked to consider the scenarios from their own perspective (Estimation task), and then to adopt the perspective of subjects in the other study group (Perspective task). The decisions of all participants (surgery vs. non-surgical alternative) were analysed using binomial generalized linear mixed models.

Results: In total, 55 lay participants and 54 doctors completed the online experiment. Systematic misalignment in expectations between high-risk patients and doctors was observed, with patients expecting better surgical outcomes than clinicians. Patients forecast a significantly higher likelihood of engaging in normal activities in the long term ($\beta = -1.09$, standard error [SE] = 0.20, $t = -5.38$, $p < 0.001$), a lower likelihood of experiencing complications in the long term ($\beta = 0.92$, SE = 0.21, $t = 4.45$, $p < 0.001$) and a lower likelihood of experiencing depression in both the short term and the long term ($\beta = 1.01$, SE = 0.19, $t = 5.38$, $p < 0.001$), than did doctors. Compared with doctors, patients forecast higher estimates of experiencing complications in the short term when a non-surgical alternative was selected ($\beta = -0.91$, SE = 0.26, $t = -3.50$, $p = 0.003$). Despite this misalignment, in both groups surgical treatment was strongly *preferred* (estimation task: 88.7% of doctors and 80% of patients; perspective task: 82.2% of doctors and 90.1% of patients).

Conclusion: When high-risk surgery is discussed, a non-surgical option may be viewed as 'doing nothing', hence reducing the sense of agency and control. This biases the decision-making process, regardless of the expectations that doctors and patients might have about the outcomes of surgery. Therefore, to improve SDM and to increase the agency and control of patients regarding decisions about their care, we advocate framing the non-surgical treatment options in a way that emphasizes action, agency and change.

KEYWORDS
colorectal cancer, expectations, framing, shared decision making, surgery

INTRODUCTION

Shared decision-making (SDM) has been advocated as an ideal model of treatment decision-making in patient–doctor consultations and a means of improving the way in which patients are assisted to make informed decisions [1]. Conceptualized as an alternative to the paternalistic decision-making model in medicine (in which the doctor controls the decision that is made), SDM aims to incorporate the values and goals of patients into the consultation process, resulting in mutual agreement regarding the best treatment option [2]. This is particularly important in the context of high-risk surgery, where serious medical complications leading to long-term declines in health and quality of life are relatively common [3–5]. Despite the benefits of this approach, SDM is still relatively underused in the context of high-risk surgery [6]. While an SDM approach has been shown to benefit both patients and doctors via improved information sharing and increased knowledge [7, 8], there is still a lack of clear guidance about how to accomplish SDM in surgical consultations [9]. In the context of the Montgomery ruling [10], which established an understanding of treatment-associated risks as a benchmark for patient consent, creating guidance on how to accomplish SDM in surgical consultations is of critical importance. Many different SDM tools are available, but evidence demonstrating clear benefits of such tools (as measured by patient satisfaction scores) is mixed [11, 12]. One reason given for this is that there is no established alignment in the views of patients and doctors to begin with, for an SDM process to proceed [12–16].

Existing models of SDM rely on health-care providers to explain the risks and benefits associated with different treatment options [2]. As in other dyadic interactions, the difficulty lies in knowing if the information conveyed is interpreted in the same way by the patient and the clinician, considering the epistemic and experiential gap between them. From that perspective, it is crucial to establish the degree of concordance in expectations of patients and doctors based on clinically relevant information, with the aim of identifying potential misalignments, especially those that are systemic (i.e., existing on an aggregate level across individuals and clinical scenarios). If such misalignments exist, and available evidence suggests that they do [17], methods to alleviate them should be incorporated into the SDM process.

One such method, which has yet to be examined in a systematic empirical way, is a perspective-taking approach [18–20]. To enhance effective communication in general, encouraging those involved in a dialogue (within a dyad) to assume the perspective of the other can help to expose some of the differences as well as the shared views, beliefs and preferences of the dyad [21]. By extension, in patient–clinician communication, some have suggested that a perspective-taking approach can help doctors increase their understanding of the needs of patients, as well as enhance empathic concern for their experiences [19, 20]. However, thus far, the empirical work examining the use of perspective-taking in patient–doctor consultations is limited [22]. Reviews based on the data that do exist [23] suggest that subjective (satisfaction) and objective (health) outcomes are improved by increasing the opportunity for health professionals to appreciate a patients' perspective during the consultation process. This raises the question of whether subjective and objective outcomes may be further enhanced by giving patients an opportunity to adopt the role of health professionals. Alignment of views in an SDM process requires *both* parties in the dyadic set up to have a close shared understanding of the goals, preferences and risk, so that the decision a patient makes is well informed and truly reflects their views. Achieving this alignment would support a more effective use of SDM models in practice [24] and ultimately the delivery of more patient-centred surgical care [25].

