



Patient Perceptions of COVID-19-Related Surgical Delay: An Analysis of Patients Awaiting Total Hip and Knee Arthroplasty

Jacob M. Wilson, MD  · Andrew M. Schwartz, MD · Helyn E. Grissom, MD · Jeffrey S. Holmes, MD · Kevin X. Farley, BS · Thomas L. Bradbury, MD · George N. Guild III, MD

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Abstract *Background:* COVID-19 has caused unprecedented delays in elective orthopedic surgery. Understanding patients' perceptions of the disruptions in care and their willingness to reengage the healthcare system are crucial to planning the resumption of elective care. *Questions/Purposes:* The purpose of this study was to elicit patient perceptions about delays in total joint arthroplasty during the COVID-19 pandemic. *Methods:* We identified a consecutive series of patients who experienced COVID-19-driven delays to scheduled total hip or knee arthroplasty at an urban, academic medical center in the Southeastern United States. A 20-item survey was administered via telephone. Answers were recorded and descriptive statistics were performed. A *post hoc* χ -square analysis compared characteristics and outlooks of patients who did and did not immediately desire surgery. *Results:* Of 111 patients (64% of those identified) who met inclusion criteria and completed the survey, 96% said they felt that they were treated fairly and 90% said that the surgical delay was in their best interest; 68% reported emotional distress from the delay, but 45% reported a desire

to wait longer for the pandemic to subside. Lower joint-function scores, higher pain levels, higher pain catastrophizing scores, and longer latency from personally deciding to pursue surgery were associated with the reported need for immediate surgery. *Conclusion:* Overall, patients reported that they understood the need for elective surgical delays during the COVID-19 pandemic. However, the psychological implications they reported were not negligible. Patient preference for immediate reengagement with the healthcare system was dichotomous, with many patients favoring precautionarily furthering the delay. Understanding these preferences will help optimize elective orthopedic care during unprecedented times.

Keywords coronavirus · COVID-19 · total hip · total knee · arthroplasty · perceptions · priority

Introduction

The novel coronavirus, SARS-CoV-2, and its associated disease, COVID-19, have interrupted modern life and the delivery of non-urgent healthcare in unprecedented ways [31, 32, 36, 37]. While the sentinel international case was reported in December 2019, it quickly disseminated, and COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 [36, 41]. At that time, the incidence of reported cases in the USA was increasing rapidly, and recommendations were made by the American College of Surgeons (ACS) [5] and the Centers for Disease Control and Prevention (CDC) [11] that elective procedures be postponed. Thereafter, the American Academy of Orthopaedic Surgeons (AAOS) released a statement supporting these recommendations [21].

Given these recommendations, it is not surprising that the performance of elective procedures across the USA came to a halt at most institutions. Total hip arthroplasty (THA) and total knee arthroplasty (TKA) were identified as being

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J. M. Wilson, MD · A. M. Schwartz, MD · H. E. Grissom, MD ·
J. S. Holmes, MD · K. X. Farley, BS · T. L. Bradbury, MD ·
G. N. Guild, III, MD
Emory University School of Medicine,
201 Dowman Dr.,
Atlanta, GA 30322, USA

J. M. Wilson, MD (✉) · A. M. Schwartz, MD ·
H. E. Grissom, MD · J. S. Holmes, MD · T. L. Bradbury, MD ·
G. N. Guild, III, MD
Emory University Orthopaedics & Spine Hospital,
1455 Montreal Rd. E.,
Tucker, GA 30084, USA
e-mail: jacobmwilson12@gmail.com

amenable to delay in most cases. While THA and TKA are among the most valuable procedures performed [26, 29], they are primarily pain-relieving interventions and are therefore considered, by many, to be elective in nature. Compliance among hip and knee arthroplasty surgeons was high; a survey conducted by the American Association of Hip and Knee Surgeons (AAHKS) found that 92% of members' hospitals had ceased performance of elective surgery [1]. Given the volume of case cancellations and ongoing demand for these procedures [28, 37], there has been a rapid accumulation of patients awaiting surgery [40].

