Evaluating the Utility and Acceptability of an AI-Powered Care Aid for Preoperative Patient Inquiries in Joint Replacement Surgery

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INTRODUCTION:
Traditional educational materials provided to patients undergoing orthopedic procedures, such as total joint arthroplasty (TJA), are often perceived as complex, inadequately readable, and lacking personalization, contributing to patient dissatisfaction. Artificial Intelligence (AI) chatbots are increasingly utilized in healthcare, especially for educating patients around the time of surgery. These chatbots can potentially improve patient engagement, reduce the burden on clinical staff, and enhance overall patient satisfaction. Prior research comparing customized AI assistants with general-purpose models suggests that former can provide more accurate, relevant, and safer responses. Given the emerging role of AI-driven assistants in orthopedic patient education, we aimed to assess the effectiveness, reliability, and patient satisfaction associated with Aidify, a custom-tailored AI (CTAI) platform developed to address preoperative patient inquires related to TJA.
METHODS: This observational validation study employed a prospective pilot design consisting of two phases. An initial pre-test cohort of 10 patients scheduled for TJA interacted with CTAI. Based on feedback, the tool underwent refinement prior to involving a definitive cohort of 30 additional patients. CTAI provided personalized responses to perioperative inquiries using information pre-approved by four arthroplasty surgeons. The primary outcome was patient satisfaction and perceived effectiveness of CTAI, assessed via structured surveys administered during pre-surgical screening via REDCap. Secondary outcomes included satisfaction and perceived effectiveness of CTAI during the postoperative phase. Survey metrics included patient utilization rates and ratings on understandability, usefulness, and likability using a 1-5 Likert scale, with ratings ≥4 signifying high satisfaction. All collected data excluded patient-identifiable information to maintain compliance with privacy regulations
RESULTS:
Thirty-two patients (50.0% knee, 50.0% hip) completed the preoperative survey. The majority (84.8%) successfully accessed and used CTAI; 59.4% submitted 1–4 questions, and 25.1% submitted five or more. Surgeon-provided materials were the most frequently used information source (84.4%), followed by the CTAI (56.3%), peer conversations (53.1%), and staff phone calls (46.9%). CTAI was rated as useful or very useful (score 4 or 5) by 66.7% of users. Regarding communication, 84.4% of respondents indicated they “mostly” or “perfectly” understood the custom-tailored AI’s responses, and 75.1% indicated that it answered “most” or “all” of their surgical questions. CTAI improved patient preparedness, with 75.0% reporting it helped them feel “somewhat,” “a lot,” or “completely” prepared, and 56.3% reporting “quite” or “very” ready for surgery. Additionally, 80.4% stated they were likely or very likely to recommend the custom-tailored AI to others. Analysis of submitted questions revealed that the most frequent themes were surgery logistics (22.8%), post-surgical concerns (22.0%), and activity guidelines (12.9%), followed by postoperative expectations (10.4%), pre-surgical concerns (9.5%), and medications (5.4%). Less frequent topics included dietary guidance (4.6%), pain management (3.7%), wound care (2.9%), complications (2.9%), communication issues (2.1%), diet and activity (0.4%), and insurance and billing (0.4%).
DISCUSSION AND CONCLUSION:
Preliminary results indicate that CTAI is a useful and well-received adjunct for preoperative patient education in TJA. High rates of engagement and accessibility (84.8%) indicate feasibility and acceptability of digital platforms in this population. Most users reported improved preparedness and understanding, with nearly three-quarters feeling more ready for surgery. CTAI compared favorably with traditional educational resources in perceived usefulness and ranked second in utilization. The diversity of question themes, particularly around logistics and post-surgical concerns, reflects broad perioperative needs and underscores the utility of an AI platform for delivering timely, relevant information. CTAI’s performance in domains of understandability and completeness further supports its potential utility in enhancing health literacy and complementing standard care. These findings support further development of CTAI as a scalable tool to enhance perioperative education and patient experience. Iterative refinement based on patient feedback will be key to optimizing its broader implementation.

Figure 1. Example of custom-tailored AI responses to patient inquiries.

Figure 2. Distribution of Aidify Question Themes

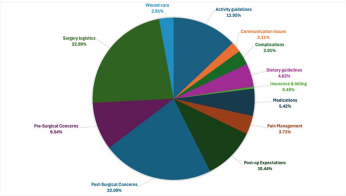

Table 1. Theme in Aidify Questions. N = 32

Theme	*Description*	*Percentage (%)*
Surgery logistics	Scheduling, surgery duration, hospital arrival time, transportation, check-in logistics, discharge instructions, facility locations, surgical procedure, implant specifics	22.89
Post-surgical concerns	Recovery at home: mobility, sleeping, appetite, swelling, bruising, physical therapy, incisions, hygiene, and return to routine activities	22.09
Activity guidelines	Walking, exercise regimens, mobility aids, when to resume physical activity, specific rehabilitation exercises, and activity pacing	12.95
Post-op expectations	Pain, sleep quality, typical recovery milestones, bruising/stiffness, and dietary influence on healing	10.44
Pre-surgical concerns	Surgical preparation, pre-op visits, anesthesia type, and pre-procedure requirements	9.54
Medications	Narcotic alternatives, medication side effects, pain relief, and cramping treatments	5.42
Dietary guidance	Food/drinks to consume or avoid	4.62
Pain management	Pain control strategies, medications, side effects (like sleeplessness), and pre-PT medication use	3.71
Wound care	Bandages, stitches, scars, and proper wound cleaning	2.91
Complications	Swelling, bruising, other post-op issues	2.91
Communication issues	Struggling to contacting their doctor or receive a response	2.11
Insurance & billing	Billing, cost, or insurance coverage	0.4