In the present study, we built on the results of previous work to help advance the ways in which to improve SDM tools in high-risk patient populations. The aims of this study were to examine the expectations of high-risk individuals and their doctors regarding the potential outcomes of surgery, with the objectives being to determine where patient/doctor expectations are most aligned and where they are potentially misaligned, and the effect this has on decisions made. We also investigated if changing

What does this paper add to the literature?

In the context of high-risk surgery, agreement between the patient and the clinician regarding the best treatment option can be hindered by misalignment in expectations of treatment outcomes, as observed in this study. To understand treatment choice, it is critical also to consider the role of framing when presenting the available options ('doing something' vs. 'doing nothing').

perspective affects alignment between patients and doctors, and whether changing perspective can be used to support better SDM processes.

METHOD

Participants

To obtain a sample of participants who would be characterized as high-risk surgical patients, we recruited lay participants over 65 years of age with a Charlson Comorbidity Index (CCI) of ≥4 (further referred to as patients). The online research recruitment platform Prolific.com was used to distribute the survey among the population of interest across the UK. Patients self-selected to be included in the survey by completing an online screening questionnaire, which was followed by the study questionnaire. In line with the policies of the platform, participants were paid £9 (approximately $12.33) for completing the study.

To gain the perspective of the clinician, surgeons and anaesthetists (further referred to as doctors) were recruited for this study. Professional networks and word of mouth were used to distribute the survey among doctors involved in the care of surgical patients. The study was also advertised via NIHR Clinical Research Networks. Respondents were from London and Liverpool (UK). Doctors self-selected to be included in the study by clicking on a survey link provided to them via email.

Procedure

Online questionnaire was accessed either via a link provided through the Prolific platform (patients), or through an email with an invitation to take part (doctors). Subjects in both groups first completed the consent form, which was followed by a short section asking about their typical daily activities (pre-COVID-19 pandemic). As the topic of the online survey (i.e., high-risk surgery) could be distressing for patients and doctors facing a similar choice in real life, only people not under surgical review at the time of the study were invited to take part. The study received ethical approval from the London Stanmore Research Ethics Committee (19/LO/1956). Consent was obtained from all subjects through an online form.

As the expectations regarding treatment outcomes are likely to depend on the underlying health problem and treatment options available, patients and doctors were assigned to one of three conditions based on the order in which they signed up for the study. In the Hip Replacement Surgery condition (Ortho), osteoarthritis of the hip was described in the online questionnaire, with treatment choices of hip replacement surgery or management with physiotherapy, walking aids and painkillers. In the Coronary Artery Bypass Grafting (CABG) condition, ischaemic heart disease was described, with treatment choices of coronary artery bypass grafting or management with stents or medications. In the Colorectal Cancer Surgery (ColRec) condition, participants made a choice between surgery to remove bowel cancer or palliative care. The exact scenarios presented in different conditions are available in Data S1.

Materials

The main component of this study was an online experiment, programmed using Qualtrics Online Survey platform [26]. The diagram of the study, which consisted of two tasks – Estimation and Perspective-Taking – is presented in Figure 1. In both tasks, participants were presented with a hypothetical scenario involving a medical condition, as described in Section 2.2, with two treatment options, namely a surgical procedure or a non-surgical alternative. For both options, participants were required to estimate (on a scale from 0 to 100) the likelihood of the following outcomes: *(1) ability to engage in normal activities*, *(2) feeling pain and discomfort*, *(3) feeling depressed or (4) experiencing health complications*. Each likelihood estimate was made at six timepoints: immediately after treatment, and 1, 3, 6, 9 and 12 months after treatment. After considering the likely outcomes of the surgical and non-surgical alternatives, participants had to make a choice between the two treatment options.

Estimation task

In the Estimation task, patients were asked to consider the hypothetical scenario as if it was them (with their age and comorbidities) who faced the choice between the surgical and the non-surgical treatments. To make this task resemble a real-life consultation, lay participants watched short videos of the experimenter delivering

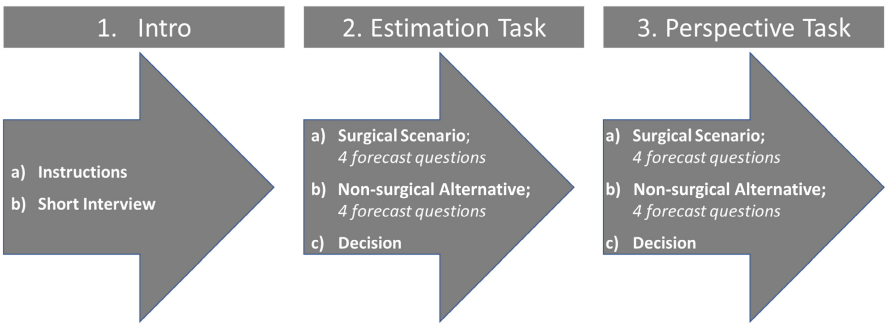

FIGURE 1 Schematic representation of the forecasting task completed by participants.

information about different treatment options verbally, as a doctor would.