While waiting significant periods for elective surgery is common in some countries [13, 15, 34], wait times in the USA are typically much shorter [15]. Therefore, the delays caused by COVID-19 represent a previously unencountered phenomenon in the USA. Patient perceptions of these delays and ultimate willingness to undergo elective surgery when operations resume are important to understand. The purpose of this study is to investigate these perceptions and to assess patient attitudes about returning to the healthcare arena for elective joint replacement in a system that has been previously repurposed for the care of patients with COVID-19. We hypothesized that while some patients may be eager to proceed, some may be reticent to expose themselves to facilities intimately linked to the pandemic.

Methods

This is an institutional review board (IRB)–approved study. Patients who were scheduled to undergo primary or revision THA or TKA from March 16, 2020, (when our institutional cessation of elective procedures began), through April 15, 2020, at our institution were identified. Patients from six fellowship-trained arthroplasty surgeons were included if they had a formally scheduled THA or TKA that was delayed indefinitely as a result of the COVID-19 pandemic. Identified patients were then contacted by phone to consent to participate in our standardized survey via telephone. Excluded patients were those who declined to participate in the survey (three patients), were no longer awaiting surgery (surgery performed elsewhere or patient no longer interested in surgery; two patients), suffered from cognitive impairment precluding ability to answer the questions (dementia or similar cognitive condition; two patients), spoke a primary language other than English (two patients), had no phone number available in the medical record (three patients), or were unreachable after three attempts to contact them (51 patients). Of the 174 patients originally identified for inclusion, 111 (64%) were contacted and completed the survey.

After patients gave verbal consent for participation, they were asked 20 questions on their attitudes and feelings with regard to COVID-19-related surgical delays (Appendix). The survey we used attempted to quantify patient-reported disease severity, perceptions related to surgical delays, and the implications that this may have with regard to their willingness and eagerness to reengage the healthcare system. Some of our questions were derived from prior, similar studies [34, 35], while others were aimed at addressing

potential provider concerns [30, 39]. While some patients reported multiple pain generators, we explicitly asked that they attempt to isolate perceptions of their pre-surgical joint. For each participant, we collected quantitative data including age, current pain level (numerical rating scale (NRS) from 0 to 10), Single Assessment Numerical Evaluation (SANE) scores [7, 35], the number of months they were willing to wait for surgery, and multiple qualitative assessments (open-ended questions). Additionally, we collected an abbreviated, binary version of the validated daily pain catastrophizing scale (PCS). The PCS used in this study was a 14-item survey, with each item receiving 1 point, with the exception of the last item that was scored between 0 and 4 points as reported by the patient (0 = not at all and 4 = all the time (Appendix) [16, 18]. We chose to include the PCS, as the literature suggests that catastrophizing plays an important role in the experience of pain [18] and may influence patient responses to perceived surgical urgency. Finally, we performed a post hoc subgroup comparison of patients who felt they required immediate surgery and those who did not to identify patient factors associated with reported urgency.

Patient responses were recorded and compiled over a 2-day period. All patient responses were obtained prior to a formalized institutional policy regarding a potential return to elective surgery at our institution. χ -square tests were used to analyze categorical variables. Content analysis was used in the comparison of qualitative responses. All analysis was performed using Microsoft Excel 2016 (Microsoft, Redmond, WA, USA) and SPSS version 25 (IBM, Armonk, NY, USA).

Results

Of 111 patients surveyed, 64.9% were female and the average age was 65 years. There were an equal number of THA and TKA patients, and over 90% were primary arthroplasty candidates. Most patients reported a SANE score (i.e., compared with a normal joint what percent is your joint?) of 26 to 50% (scale 0 to 100%). The average pain scale metric attributed to the affected joint was 7.3 (scale 0 to 10) (Table 1).

The majority of patients reported patience and understanding in the situation. Over 90% of patients felt that their surgery was cancelled with a focus on their safety and over 96% of patients felt they were treated fairly given the circumstances. The majority of patients planned to remain under the care of their current surgeon (64.0%) and current practice (79.3%) regardless of wait time; only 16.2% and 13.5% would be willing to switch surgeon and practice, respectively. Although 87.4% of patients were comfortable with their home support team, the surgical delay caused emotional distress in 67.6% of patients. As for ideal timeline for undergoing surgical treatment, 55% of patients indicated a desire to be among the first surgical patients after formal resumption of elective arthroplasty and 46.8% of patients would have surgery immediately, despite the pandemic (Table 2).

