

The Lived Experience of Individuals With Prosthetic Joint Infection

Margaret M. Harding ▼ Kim L. Larson ▼ Linda P. Bolin

Background: Prosthetic joint infection (PJI) is a complication of total joint arthroplasty with a survival rate worse than some cancers. **Methods:** A qualitative design, using descriptive phenomenology, was used to explore the lived experience of PJI. Twelve interviews were analyzed to report the essence of the phenomenon. A chart review was also conducted to assess surgical outcomes. **Results:** Participants “made sense of” PJI through two themes: “The Nail in the Coffin” and “Struggle with Living.” “The Nail in the Coffin” was represented by losses of independence, identity, and financial security. “Struggle with Living” was represented by pain, balance of burden, uncertainty, and emotional responses. Half of participants had poor outcomes including amputation and death. **Conclusion:** The experience of PJI may be moderated by stage of life. Social support plays an important role, affecting both gratitude and guilt. Loss of independence and identity, pain, burden, and emotional responses are impactful experiences in PJI.

Introduction

Prosthetic joint infection (PJI) is a devastating complication of total joint arthroplasty (TJA) with a relative survival rate worse than that of prostate cancer, melanoma, and breast cancer (Parvizi & Zmistowski, 2013). Although PJI is a relatively rare complication, affecting up to 2% of patients undergoing primary TJA, the large volume of TJA performed in the US has made PJI an increasingly common complication with significant economic impact (Berbari et al., 2019; Premkumar et al., 2021; Sloan et al., 2018; Tande & Patel, 2014). PJI is treatable with a combination of surgical revision and antibiotics. However, in up to 30% of these patients, persistent PJI can lead to multiple surgeries, readmissions, joint resection, lower limb amputation, or even death (Cochran et al., 2016; Lamagni, 2014). Patients undergoing treatment for PJI have extensive physical, psychological, social, and economic support needs (Kunutsor et al., 2017). PJI has a negative impact on health-related quality of life (Cahill et al., 2008; Helwig et al., 2014). It has been suggested that the quality of life and fear of disease progression in PJI are similar to that of persons with cancer (Knebel et al., 2020).

Comparisons have been drawn between PJI and cancer in biology, financial impact, psychological burden, and mortality (Stanton, 2017). Due in part to the relatively high mortality rate, 30%–60% of all cancer patients suffer psychosocial distress during treatment (Niedzwiedz et al., 2019; Zabora et al., 2001). Cancer has been shown to impact health-related quality of life, depression and anxiety, life satisfaction, and economic losses (Lindbohm et al., 2014; Niedzwiedz et al., 2019; Zabora et al., 2001). The psychological impact of cancer on patients and caregivers has been extensively explored. However, that of PJI remains under investigation. Given the dearth of research in this area, there is a need for qualitative inquiry to guide future research queries and nursing interventions for this growing vulnerable community-dwelling population. This article reports on the lived experiences of individuals with PJI following TJA of the hip or knee.

Methods

A qualitative design, using descriptive phenomenology, was selected to explore the lived experience of individuals with PJI following TJA of the hip or knee. As described by Moustakas (1994), data collection using semi-structured interviews followed by analysis of significant statements, generation of themes, and development of textual descriptions was used to create a composite description to report the essence of the phenomenon. The Principal Investigator (M.M.H.) is a Nurse Practitioner, currently practicing in Orthopedics. MMH cares for individuals with PJI in the inpatient setting. MMH's personal

Margaret M. Harding, PhD, RN, AGPCNP-BC, RNFA, Department of Orthopaedics, Duke University Hospital, Durham, NC; Clinical Faculty, Duke University School of Nursing, Durham, NC.

Kim L. Larson, PhD, RN, MPH, FNAP, Department of Nursing Science, East Carolina University College of Nursing, Greenville, NC.

Linda P. Bolin, PhD, RN, ANP, BCB, FAHA, Department of Nursing Science, East Carolina University College of Nursing, Greenville, NC.

The authors have disclosed no conflicts of interest.