Doctors were asked to consider the disease scenario as if it was them advising a patient with this condition. Information about potential treatment outcomes was provided in text format for this group.

Perspective-taking task

Once the Estimation task had been completed, participants were informed that they would be repeating the same task, but this time they were to 'switch roles' and assume the role of either a 'patient' (if the participant was a doctor) or a 'doctor' (in the case of patients). Participants were asked to call to mind their experiences of patients/doctors and imagine themselves in the role, by considering the life they might lead, the physical and mental experiences they might have and how they might feel. Following this prompt, participants completed exactly the same procedure as in the Estimation task. For patients pretending to be doctors, the information about treatment options was presented in text format, whereas for doctors the information was delivered verbally by the experimenter, to make this experience more similar to that of a real-life consultation.

Data analysis

To investigate the misalignment in expectations regarding surgical and non-surgical outcomes between patients and doctors, beta regression was performed using a glmmTMB package [27] for statistical software R [28]. This method was selected because of its suitability for analysis of data bounded on two sides (in our case 0 and 100), with a repeated measures design and an unequal number of participants in each group, even when the data are not nested [29, 30]. As we were interested primarily in the participants' estimates of short- and long-term outcomes for different treatment alternatives, likelihood estimates at 0, 1 and 3 months were combined to create an average estimate for short-term outcomes and likelihood estimates at 6, 9 and 12 months were combined to give an average estimate for long-term outcomes.

Estimates of surgical and non-surgical outcomes were analysed separately, as were the estimates of the likelihood of (1) engaging in normal activities (Activities), (2) experiencing pain (Pain), (3) experiencing depression (Depression) and (4) experiencing complications (Complications). For each surgical and non-surgical outcome analysed, the full beta regression model included Condition (CABG, ColRec, Ortho), Timeframe (Short term vs. Long term), Group (Doctors vs. Patients) and all possible interactions as fixed factors, and participant ID as a random factor. Bonferroni correction was used to adjust for multiple comparisons, with $p < 0.002$ used as a significance cut-off point.

To investigate potential misalignment between doctors and patients in terms of the treatment choices made, the decisions (Surgery vs. Non-surgical Alternative) of participants were analysed using binomial generalized linear mixed models (GLMM), with Task (Estimation vs. Perspective), Group (Doctors vs. Patients) and Condition (CABG, ColRec, Ortho) and all possible interactions as fixed factors, and participant ID as a random factor. Nine participants had to be removed from this analysis because of data-collection error, resulting in 100 separate choices being analysed.

The most parsimonious model was selected based on Akaike Information Criterion (AIC) from the set of models including all possible combinations of fixed factors. The AIC values were calculated using the Maximum Likelihood (ML) method. For post-hoc analyses, the Tukey HSD test was used as a method of adjusting p values for multiple comparisons using the lsmeans R package [31].

RESULTS

To establish the appropriate sample size for the present study, a combination of literature review of broadly comparable studies and power analysis was used. This analysis indicated that detecting an average 5-point difference between patients and doctors on a scale ranging from 1 to 100, with SD = 10, $\alpha < 0.05$ and a power of 0.80, would require a minimum of 63 doctor–patient dyads. The final sample included in the analysis consisted of 55 patients and 54 doctors from the UK who completed the study questionnaires in full. Post hoc sensitivity analysis using G × Power tool revealed that this size of sample allowed detection of a medium-to-large effect size ($f^2 > 0.09$). All patients (23 female, 32 male) were older than 65 years of age, and all had a CCI [32] of ≥ 4 (M = 5.71; SD = 2.14). Age (≥65 years) and the CCI score (≥4) were specific recruitment criteria used to obtain a sample with the same health characteristics as high-risk surgical patients. We recruited 26 surgeons, 25 anaesthetists and three other doctors involved in the care of surgical patients (in the intensive care unit) for this study (18 female, 36 male). They were typically younger than 60 years of age (with four exceptions). Forty-four participants (22 doctors, 22 patients) experienced the CABG scenario, 33 (17 doctors, 16 patients) experienced the ColRec scenario and 32 (15 doctors, 17 patients) experienced the Ortho scenario.

Results of the likelihood ratio test of fixed effects for models of Activities, Pain, Depression, Complications and Choice are available in Tables S1, S2.

Likelihood of different outcomes when the surgical option is chosen: Is there misalignment between patients and doctors?