Table 1 Patient characteristics

	<i>n</i> (%)
Age	
< 60	26 (23.4%)
60–69	46 (41.4%)
70+	39 (35.1%)
Sex	
Female	72 (64.9%)
Male	39 (35.1%)
Arthroplasty	
Knee	56 (50.5%)
Hip	55 (49.5%)
Revision	
No	100 (90.1%)
Yes	11 (9.9%)
SANE score	
< 25%	37 (33.3%)
26–50%	46 (41.4%)
51–75%	17 (15.3%)
75%+	11 (9.9%)
Current pain (NRS, 0–10)	
< 5	26 (23.4%)
5–7.5	24 (21.6%)
> 7.5	61 (55.0%)
PCS	
0	15 (13.5%)
1–5	37 (33.3%)
6–10	35 (31.5%)
10+	24 (21.6%)
Time since decided to have surgery	
< 3 months	31 (27.9%)
4–6 months	38 (34.2%)
6–12 months	29 (26.1%)
> 12 months	12 (10.8%)

PCS, pain catastrophizing scale; NRS, numeric rating scale; SANE, Single Assessment Numerical Evaluation

Patients' physical and emotional response to their surgical delay was also reasonably positive. The most common

methods for non-operative management of their pain were simple activity modifications (53.2%), non-steroidal anti-inflammatory drugs (NSAIDs) (48.6%), and exercise and acetaminophen (both 23.4%); 21.6% reported using opioids to manage their arthritis pain. Of note, 23.4% of patients reported an increase in the dose or frequency of pain medication consumption after being told surgery was delayed. The most common reported emotion was frustration with COVID-19 shelter-in-place directives, while sadness, depression, anger, and confusion were far less commonly reported; 25.2% of patients reported no negative emotions and stated understanding, while 6.3% reported happiness or relief when their surgery was cancelled. Finally, patients felt they were capable of waiting for surgical intervention: 67.5% of patients reported being able to wait at least 2 more months, with 26.1% stating they could wait indefinitely until they were offered surgery, and only 24.3% felt like they could not wait more than 1 month (Table 3).

Our post hoc subgroup comparison of patients who felt they were indicated for immediate surgery found several recurring predictive factors. Over 66% of patients in the immediate surgery group were awaiting TKA, while the remaining patients in the urgent group were awaiting THA ($p = 0.018$). Lower SANE scores ($p = 0.027$) and higher NRS scores ($p < 0.001$) were also associated with likelihood of a reported immediate need for surgery. Similarly, increasing measures of pain catastrophizing ($p < 0.001$) and longer history of desiring an arthroplasty or revision arthroplasty on the affected joint ($p = 0.008$) were associated with a reported more immediate need for surgery (Table 4).

Discussion

After the COVID-19 pandemic resulted in an abruptly reduced number of THA and TKA procedures being performed in the USA, the number of patients waiting for these procedures is likely higher now than at any other time in modern medicine [40]. The aim of this study was to investigate patient perceptions regarding these mandatory, COVID-19-related surgical delays. Our results indicate that the majority of patients have a reasonable perspective on

Table 2 Patient perceptions of COVID-19-related surgical delays ($N = 111$)

	No	Yes	Maybe
Do you think surgery was cancelled with your best interest in mind?	11 (9.9%)	100 (90.1%)	-
Would you consider changing surgeons rather than waiting a longer period of time for surgery? ^a	71 (64.0%)	22 (19.8%)	18 (16.2%)
Would you consider going to another practice if they opened for surgery before your planned surgeon? ^a	88 (79.3%)	8 (7.2%)	15 (13.5%)
Would you prefer to get surgery immediately when operations resume, or would you rather give more time for the current pandemic to calm down?	50 (45.0%)	61 (55.0%)	-
Have you increased the dose or frequency of your pain medications?	85 (76.6%)	26 (23.4%)	-
Has your surgical cancellation/delay caused you any emotional distress?	75 (67.6%)	36 (32.4%)	-
Do you have an adequate support network at home to help you during this delay?	14 (12.6%)	97 (87.4%)	-
Do you feel you have been treated fairly? ^b	3 (2.7%)	107 (96.4%)	-
If your surgeon offered you surgery tomorrow, with the pandemic in its current state, would you?	59 (53.2%)	52 (46.8%)	-
Has your opinion/perception of the delay changed as you have learned more about coronavirus?	75 (67.6%)	36 (32.4%)	-

