



Patients Would Accept Antibiotics for Appendicitis if Recommended by Their Surgeon – An Interview Study

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Background: Antibiotics as treatment for uncomplicated appendicitis has been studied intensely in terms of complications and recurrence of appendicitis to assess if antibiotics could replace appendectomy in selected patients. The group of patients that have their healthy appendix removed or left in situ could potentially benefit from a more conservative treatment with antibiotics. We therefore aimed to explore patients' thoughts and opinions on the use of antibiotics for suspected uncomplicated appendicitis instead of appendectomy.

Methods: Semi-structured interviews were conducted with participants operated for suspected appendicitis who either had a negative appendectomy or a normal diagnostic laparoscopy. Participants were recruited from a large university hospital in the Capital Region of Denmark. Interviews were analyzed using content analysis.

Results: Rich data were reached after interviewing 15 participants, and three themes were developed: (1) participants wondered if antibiotics or surgery would be the correct treatment because of the risks of complications or recurring appendicitis, (2) some participants wanted to avoid surgery for different reasons, e.g., they were scared, and (3) participants relied heavily on recommendations from the surgeon.

Conclusion: Patients have different perspectives when asked about their preference towards surgery and antibiotics. Some participants preferred surgery because it seemed quick and safe while some preferred antibiotics because they were anxious about surgery or wanted to skip the postoperative recovery period. Participants relied on recommendations from their surgeon, and if antibiotics were to be implemented, it would possibly be best accompanied by guiding and asking the patient about their preferences before deciding on a treatment strategy.

Keywords: Qualitative interviews; Non-operative management; Appendicitis; Negative appendectomy.

Introduction

Conservative treatment of uncomplicated appendicitis with antibiotics has been investigated in randomized controlled trials over the past decades^[1-5]. The focus has been on patient safety and re-operations, but patients' expectations and opinions have not been thoroughly investigated. The implementation of conservative treatment of uncomplicated appendicitis became increasingly relevant when the COVID-19 pandemic hit in 2020. In this period, it was not only tested in randomized controlled trials but also implemented in daily practice where surgery was previously the only treatment used^[6]. Furthermore, a worldwide survey conducted during the COVID-19 pandemic among 709 surgeons found that antibiotics for uncomplicated appendicitis were used to a greater extent, especially in patients who had COVID infection but also those without^[7], and antibiotic treatment of uncomplicated appendicitis has been implemented as sole treatment in some

departments e.g., in Norway and Sweden^[8]. A systematic review found that 13% of patients undergoing surgery for suspected appendicitis had a healthy appendix removed^[9]. These patients, along with patients who have a normal diagnostic laparoscopy, could potentially benefit from a more conservative treatment and avoid surgery. A randomized controlled trial conducted a follow-up on patients one year after antibiotic treatment for uncomplicated appendicitis^[3] and found that one third of the patients had received an appendectomy for their symptoms after one year, and two thirds of the patients were successfully treated with antibiotics. These results were recently confirmed in a Cochrane review^[10]. These results could be interpreted as both promising and unfavorable.

When implementing a new treatment strategy, it is of interest to explore the patient perspective and focus on what is important for the patients who are directly affected by the treatment. The patients' thoughts about the perceived risks or benefits of antibiotic treatment needed further investigation to better understand barriers towards implementing antibiotics as a treatment option for appendicitis. The aim of this study was to investigate patients' perspectives on receiving antibiotics as a treatment for suspected uncomplicated appendicitis instead of surgery, and how the surgeon could influence this decision.

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Methods

This study was based on qualitative research methods consisting of semi-structured interviews with patients and reported according to the COnsolidated criteria for REporting Qualitative research (COREQ) guideline^[11]. We interviewed 15 patients who underwent surgery for suspected acute appendicitis. To be eligible, they had to have either an uninflamed appendix removed (called a negative appendectomy, confirmed by histopathologic examination) or a normal diagnostic laparoscopy without appendectomy because the appendix was macroscopically normal. Participants were recruited from a university hospital in the Capital Region of Denmark. Participants were contacted over the phone in the months after their surgery and asked to participate in an interview regarding their experience of having surgery for appendicitis. Participants were operated between May and November 2022 and were interviewed from November 2022 to January 2023. The initial plan was to include participants purposely stratified but as the study progressed and surgical reports were found, most patients were female and under 40 years of age. As a result, the sampling method was revised, and consecutive patients from the surgery log were eligible for inclusion if they had undergone a negative appendectomy or a normal diagnostic laparoscopy. Interviews were audio recorded and transcribed verbatim. Quotations used in presented results were translated from Danish by two researchers and discussed within the author group.