Correspondence: Margaret M. Harding, PhD, RN, AGPCNP-BC, RNFA, Department of Orthopaedics, Duke University Hospital, 3915 Covington Trace, Apex, Durham, NC 27710 (margaret.harding@duke.edu).

DOI: 10.1097/NOR.0000000000001122

experiences with PJI were bracketed through critical evaluations by two experienced qualitative methodologists (Fischer, 2009).

SETTING

The study setting was an outpatient combined Orthopedic and Infectious Disease clinic associated with a major academic medical center, located in the piedmont region of North Carolina. This health system houses an orthopedic surgical department, including one of the largest adult reconstruction programs in the state. In 2020, a combined Orthopedic and Infectious Diseases clinic was formed with the sole purpose of caring for patients with PJI, an ideal setting for this study.

SAMPLE

Individuals diagnosed with PJI were recruited from the outpatient clinic. These individuals were in varying phases of care following PJI. All participants had undergone at least one surgical revision for the treatment of PJI and had transitioned to outpatient care. However, half of the individuals expected to need further surgeries, while half expected no further surgeries. All participants in this postoperative phase had experienced a transition to outpatient care and had time to reflect on their experiences. In some cases, participants chose to have their significant other or a family member with them during the interview. While the focus of this study was on the experience of the participants, family members often added their perceptions, which were recorded as field notes. Each participant was assigned a pseudonym prior to analysis.

Purposive sampling used the following inclusion criteria for eligibility to participate in the study: (a) adults aged 18 or older, (b) understand and speak English, (c) diagnosis of PJI following total hip or knee arthroplasty, and (d) surgical revision performed. Exclusion criteria included: (a) cognitive impairment that would preclude understanding of study protocols, (b) lower limb amputation, (c) infection of a unicompartamental (partial) knee replacement or other non-TJA hardware.

Polkinghorne (1989) recommended a sample of 5–25 individuals who have experienced the phenomenon of interest. Morse (1994) recommended a sample of about six participants for phenomenological studies focused on the essence of experience. Sandelowski (1995) went on to recommend an adequate sample size in qualitative research is one that allows profound analysis that results in a new and rich understanding of experience (p. 183).

With that in mind, this study aimed for a sample of 10–25 community-dwelling participants, with data collection ending once thematic saturation was achieved (Hennink et al., 2019). Fifteen people were approached and 3 declined to participate due to time constraints. This yielded a total sample of 12 individuals, 3 women and 9 men, aged 49–86 years (mean age 69; Table 1).

DATA COLLECTION

Data was collected through face-to-face interviews, conducted in English by MMH. Interviews began immediately after consent was provided. Verbal consent was utilized, clearly stating that participation in the study was voluntary, had no impact on medical care, and interviews could be stopped at any time. This was particularly important, given that the interviews were conducted while patients were receiving care. Private clinic exam rooms were used to conduct interviews following participants' scheduled clinic appointments.

A multifaceted semi-structured interview guide was used to explore the participants' experience of living with PJI. The interview guide was used flexibly to allow participants the opportunity to discuss issues that were most meaningful to them. The overarching question for participants was: "Tell me about your experience with having a prosthetic joint infection."

See Figure 1 for additional interview questions.

Probe questions were utilized when the interviewer wanted the participant to elaborate, as described by Tong et al. (2007). Iterative refinement of the interview guide allowed for flexibility, based on participant responses.

Participants were interviewed once. Interviews lasted between 12 and 50 minutes, with an average of 22 minutes. Interviews were audio-recorded using a handheld audio-recording device. A chart review was utilized to collect diagnosis, causative organism, and surgical dates. Two years after the start of interviews, a second electronic chart review was performed to gather data on surgical outcomes. No protected health information was recorded in electronic chart reviews.

DATA MANAGEMENT AND ANALYSIS

Audio recordings were transcribed, de-identified, and analyzed using phenomenological data analysis. Analysis began with the transcription process and continued with the reading and re-reading of transcripts. Themes were extracted through inductive coding and grouping of coded data, using horizontalization and clusters of meaning (Creswell & Poth, 2018). Textual and structural descriptions were developed, and essential invariant structure, or essence, was explained using composite description. Coding of each transcript was performed by the interviewer, with three transcripts independently double-coded by an additional experienced qualitative researcher. Codes were discussed with two qualitative experts and several novice researchers. Codes were applied to the data going forward with continued refinement. Field notes provided context during the analysis process. Analysis and continued data collection were performed simultaneously. Data collection was discontinued once thematic saturation was achieved (Hennink et al., 2019).