^a If asked for clarification, patients were given a hypothetical difference between surgeons and practices of 6 months of wait time

^b 1 patient refused to answer

Table 3 Patient reactions to COVID-19-related surgical delays

Survey response	n (%)
What are you doing to manage your pain? ^a	
NSAIDs	54 (48.6%)
Weight loss	9 (8.1%)
Exercise	26 (23.4%)
Tramadol	12 (10.8%)
Other opioids	24 (21.6%)
Tylenol	26 (23.4%)
Activity modification	59 (53.2%)
Other	17 (15.3%)
Emotions for COVID cancellations ^a	
Anger	8 (7.2%)
Confusion	2 (1.8%)
Frustration	44 (39.6%)
Sad	17 (15.3%)
Depression	18 (16.2%)
Understanding	28 (25.2%)
Happy/relieved	7 (6.3%)
How long are you willing to wait for surgery?	
1 month or less	27 (24.3%)
2–6 months	29 (26.1%)
6+ months	26 (23.4%)
Indefinitely	29 (26.1%)
Perceived reason for cancellation (Q3) ^a	
COVID-19	77 (69.4%)
Protect patients	4 (3.6%)
PPE shortage	2 (1.8%)
Protect surgeon	1 (0.9%)
Other	6 (5.4%)
All of the above	30 (27.0%)

^a Multiple responses allowed

NSAIDs, non-steroidal anti-inflammatory drug

surgical delays, with many reporting (1) understanding of the global circumstance, (2) fair treatment, (3) perceived focus on other patients' best interests, and (4) patience with surgeons and their practices with rescheduling their surgery. However, the surgical delay has been impactful, as some patients took higher doses of their analgesic medications and expressed frustration and emotional distress as a result of the cessation of elective surgery.

Limitations of our study must be considered. First, our survey was carried out near peak viral transmission volumes and death rates in the USA. Thus, it is possible that patient attitudes were dynamic in response to not only how symptomatic they were but also to external influences imparted by COVID-19 and its reporting. To that point, 32% of patients reported their perception of the delay had already changed since first being notified. It is possible that patient perceptions will continue to change as the pandemic runs its course. Second, our cohort is derived from a group of senior-level, fellowship-trained arthroplasty surgeons in the Southern USA. Our patients' attitudes may not be externally valid given potential confounding factors related to a patient's perception of their surgeon, institutional prestige, the local COVID-19 burden, the local timeline for return to surgery, and the baseline access to care. Third, while we

Table 4 Patient factors associated with immediate want for surgery (Q11)

	No	Yes	p value
Total	50 (45%)	61 (54.9%)	
Age			
< 60	10 (38.5%)	16 (61.5%)	0.094
60–69	17 (37.0%)	29 (63.0%)	
70+	23 (59.0%)	16 (41.0%)	
Sex			
Female	34 (47.2%)	38 (52.8%)	0.531
Male	16 (41.0%)	23 (59.0%)	
Arthroplasty			
Knee	19 (33.9%)	37 (66.1%)	0.018
Hip	31 (56.4%)	24 (43.6%)	
Revision			
No	45 (45.0%)	55 (55.0%)	0.977
Yes	5 (45.5%)	6 (54.5%)	
SANE score			
< 25%	12 (32.4%)	25 (67.6%)	0.027
26–50%	20 (43.5%)	26 (56.5%)	
51–75%	13 (76.5%)	4 (23.5%)	
75%+	5 (45.5%)	6 (54.5%)	
Current average daily pain (NRS, 0–10)			
< 5	23 (88.5%)	3 (11.5%)	<0.001
5–7.5	10 (41.7%)	14 (58.3%)	
> 7.5	17 (27.9%)	44 (72.1%)	
PCS			
0	14 (93.3%)	1 (6.7%)	<0.001
1–5	19 (51.4%)	18 (48.6%)	
6–10	13 (37.1%)	22 (62.9%)	
10+	4 (16.7%)	20 (83.3%)	
Current opioid use			
No	42 (48.3%)	45 (51.7%)	0.193
Yes	8 (33.3%)	16 (66.7%)	
Time since decided to have surgery			
< 3 months	20 (64.5%)	11 (35.5%)	0.008
4–6 months	18 (47.4%)	20 (52.6%)	
6–12 months	11 (37.9%)	18 (62.1%)	
> 12 months	1 (8.3%)	11 (91.7%)	