The participants were asked about their thoughts on nonoperative management of appendicitis. To introduce the participant to the topic, we used an interview guide that explained the results from a randomized controlled trial^[3] which were recently confirmed in a Cochrane review^[10]. The trial and review found that one-third were operated within one year and the participants were asked about their thoughts on the possibility of being treated with antibiotics. They were told that some patients might require surgery at a later point; however, they were not presented with the percentages. They were asked what they would prefer themselves and why. Lastly, they were asked how their opinion would be affected if the surgeon recommended antibiotic treatment. Prior to the aforementioned questions the participants were informed of the results from their histopathology report or normal diagnostic laparoscopy. See [Supplementary Material](#) for interview guide. Interviews were held over the phone at a time and place that was convenient for the participant. Analysis of data was conducted using directed content analysis^[12]. This means that the interviews were deconstructed into meaning units, which were then coded using a codebook that grew as the analysis progressed. Themes were generated based on the codes, thoroughly discussed within the author group, and revised throughout the analysis process. At last, three overarching themes were created to best encompass the interpretation of data. The interviewer was a medical student closely supervised by the author group. The interviewer had not been involved in the participants' treatment and did not know the participants beforehand. Participants had to give written informed consent to participate in the study, and participants were not compensated for their participation. The participant was guaranteed anonymity in the presented results and their data were pseudonymized and saved on secure institutional electronic drives. The project was approved by the Danish Data Protection Agency (P-2022-474), and the regional ethics board waived the need for approval (H-22041934).

Results

From the period May to November 2022, 18 consecutive patients were identified from the surgical reports and successfully contacted. One patient declined the invitation while 17 patients consented to participate. However, two participants were lost to follow-up between the day of consent and the day of interview. In total, 15 participants were interviewed. The participants were between 18 and 40 years of age. Ten of the participants were female. Eleven participants had a negative appendectomy (eight of them women) while four participants (two of them women) had a normal diagnostic laparoscopy without the removal of the appendix. All participants underwent laparoscopic surgery. The interviews lasted for a median of 13 minutes (range 7–21). From the analysis of the interviews, we developed three themes. The first theme “is it the best treatment” was based on the participants' thoughts on what would be the better treatment for appendicitis. The second theme “avoiding operation” included the wish to avoid operation, and the third theme “recommendations of the surgeon” explored how the participants relied on recommendations from their surgeon, see [Fig. 1](#).

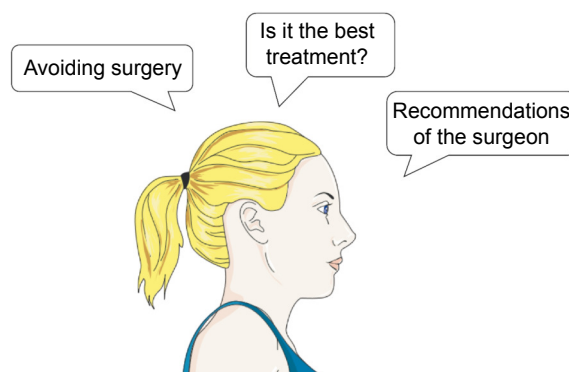


Fig. 1. An illustration of the three themes from the analysis of interviews.

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Is it the best treatment?

The participants were asked what they thought about a scenario where it was possible to treat uncomplicated cases of appendicitis with antibiotics. Before this question, the participants were informed that they had a negative appendectomy or a normal diagnostic laparoscopy. The participants had diverse opinions on this subject. Many participants were not aware of antibiotics as a possible treatment option and were surprised to learn that some patients could be successfully treated this way. Most participants were not immediately in favor of one treatment over the other but weighed surgery against antibiotics before concluding on their preference. Even then, some felt unsure about their preference. The participants that were apprehensive of antibiotics as treatment mainly questioned whether it would be the best treatment, and they had various reasons for their doubt. Some were hesitant to try antibiotics because of the risk of having appendicitis at a later point in life.

“Another part of the rationale relates to the uncertainty of the subsequent course, so to say, whether you can beat the infection now, but then walk around with a risk of it flaring up again, maybe in the short run or in the long run. I would not be comfortable with that. So, it is not the antibiotics I would be uncomfortable with, but it is whether I am going to get sick again.” Participant no. 3.