Initial analysis of the surgical data revealed no significant effects of Condition (CABG, ColRec, Ortho); therefore, for the final analysis the data were collapsed across conditions. Mean ratings of the

TABLE 1 Mean ratings of the likelihood of experiencing different outcomes in the short term and the long term after surgical or non-surgical treatment (Estimation Task).

Variable	Short-term outcome *M (SD)*	Long-term outcome *M (SD)*
Surgery		
Activities		
Patients	52.09 (18.00)	93.00 (9.04)
Doctors	53.39 (19.58)	82.60 (14.02)
Pain		
Patients	45.84 (17.01)	9.71 (13.00)
Doctors	48.19 (16.94)	11.10 (11.01)
Depression		
Patients	21.93 (18.82)	4.89 (7.53)
Doctors	36.17 (20.61)	13.96 (12.68)
Complications		
Patients	25.58 (17.26)	8.70 (11.23)
Doctors	33.60 (20.36)	17.88 (16.99)
Non-surgical treatment		
Activities		
Patients	50.12 (28.39)	54.64 (33.85)
Doctors	59.39 (23.57)	51.96 (24.22)
Pain		
Patients	55.83 (26.00)	57.34 (32.35)
Doctors	39.27 (9.71)	46.04 (30.73)
Depression		
Patients	41.55 (27.55)	42.24 (33.55)
Doctors	39.17 (20.72)	40.01 (24.28)
Complications		
Patients	44.36 (27.93)	44.58 (33.79)
Doctors	25.87 (20.50)	38.28 (26.85)

Values are given as mean (SD).

The short- and long-term outcomes were obtained by combining likelihood estimates at 0, 1 and 3 months or 6, 9 and 12 months, respectively, and calculating the average estimate.

likelihood of experiencing different outcomes in the short term and the long term after different treatments are presented in Table 1.

Overall, patients were found to make more positive forecasts of surgical outcomes than doctors, particularly concerning the long-term outcomes, as demonstrated in Figure 2. Patients were found to forecast a significantly higher likelihood of engaging in normal activities in the long term ($\beta = -1.09$, standard error [SE] = 0.20, $t = -5.38$, $p < 0.001$), a lower likelihood of experiencing complications in the long term ($\beta = 0.92$, SE = 0.21, $t = 4.45$, $p < 0.001$) and a lower likelihood of experiencing depression in both the short term and the long term ($\beta = 1.01$, SE = 0.19, $t = 5.38$, $p < 0.001$) after surgery. Estimates of the likelihood of experiencing pain were similar for patients and doctors.

Likelihood of different outcomes when the non-surgical alternative is chosen: Is there misalignment between patients and doctors?

Patients were found to make higher estimates than doctors of the likelihood of experiencing complications in the short term when the non-surgical alternative was selected ($\beta = -0.91$, SE = 0.26, $t = -3.50$, $p = 0.003$) (Figure 3). No significant differences in estimates of the likelihood of engaging in normal activities or the likelihood of experiencing pain or depression were found, as indicated in Figure 3.

Changing perspective: Does it reduce the misalignment?

Overall, while an opportunity to adopt a perspective of the other participant group did lead to some adjustments in the estimates of treatment outcomes, it did not fundamentally reduce the misalignment between patients and doctors (see Table 2). Patients adopting the perspective of doctors were found to make lower estimates of the likelihood of experiencing complications in the short term and the long term following surgery ($\beta = 0.86$, SE = 0.19, $t = 4.50$, $p < 0.001$) and to make lower estimates of the likelihood of engaging in normal activities in the short term after surgery ($\beta = 0.62$, SE = 0.18, $t = 3.46$, $p = 0.003$) than were doctors. No significant differences between the estimates of patients pretending to be doctors and actual doctors were found for pain and depression, or for non-surgical treatment outcomes.

In line with the trends observed in the Estimation task, doctors adopting the perspective of patients were found to be less positive about surgical outcomes than were the actual patients: a lower likelihood of engaging in normal activities in the long term ($\beta = -0.89$, SE = 0.21, $t = -4.33$, $p < 0.001$) and a higher likelihood of experiencing depression ($\beta = 0.54$, SE = 0.19, $t = 2.86$, $p = 0.005$) were estimated. For the non-surgical alternative, doctors adopting the perspective of patients estimated a lower likelihood of experiencing complications in the year following the consultation ($\beta = -0.61$, SE = 0.24, $t = -2.54$, $p = 0.01$) than did the actual patients.

Does the misalignment affect the choices made by doctors and patients?