SANE, Single Assessment Numerical Evaluation; NRS, numeric rating scale; PCS, pain catastrophizing scale

explicitly directed patients to isolate the pertinent joint when considering our survey, patients with multiple pain generators may not be able to ignore concomitant nociceptive stimuli. Finally, given the inherent lack of blinding with active survey administration, our results are subject to Hawthorne observer bias, in which respondents may subconsciously favor motivated responses that do not fully represent the individual's true attitude. To combat this, we notified patients that results were recorded in a deidentified manner and would in no way influence their medical care or surgical priority.

The circumstances of the recently mandated wait period for THA and TKA have not been experienced since modern arthroplasty techniques have become available. In addition,

COVID-19-related delays likely generate different patient reactions and attitudes than delays associated with more traditional care access limitations. The COVID-19 pandemic has been widely publicized, and unprecedented social precautions have been instituted [41]. In the public eye, hospitals are identified as at-risk areas where there are high focal concentrations of COVID-19 patients [12]. Furthermore, hospital resources and manpower have been diverted away from operating rooms, given the increased demand on pulmonary and intensive care units [19, 27]. As elective arthroplasty practices look toward resuming standard operating procedures, it is important to delineate patient attitudes toward their surgical delays and to better understand their willingness to reengage the healthcare system in the current climate. This is especially true in the case of elective THA and TKA, in which the majority of candidates are older and may have many of the comorbidities associated with more severe COVID-19 [31, 41].

Our results indicate that patients, in general, are understanding of their surgical delays. Though many patients are engaging in relatively safe practices to manage pain (NSAIDs, acetaminophen, exercise, and activity modifications), over one-fifth of the patients are prescribed opioid analgesics. This is concerning, considering that 23% of our patients reported an increase in their pain medication consumption following the surgical delay. This is especially true given the well-documented risks of pre-operative opioid use [25, 39]. Although nearly three-fourths of patients felt they could wait at least 2 months for surgery, 55% wanted to pursue surgery immediately upon resumption of elective care, and almost 47% would be willing to undergo arthroplasty the next day if allowed. To the contrary, 45% expressed a desire to postpone surgery further as a result of the pandemic.

Patients surveyed primarily cited the COVID-19 pandemic as their reason for surgical delay. The more nuanced reality was that elective surgery delays resulted from a need for risk mitigation for both patients and providers [32], conservation of resources including personal protective equipment (PPE) and ventilators, and uncertainty about how aggressively the disease would spread in the USA [8, 23, 24]. For the most part, our patients felt that surgical delays were in their best interests, and many said they would have cancelled had our institution done so.

The current backlog of patients waiting for surgery creates a threat to patient wellbeing [40]. Prior investigations in patients waiting for surgery have reported disease progression, including a decline in both physical function and psychological wellbeing [2, 3, 17, 22]. A recent report found that 12% of TKA and 19% of THA patients awaiting surgery report they are in a health state that is “worse than death” [33]. While perhaps tempting, it is imperative that surgeons avoid the use of opioids as a bridge to delayed surgery [9, 10, 25, 38]. We found that the spectrum of distress created by COVID-19-related surgical delays was broad and each patient’s perception and opinions were quite variable. Thus, patient concerns related to further delay in surgery must be addressed on an individual basis.