Other participants stated that if there was a risk that antibiotics did not work, they wanted surgery. For some, operation seemed safer and quicker. One participant reasoned they were in too much pain to try antibiotics and just wanted the treatment to be over and felt like surgery would be a quicker solution. More participants expressed an overwhelming fear that the appendix might burst, and that made some of the participants apprehensive about the antibiotic treatment.

“So, if you have a very sick appendix that bursts, right? Then, the antibiotics will not be able to cure it, and then it looks even worse than before, and then you’ve just delayed everything.” Participant no. 7.

The participants were anxious that the appendix might burst during antibiotic treatment and the only outcome of antibiotic treatment would be a delay of the surgery. One participant wanted to know if the third of patients that eventually had an appendectomy had any complications, but the participants generally preferred to avoid surgery.

“I mean, it probably depends on the complications amongst that one-third. So to say, whether there is a greater risk that the appendix bursts when they get appendicitis, because it has lasted for a while or something like that. But I still think that it seems like a better solution to avoid surgery.” Participant no. 14.

Avoiding operation

Participants saw antibiotic treatment as an opportunity to avoid surgery, and while some participants were apprehensive, others thought it sounded as a preferable solution to treat with antibiotics. The participants had multiple reasons and motivations for preferring antibiotics over surgery. Some participants felt that the recovery time following surgery should not be underestimated even though it was a minor procedure. They reasoned that surgery should generally be avoided where possible.

“My thoughts are that it would be wonderful if you could avoid surgery. I mean if you can try to avoid it to begin with. Umm, you shouldn’t forget that it takes some time to recover after surgery like that. Yes, I think it would be cool if you could do that.” Participant no. 17.

One participant pointed out that it seemed like a good option for patients that might not tolerate surgery. They did not necessarily prefer it themselves, but they saw it as a sensible solution for patients who were nervous or could not tolerate an invasive procedure because of risk factors. At the same time, other participants mentioned anxiety and fear as the reason for wanting antibiotics.

“Well, if it was offered to me, and I was told that I could avoid surgery then I would probably say yes, because I was so nervous before the operation. I think that it is mostly for patients who would prefer to avoid the surgery.” Participant no. 15.

A participant reasoned that antibiotics might use less resources, which they saw as an opportunity to bring down waiting time and

reduce strain on the public health care system. Some participants were undecided but felt that antibiotics would be a possible treatment if the participant would be able to decide for themselves and were thoroughly informed of the risk that surgery could become necessary.

Recommendations of the surgeon

At the end of the interview, the participants were asked what treatment they would prefer if their surgeon recommended antibiotics as treatment. All but one participant concluded that they would accept antibiotic treatment if offered. Most of the participants who preferred surgery changed their minds immediately after the question. Afterwards, all participants were asked to elaborate on their response, and the reasons as to why they now would like to be treated with antibiotics were similar across the interviewed participants. They generally reasoned that they trusted the surgeon and the surgeons’ knowledge and experience in that area.

“If they propose that antibiotics are what we should try first, then that is what we do. Yeah, I actually think that’s my opinion on that... What does the doctor say, what do they think is best, and then we will take it from there.” Participant no. 6.

Participants were inclined to trust the recommendation from their surgeon. While they believed that surgery was safe, they felt it was a decision that should be made by a surgeon. They reasoned that the surgeon would have knowledge of how to prioritize risks and benefits of one treatment versus another.

“Yeah, a professional should be the one to make that decision, in my opinion. There are a lot of risks related to surgery, so in that sense, it would be smart to start out carefully, if you could then avoid surgery.” Participant no. 2.

Participants generally trusted the decision of the surgeon and that their expertise and experience made them capable of deciding whether antibiotics were a preferable treatment option. They were of the impression that the surgeon would have their best interest at heart, and therefore would only recommend a treatment that best suited the patient. They believed that the surgeon would only suggest a treatment that would benefit them, even if they were not able to see the beneficial effects themselves.

“I trust that the doctors know what they are doing, and they have gone to school for a thousand years or something like that, and they know a bit more about the body, the disease, and the health, and all that stuff than I do. So, I choose to trust them because I feel like they know more about what is in my best interest.” Participant no. 6.

While some participants relied heavily on recommendations from their surgeon, other participants reasoned that having the possibility to choose for themselves would be of interest. To be able to choose they felt that advice or recommendations from their surgeon were necessary.

“Well, I think there should be some kind of limit to when you would recommend one thing or another. In general, I think that it would be positive if you could choose yourself but maybe supported by a recommendation.” Participant no. 14.