Examination of the treatment choices made by participants revealed that surgery was the most popular option in the ColRec (100% chose surgery) and Ortho (97% chose surgery) conditions, but less so in the CABG (64.3% chose surgery) condition. As no participants chose the non-surgical alternative in the ColRec condition, a GLMM model with Condition as a fixed factor could not be estimated due to complete separation. For that reason, to explore the differences in choices observed between conditions, the chi-square test of independence (Estimation task) and Fisher's exact test (Perspective task) were used with data collapsed across groups. Comparison of choices made in

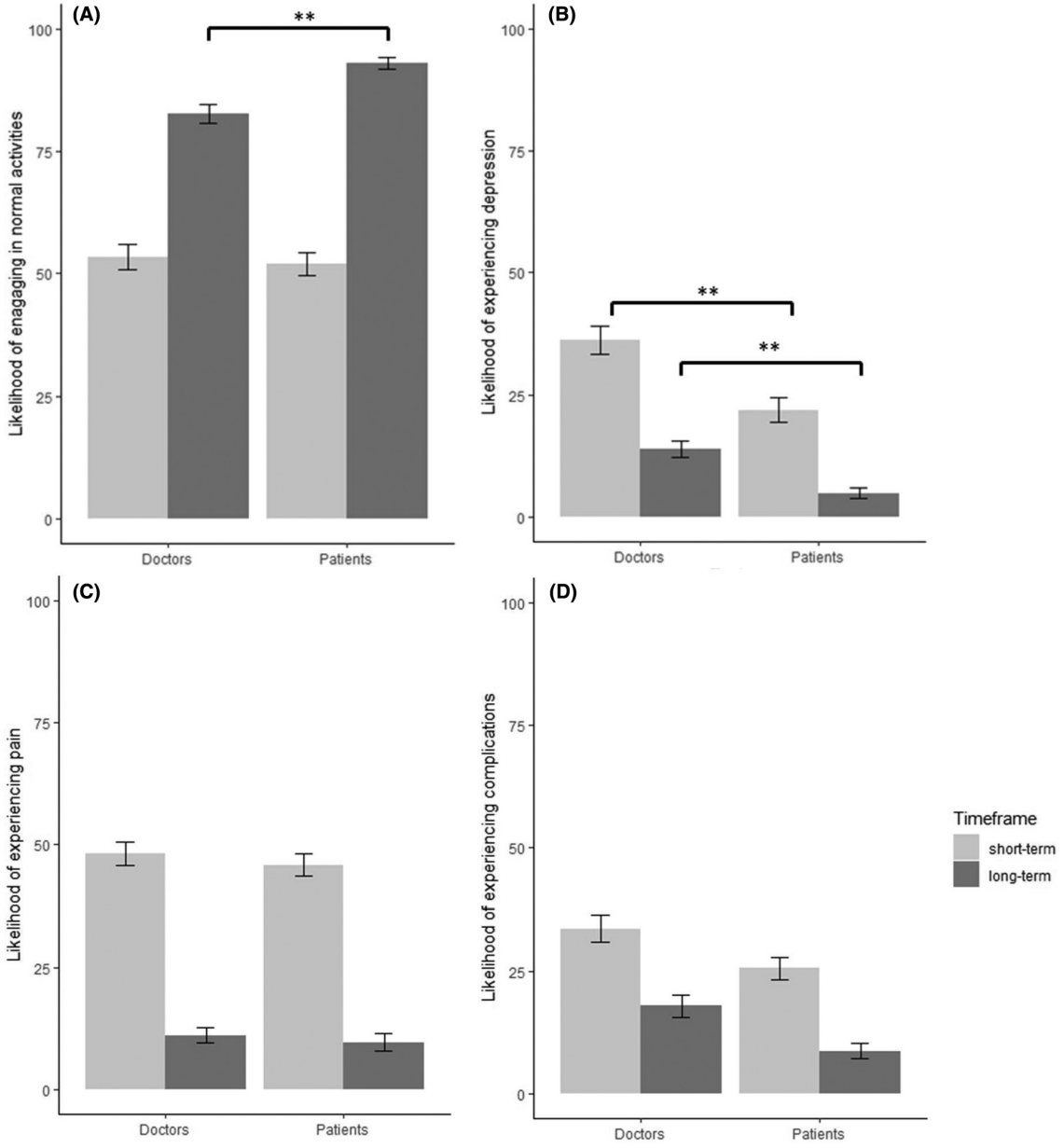

FIGURE 2 Likelihood estimates of different outcomes following surgery. (A) Engaging in normal activities. (B) Experiencing depression. (C) Experiencing pain. (D) Experiencing complications. Long-term, long-term outcome (obtained by combining likelihood estimates at 6, 9 and 12 months and calculating the average estimate); short-term, short-term outcome (obtained by combining likelihood estimates at 0, 1 and 3 months and calculating the average estimate). $^{**}p < 0.05$.

the Estimation task revealed that participants (both patients and doctors) were significantly more likely to choose the non-surgical treatment for the CABG condition than for the Ortho ($\chi^2(1,N=76)=11.79$, $p<0.001$) and ColRec ($\chi^2(1,N=68)=11.41$, $p<0.001$) conditions. In the Perspective task, both patients and doctors were found to be significantly more likely to choose the non-surgical treatment for the CABG condition than for the ColRec condition ($p=0.011$, Fisher's exact test) but not for the Ortho condition.