Along the same lines, prioritizing waitlists based on clinical criteria may enhance equitable care after this pandemic disruption, and fortunately, there are validated tools for determining the urgency of each patient’s clinical status [6, 14, 20]. While this work is useful, our results indicated that patients are self-triaging and 45% prefer to wait an indefinite period after surgeries resume over concerns of viral transmission. Patients who reported a more urgent need for surgery were more often TKA candidates, reported lower SANE scores, had higher measures of pain catastrophizing and perceived pain levels, and had already waited longer periods for surgery. Therefore, while prioritization with our predictive factors may be helpful, a simple conversation with patients may decrease the need for prioritization quickly, while simultaneously appealing to patient autonomy [4]. We also found that the majority of patients are not interested in changing surgeons and even fewer are willing to change orthopedic practices but would rather wait for availability in their current practice environment. Therefore, despite prior literature [30], patients self-report trust in the patient-physician relationship with their surgeon, which may negate concerns of significant practice attrition. However, these findings may not apply to all hip and knee arthroplasty practice environments. Increased surgical wait times are likely to persist. A reinvigorated focus on patient-centric care and ongoing, frequent pre-procedure communication with the waiting patient is likely a cornerstone of preserving patient satisfaction.

In conclusion, patients waiting for THA and TKA are understanding of surgical delays caused by COVID-19—even if they initially were not. Patients have varying opinions on when they would like to have surgery and many would prefer to wait for surgery until a social return to normalcy occurs. In this way, patients are self-prioritizing and a simple conversation with patients will help providers optimize their surgical calendars upon return. Additionally, most of our patients prefer to stay with their scheduled surgeon, even if this means a longer wait period. While surgical delays persist, patients simply want to stay informed and providers should make this a priority while also optimizing non-operative management without placing patients at undue risk by starting opioids. Understanding these patient preferences will assist with the optimization of elective orthopedic care in otherwise unprecedented and challenging times.

Compliance with Ethical Standards

Conflict of Interest: Jacob M. Wilson, MD; Andrew M. Schwartz, MD; Helyn E Grissom, MD; Jeffrey S. Holmes, MD; Kevin X. Farley, BS; Thomas L. Bradbury, MD; and George N. Guild III, MD declare that they have no conflicts of interest.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013.

Informed Consent: Informed consent was obtained from all patients included in this study.

Required Author Forms Disclosure forms provided by the authors are available with the online version of this article.

Appendix

Patient Questions

- 1 What surgery were you scheduled for?
- 2 How long has it been since you made up your mind to have surgery?
- 3 What is your understanding of why your surgery was delayed?
- 4 Do you think your surgery was cancelled with your best interest in mind?
- 5 How long are you willing to wait for surgery?
- 6 Would you consider changing surgeons rather than waiting a longer period of time for surgery?
- 7 Would you consider going to another practice if they opened for surgery before your planned surgeon?
- 8 What are you doing to manage your pain at this time?
- 9 If a completely normal hip/knee represents 100%, what would you rate your hip/knee on a scale of 0-100%? (SANE score)
- 10 What is your average daily pain on a scale of 1-10?
- 11 Would you prefer to get surgery immediately when operations resume, or would you rather give more time for the current pandemic to calm down?
- 12 Have you increased the dose or frequency of your pain medications since your surgery was delayed?
- 13 Have you used other alternative methods to treat your pain?
- 14 What emotions have you felt with regards to your surgical cancelation?
- 15 Has your surgical cancelation/delay caused you any emotional distress?
- 16 Do you have an adequate support network at home to help you during this delay?
- 17 Do you feel you have been treated fairly or unfairly?
- 18 If your surgeon offered you to have surgery tomorrow, with the pandemic in its current state, would you?
- 19 Has your opinion/perception of the delay changed as you have learned more about coronavirus and the medical care situation in the United States?
- 20 Is there anything else I should know about your thoughts on the surgical delay/cancelation?

Modified Pain Catastrophizing Scale (1 point for each yes answer, except item 14, scored on a Scale of 0-4; Range of scores 0-17).

During the past 24 hours ...

- 1 I worried about whether my pain would end.
- 2 I felt I could not go on because of my pain.
- 3 I thought my pain was never going to get any better.
- 4 I felt that my pain overwhelmed me.

- 5 I felt I could not stand my pain anymore.
- 6 I was afraid that my pain would get worse.
- 7 I kept thinking of other painful events.
- 8 I anxiously wanted my pain to go away.
- 9 I could not seem to keep my pain out of my mind.
- 10 I kept thinking about how much I hurt.
- 11 I kept thinking about how badly I wanted my pain to stop.
- 12 I felt there was nothing I could do to reduce the intensity of my pain.
- 13 I wondered whether something serious might happen.
- 14 I felt my pain was awful (scored 0-4).

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