In general, participants would accept antibiotic treatment and even more so if their surgeon recommended the treatment as the suitable option for them.

Discussion

This study sought to explore patients' thoughts and opinions on antibiotic treatment for uncomplicated appendicitis. We found that the participants had differing opinions. Most participants were not aware that antibiotics could be used as a treatment for appendicitis prior to the interview. Once informed, most participants were not immediately in favor of one treatment over the other, and some felt unsure about their preference. Some preferred antibiotics because they were scared or wanted to avoid the recovery time following surgery, and some participants felt that they had underestimated the pain and length of recovery. When asked what their opinion would be if the surgeon recommended antibiotics, most participants would follow the surgeon's recommendation.

Our study found diverse opinions on the perceived risk of treating appendicitis with antibiotics. The participants were asked what they thought about the risk that some of the patients who had received antibiotics for appendicitis had an appendectomy within a year^[3,10]. In a previous survey, 300 parents of children with suspected appendicitis were asked about their preference between antibiotics or surgery^[13], and most parents believed appendicitis was a condition that required urgent surgery and that a perforated appendix was a life-threatening condition. However, the study found that half of the parents would still choose antibiotics. A qualitative interview study asking parents about implementation of antibiotic treatment of appendicitis in children found that one of the barriers towards implementing antibiotics was that appendicitis is a common sickness, and surgery is perceived as routine and safe^[14]. Our study found the same opinion among some of the adult participants that preferred surgery. This suggested that adults could also have some of the same barriers as parents have for their children. Even greater barriers towards antibiotics were found in a large online survey of 1,700 people^[15], where around 10% would choose antibiotic treatment for appendicitis for themselves or their children. The respondents were not patients but healthy participants. The researchers concluded that short-term complications and long-term recurrences were of importance to the respondents when choosing treatment. On the other hand, a different survey of 1,300 healthy online respondents with no prior appendicitis found that the respondents were willing to accept a high risk of recurrence (60%) of appendicitis if there was a chance to avoid surgery^[16]. This suggests that there might be a difference in the way surgery and antibiotics were perceived according to the situation, and knowledge of appendicitis in general and perhaps an imminent surgery impacted the response differently than a hypothetical situation, which the respondents could maybe not relate to.

In our study, the interviewed participants were informed that they had a normal appendix on their final histopathology report, or that they did not have their appendix removed. Strictly speaking, they received an unnecessary operation. Still, some of these participants were apprehensive of antibiotic treatment, which hypothetically would have been less invasive for them. This is an important point that could perhaps be explained by appendicitis being a commonly known disease which is known to be treated surgically, and they perceived their own surgery as successful considering this. In this way, our study found that surgery was perceived as a safe standard treatment. A secondary analysis from

a previous randomized controlled trial found that the patients' beliefs on the likelihood of antibiotic treatment being successful were associated with a lower 30-day risk of appendectomy^[17]. The study included patients before randomization; however, nearly 800 patients were assigned to the antibiotic intervention but only 400 patients completed the baseline survey before knowing their randomization. This could potentially skew results if a systematic reason for knowing the intervention before completing the survey was present. A survey and interview study of 129 American patients^[18] found that only about 40% of patients could correctly define appendicitis. After this initial survey, they were educated on appendicitis and told that studies found that some patients could be treated with antibiotics. Subsequent interviews with the patients found that 57% chose antibiotics over surgery. Thus, patients do not necessarily have the sufficient knowledge of appendicitis and how it can be treated to feel confident in shared decision-making.

This study had several strengths. It is reported according to COREQ guideline^[11] for transparency, participants received no compensation, and the interviewer was unknown to the participants and not related to the previous admission and treatment for appendicitis. The questions were open and neutral in their tone. We followed standard qualitative research methodology, where themes were analyzed with an inductive approach. This means that themes were not predefined but adjusted as interviews were analyzed and information was gathered. The study had limitations as well. The interviews were short, and the interview guide could perhaps have been revised/expanded to further elaborate and unfold the answers. The participants were asked about their opinion on a situation they had already lived through and could not relive (except for the four participants who received a normal diagnostic laparoscopy), and in some ways underwent unnecessary surgery. This could make their responses different than patients with histologically confirmed appendicitis. However, these patients also have valuable insight into the experience of having emergency surgery caused by abdominal pain suspected to be appendicitis. It is exactly these kinds of patients that surgeons will have to guide through a decision-making process between antibiotics or surgery. Furthermore, asking participants after treatment for suspected appendicitis gave us valuable insight into the experiences and thoughts of these participants and could help us understand what was deemed important by the patients in a setting with acute abdominal pain and the prospect of surgery. Furthermore, this study investigated thoughts and opinions on antibiotic treatment for uncomplicated appendicitis, and even though this qualitative interview study could not tell us how all patients would react to antibiotics, it suggested what barriers we need to address to be able to provide antibiotics for appendicitis in a way that the patients will find safe and meaningful. The interviews were not centered on whether the unnecessary surgery made them more or less likely to say yes to antibiotics, but this topic is of course interesting when this group of patients probably would benefit from a non-invasive treatment.