To investigate the potential differences in choice behaviour between patients and doctors, and to explore changes between the Perspective task and the Estimation task in decisions made, binomial GLMM was used, with data collapsed across conditions. In the resulting analysis, patients were found to be significantly more likely to choose surgery when assuming the role of doctors than when making decisions as patients ($\beta=-6.37$, SE$=1.92$, $z=-3.31$, $p=0.005$). Crucially, overall, no significant differences were found between the choices made by doctors and patients. Most participants opted for surgery during both the Estimation task (88.7% of doctors and 80% of patients) and the Perspective task (82.2% of doctors and 90.1% of patients).

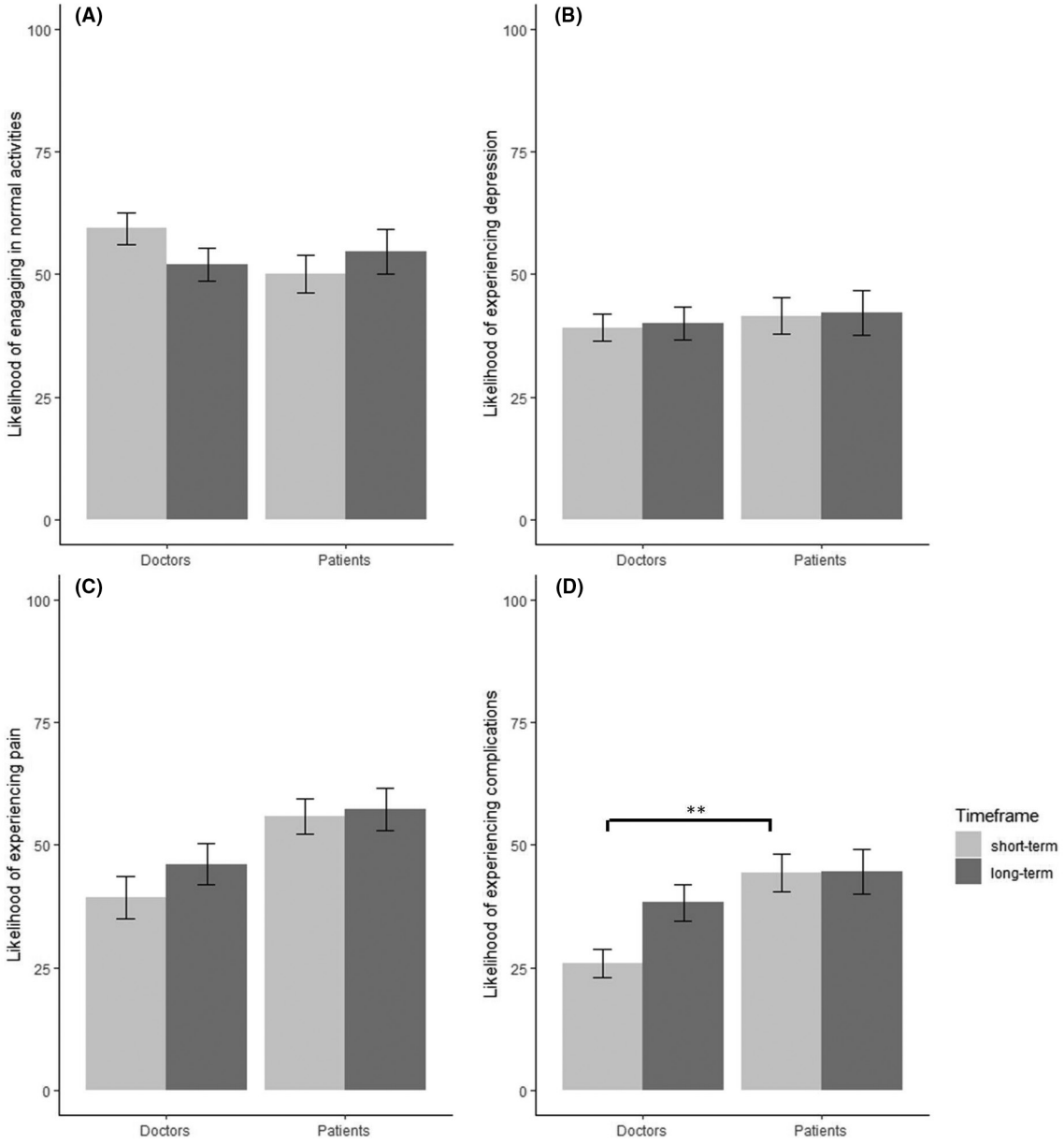

FIGURE 3 Likelihood estimates of different outcomes following a consultation in which surgery was declined. (A) Engaging in normal activities. (B) Experiencing depression. (C) Experiencing pain. (D) Experiencing complications. Long-term, long-term outcome (obtained by combining likelihood estimates at 6, 9 and 12 months and calculating the average estimate); short-term, short-term outcome (obtained by combining likelihood estimates at 0, 1 and 3 months and calculating the average estimate). $^{**}p < 0.05$.

DISCUSSION

Overall, our findings revealed a mismatch between the expectations of patients and doctors regarding the outcomes of treatment for a surgical condition. For outcomes after surgery, patients typically adopted a more positive outlook than doctors, particularly when considering long-term consequences. For non-surgical alternatives, the estimates of patients were more negative than those of doctors. These trends were observed across clinical scenarios, despite differences in the risks and benefits associated with the treatment options available, suggesting a systematic nature of the observed misalignment. Importantly, while the expectations of patients and doctors differed considerably, the choices that they made were similar. In the present section we discuss the implications of this finding for the SDM approach, and the consequent recommendations for clinical practice, with the purpose of improving the quality of SDM for high-risk surgical patients.

Our findings contribute to existing work on action bias in health care-related decisions, with evidence that this bias exists for both doctors and patients [33–35]. In the osteoarthritis and colorectal cancer scenarios, participants faced a choice between surgery and an alternative that could be construed as 'doing nothing' (management with medications, which has not been effective in the past; palliative care). In the ischaemic heart disease scenario, an option

TABLE 2 Mean ratings of the likelihood of experiencing different outcomes in the short term and the long term after surgical or non-surgical treatment (Perspective Task).

Variable	Short-term outcome *M (SD)*	Long-term outcome *M (SD)*
Surgery		
Activities		
Patients as doctors	40.49 (20.51)	85.03 (12.39)
Doctors as patients	56.12 (20.23)	83.83 (12.87)
Pain		
Patients as doctors	47.59 (20.69)	13.73 (15.73)