Our study showed that patients with suspected acute appendicitis had differing opinions on what was considered important when deciding on a treatment strategy between surgeon and patient. While some wanted to be able to choose, others felt they were in too much pain to make decisions or were not capable because of lack of knowledge. Some participants wanted to decide

for themselves but with a recommendation from their surgeon, because they felt that they were not capable of making treatment decisions entirely on their own. To accommodate these preferences, the surgeon should ask the patient their opinion and then inform and educate on the treatment options. In the aforementioned interview study^[18], 129 patients were educated on appendicitis and informed of treatment and then asked about their preferences with regards to treatment in a hypothetical scenario with uncomplicated appendicitis. Education of patients has proved beneficial in other settings e.g., patients undergoing screening for prostate cancer. Here a study found that education and information about the screening process and the possible harms and benefits helped the patient decide whether to undergo screening or not^[19]. These findings are important because patients with uncomplicated appendicitis could benefit from being part of the decision-making process since both antibiotics and surgery pose as treatment options for uncomplicated appendicitis. Selected patients who are believed to have suspected uncomplicated appendicitis could well be treated with antibiotics if the surgeon deemed it safe^[3,10]. This leads to an important notion, that the surgeon should be aware of their possible bias toward any treatment option because, as our study suggests, their recommendation greatly influences the patients' choice. An interview study investigating surgeons' barriers towards recruiting patients to randomized controlled trials found that the surgeons had multiple barriers towards recruiting patients and presenting them with treatments they are not familiar with or believe in^[20], which is an important issue that could also arise in an implementation of antibiotic treatment as standard care. Patients should be properly and neutrally informed about their options and the associated risks. An informed and unbiased presentation of treatment options are crucial for a successful implementation of antibiotics and could lead to an increased satisfaction with treatment than when not being involved in the decision-making. Furthermore, the patients could perhaps in some settings be presented with the choice to have a CT scan before treatment with either antibiotics or surgery; however, CT scans are not routinely used before surgery for appendicitis in our setting. It is unlikely to be implemented as a choice for the patient but can have use in cases where the diagnosis is unclear. Shared decision-making between the treating physician and the patient is used in many fields of medical practice^[21,22]. However, a survey study among 650 trauma and emergency surgeons showed they had little knowledge of shared decision-making, and 30% of surgeons still saw some value in exclusively deciding the treatment without involving the patients^[23]. Shared decision-making could potentially help patients who are anxious of surgery or just want to avoid it, or even give them an option they were not aware of.

In conclusion, the participants had differing opinions about antibiotic treatment for uncomplicated appendicitis. Those who preferred surgery highlighted that surgery seemed like a safe, quicker, and definitive solution that did not involve a perceived risk of a burst appendix or delay of surgery. Those who preferred antibiotic treatment were mainly focused on the prospect of avoiding surgery and postoperative recovery. Most participants were not aware of antibiotics as a possible treatment option. Participants were willing to accept antibiotics instead of surgery if their surgeon recommended it.

Abbreviations

COREQ guideline, COnsolidated criteria for REporting Qualitative research guideline.

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Ethical approval and consent to participate

The participants had to give written informed consent to participate in the study and were not compensated for their participation. The participants were guaranteed anonymity in the presented results. The project was approved by the Danish Data Protection Agency (P-2022-474), and the regional ethics board waived the need for approval (H-22041934).

Declarations of interest

All authors declared that there are no conflicts of interest.

Authors' contributions

SRH: conception, design, acquisition, analysis, interpretation, wrote the manuscript; JR: conception, design, substantial revision of the work; SF: conception, design, interpretation of data, substantial revision of work.

References

- [1] Eriksson S, Granström L. Randomized controlled trial of appendectomy versus antibiotic therapy for acute appendicitis. *Brit J Surg*, 1995, 82: 166-169.
- [2] Styrd J, Eriksson S, Nilsson I, et al. Appendectomy versus antibiotic treatment in acute appendicitis, A prospective multicenter randomized controlled trial. *World J Surg*, 2006, 30: 1033-1037.
- [3] Salminen P, Paajanen H, Rautio T, et al. Antibiotic therapy vs appendectomy for treatment of uncomplicated acute appendicitis: the APPAC randomized clinical trial. *Ama-J Am Med Assoc*, 2015, 313: 2340-2348.
- [4] Talan DA, Saltzman DJ, Mower WR, et al. Antibiotics-first versus surgery for appendicitis: a US pilot randomized controlled trial allowing outpatient antibiotic management. *Ann Emerg Med*, 2017, 70: 1-11.
- [5] Collaborative C. A randomized trial comparing antibiotics with appendectomy for appendicitis. *N Engl J Med*, 2020, 383: 1907-1919.
- [6] Ganesh R, Lucocq J, Ekpote NO, et al. Management of appendicitis during COVID-19 pandemic; short-term outcomes. *Scott Med J*, 2020, 65: 144-148.
- [7] Ielpo B, Podda M, Pellino G, et al. Global attitudes in the management of acute appendicitis during COVID-19 pandemic: ACIE Appy Study. *Br J Surg*, 2021, 108: 717-726.
- [8] Gran MV, Kjønsås D, Gunnarsson U, et al. Antibiotic treatment for

- appendicitis in Norway and Sweden: a nationwide survey on treatment practices. *BMC Surg*, 2022, 22: 229.
- [9] Henriksen SR, Christophersen C, Rosenberg J, et al. Varying negative appendectomy rates after laparoscopic appendectomy: a systematic review and meta-analysis. *Langenbecks Arch Surg*, 2023, 408: 205.
- [10] Doleman B, Fonnes S, Lund JN, et al. Appendectomy versus antibiotic treatment for acute appendicitis. *Cochrane Database Syst Rev*, 2024, 4: CD015038.
- [11] Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health C*, 2007, 19: 349-357.
- [12] Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*, 2005, 15: 1277-1288.
- [13] Ensor N, Qin KR, Sivasubramaniam M, et al. Parental views on the non-operative management of simple appendicitis in children: results of a cross-sectional survey. *World J Surg*, 2022, 46: 274-287.
- [14] Knaapen M, de Wind A, van der Lee JH, et al. Implementing nonoperative treatment strategy for simple pediatric appendicitis: a qualitative study. *J Surg Res*, 2022, 279: 218-227.
- [15] Hanson AL, Crosby RD, Basson MD. Patient preferences for surgery or antibiotics for the treatment of acute appendicitis. *JAMA Surg*, 2018, 153: 471-478.
- [16] Rosen JE, Agrawal N, Flum DR, et al. Willingness to undergo antibiotic treatment of acute appendicitis based on risk of treatment failure. *Br J Surg*, 2021, 108: e361-e363.
- [17] Zhang IY, Voldal EC, Davidson GH, et al. Association of patient belief about success of antibiotics for appendicitis and outcomes: a secondary analysis of the CODA randomized clinical trial. *JAMA Surg*, 2022, 157(12): 1080.
- [18] Kadera SP, Mower WR, Krishnadasan A, et al. Patient perspectives on antibiotics for appendicitis at one hospital. *J Surg Res*, 2016, 201: 253-257.
- [19] Blackwelder R, Chessman A. Prostate cancer screening: shared decision-making for screening and treatment. *Prim Care*, 2019, 46: 149-155.
- [20] Donovan JL, de Salis I, Toerien M, et al. The intellectual challenges and emotional consequences of equipoise contributed to the fragility of recruitment in six randomized controlled trials. *J Clin Epidemiol*, 2014, 67: 912-920.
- [21] Ghodisian S, Ghafourifard M, Ghahramanian A. Comparison of shared decision making in patients undergoing hemodialysis and peritoneal dialysis for choosing a dialysis modality. *BMC Nephrol*, 2021, 22: 67.
- [22] Serpico V, Liepert AE, Boucher K, et al. The effect of previsit education in breast cancer patients: a study of a shared-decision-making tool. *Am Surg*, 2016, 82: 259-265.
- [23] Cobianchi L, Dal Mas F, Agnoletti V, et al. Time for a paradigm shift in shared decision-making in trauma and emergency surgery? Results from an international survey. *World J Emerg Surg*, 2023, 18: 1.