Doctors as patients	45.49 (22.28)	12.19 (11.54)
Depression		
Patients as doctors	29.17 (21.57)	9.01 (12.45)
Doctors as patients	25.54 (20.46)	10.34 (10.89)
Complications		
Patients as doctors	20.48 (15.34)	8.11 (10.08)
Doctors as patients	25.63 (19.06)	12.20 (12.93)
Non-surgical treatment		
Activities		
Patients as doctors	46.35 (27.00)	46.50 (34.92)
Doctors as patients	58.62 (23.68)	46.86 (28.06)
Pain		
Patients as doctors	56.18 (27.23)	63.64 (33.01)
Doctors as patients	39.51 (27.72)	50.54 (30.6)
Depression		
Patients as doctors	48.11 (29.22)	52.79 (33.27)
Doctors as patients	37.79 (25.18)	41.68 (28.51)
Complications		
Patients as doctors	41.96 (30.91)	51.25 (36.43)
Doctors as patients	26.67 (20.52)	38.88 (28.70)

Values are given as mean (SD).

The short- and long-term outcomes were obtained by combining likelihood estimates at 0, 1 and 3 months or 6, 9 and 12 months, respectively, and calculating the average estimate.

of active treatment (i.e., stents) was provided. This, in comparison, constituted 'doing something', so was a more attractive proposition. Our results suggest that if forced to choose between 'doing something' (i.e., surgery) and 'doing nothing' (i.e., non-surgical treatment), it is likely that 'doing something' will be chosen, regardless of the personal characteristics of the decision-maker (e.g., whether they are a patient or a doctor, or what their expectations are about outcomes).

There are few studies on the causes of action bias in health care specifically, but experimental studies on agency and control may provide an explanation as to why such a pattern of results was observed in the present study. In laboratory studies in which participants are faced with conditions of uncertainty, there is a strong preference to choose to act in order to reduce uncertainty and enhance a sense of control over the situation [36, 37]. Under dynamic uncertainty, often experienced in medical settings, the outcomes (symptoms) change both as a result of the actions taken (treatment) but also because of properties endogenous to the context (e.g., disease progression). In laboratory tasks in which the way that people learn in such circumstances is examined, participants typically avoid a 'do nothing' strategy in favour of making multiple interventions [38–40]. This phenomenon has also been observed in real world contexts: for organ donation, people have a stronger preference for active choice systems (e.g., opt-in, mandated choice) [41]; in situations of uncertainty, both patients and doctors may choose antibiotic treatment over a more conservative strategy, despite the known, longer-term, risks of inappropriate antibiotic prescribing. Related to this, after a negative outcome, people tend to experience higher levels of regret associated with actions they *failed* to take [42]. However, we also know that the patient decision regret (i.e. dissatisfaction with the treatment choice made) after a health care-related decision can be reduced by a number of factors, including greater satisfaction with the information provided and more involvement in the decision-making process [43].

In terms of the practical implications of these findings for SDM in a surgical context, our study highlights the importance of considering the decision-making problem faced by patients and doctors. Research on SDM focuses on the characteristics of the patient–doctor dyad, specifically their ability to convey and understand information, and their personality, knowledge, experience, goals, and preferences [1, 16, 44, 45]. So far, less consideration has been given to the decision problem faced by patients and doctors, and how it is framed. Decision-making literature demonstrates that how the choice alternatives are presented (e.g., the features which are emphasized), can have an impact on the choice that is made [46, 47]. In the context of surgery, presenting this treatment as the only 'active' option that allows patients to maintain a sense of agency and control will make it more likely that this option is chosen, despite the associated risks.

This propensity to opt for an 'active' treatment option to maintain the sense of agency and control has particularly important implications for high-risk patients considering surgery. As these patients are more likely to experience short-term and long-term complications following surgery [3, 4], careful consideration of the potential consequences of this treatment and any alternatives is crucial to achieve a satisfactory decision. Such deliberation is unlikely if the choice patients are facing is between 'doing something' (surgery) and 'doing nothing' (alternative treatment), as in such circumstances patients are likely to prioritize maintaining the sense of agency and control over exhaustive analysis of the pros and cons of different options. Based on the findings of this study, to encourage more in-depth processing of the information about treatment alternatives, we recommend that the non-surgical option is presented as 'doing something', a choice that leads to active disease management with a potential to bring about tangible benefits.

To our knowledge, this is the first study in which outcome expectations and treatment decisions of high-risk individuals and doctors involved in surgery and perioperative care are directly compared.

Rigorous design, in which psychological and clinical experise were combined, allowed us to evaluate the perception of the short- and long-term consequences of high-risk surgery, as well as actual choice of treatment, using online tools. Online design enabled consistent, efficient and safe data collection during the Covid-19 pandemic. It also gave us an opportunity to extend the geographical reach of our recruitment efforts and allowed us to protect participants from unnecessary stress by reaching people who, although suffering from several comorbidities, were not considering surgery at the time.

As with any experiment exploring decision-making in hypothetical scenarios, a possibility remains that our findings would be somewhat different in real-life clinical situations, which typically involve dyadic, in-person interactions. A larger number of qualitative studies are needed to establish the impact of the framing of the choice alternatives ('do something' vs. 'do nothing') on the actual decisions made by patients and clinicians in the consultation rooms. Such investigations would also be needed to clarify if perspective-taking interventions that are more immersive would have greater efficacy at aligning the expectations of patients and clinicians. Moreover, online delivery prevented us from establishing how effective the perspective-taking was in our task (i.e., how engaged our participants were when pretending to be patients/doctors). It is also important to note that the scenarios presented to participants were not necessarily common ones, limiting the choice to two alternatives where more are typically available. Further research is needed to determine the importance of such factors in the clinical SDM process.

Conclusions

Despite misalignment between patients and doctors in their expectations regarding the outcomes of surgical and non-surgical interventions, both groups made very similar decisions regarding treatment. The choices seem to have been guided primarily by the presence or absence of 'active', actionable non-surgical treatment alternatives that allow for a sense of agency and control to be maintained without resorting to surgery. To improve SDM in surgical settings we advocate for a shift in research focus to explore the effect of presenting different treatment alternatives as 'active' and capable of changing the status quo. Equalizing the surgical and non-surgical option in this way could potentially increase the willingness of both patients and doctors to consider the consequences of each option, allowing an informed, patient-tailored decision to be made.

AUTHOR CONTRIBUTIONS

Agata Ludwiczak: Data curation; formal analysis; writing – original draft; methodology; project administration; visualization; investigation. **John Prowle:** Conceptualization; methodology; writing – review and editing. **Rupert Pearse:** Conceptualization; methodology; writing – review and editing; funding acquisition; supervision. **Magda Osman:** Conceptualization; methodology; project administration; supervision; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

RP has received research grants and/or honoraria from Edwards Lifesciences, Intersurgical and GloaxoSmithkline, and is a member of the editorial board of the British Journal of Anaesthesia.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHIC STATEMENT

This study received ethical approval from the London Stanmore Research Ethics Committee (19/LO/1956). Consent was obtained from all participants through an online form.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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