Findings

A total of 12 individuals, 9 men and 3 women, between the ages of 49 and 86 participated in the

TABLE 1. PARTICIPANT CHARACTERISTICS (N = 12)

Pseudonym	Gender	Age	Level of Education	Occupation	Affected Joint	Year of Index TJA	Total Number of Surgeries on Affected Joint
Joe	Male	69	11th grade	On disability, previously worked odd jobs as truck driver, mover, builder	Knee	2017	5+
George	Male	65	GED, some college	Retired police officer	Knee	2021	2+
Bill	Male	72	Two master's degrees	Retired engineer	Knee	2020	3
John	Male	77	Master's degree	Retired engineer	Hip	2017	2
Stan	Male	62	4th grade	On disability, previously worked as a bouncer at a nightclub	Knee	2016	11+
Jack	Male	49	9th grade	On disability, previously worked odd jobs in bricking, carpentry, textiles	Hip	2017	4
Deb	Female	72	1 year of college	Volunteers as a Sunday school teacher	Knee	2017	2
Jill	Female	73	10th grade	Retired sewing machine operator	Hip	2004	2
Bonnie	Female	85	12th grade	Retired	Knee	2020	2
Luke	Male	68	12th grade	Retired mechanic	Hip	2013	5
Lester	Male	86	Bachelor's degree	Retired engineer at a tech company	Knee	2016	3
Ron	Male	55	12th grade	Retired bakery line worker	Knee	2021	2

study. Participants reported having between 2 and 11 surgeries on their affected joint. Chart reviews suggested revision surgeries were necessary due to both aseptic and septic causes; aseptic component failure (wear, dislocation, or periprosthetic fracture) and

recurrent PJI. While all participants had experienced at least one revision surgery for septic cause, time since index TJA ranged from 1 to 17 years. No trends were identified in the demographic categories of gender, race, or affected joint. Participants who reported

Additional Interview Questions

- "Tell me about the information you received after deciding to have a joint replacement."
- "What education did you have about the risk of infection after surgery?"
- "How has having a prosthetic joint infection affected you physically?"
- "How has having a prosthetic joint infection affected you mentally?"
- "Tell me about your support system (family, friends, church, etc.)."
- "What have been some burdens associated with having a prosthetic joint infection?"
- "What have been some positive things associated with having a prosthetic joint infection?"
- "In what ways have you felt uncertain since finding out you have a prosthetic joint infection?"
- "Is there anything else that you feel is important to add, that I may not have asked about?"

FIGURE 1. Additional interview questions.

less formal education exhibited more intense emotional responses. Individuals with more formal education reported having more financial resources that moderated their experience with PJI, such as traveling between multiple homes. Participants who reported a higher number of surgeries on their affected joint expressed fear of losing their limb and had more severe anxiety and depression.

Participants “made sense of” their experience with PJI through two themes: “The Nail in the Coffin” and “Struggle with Living.” The first theme, “The Nail in the Coffin” was represented by losses of independence, identity, and financial security. The second theme, “Struggle with Living” was represented by pain, balance of burden, uncertainty, and emotional responses.

Sub-themes of loss included loss of independence, financial security, and identity. Loss of identity encompassed changes in partner and family relationships, changes in sex life, inability to participate in hobbies and leisure activities, changes in energy levels, and changes in attitude or personality. Sub-themes of a new reality included pain, social support: burden and blessing, uncertainty, emotional responses, and gratitude.

The themes and sub-themes characterizing common experiences of participants during PJI recovery are described below. Illustrative anonymized data exemplars are provided for each theme and sub-theme in Table 2.

THEME I: “THE NAIL IN THE COFFIN”

Jack said, “...that was the nail in the coffin for me. I was walking one day, and I couldn’t walk. I had to go

to the break room, and it was over for me working, that was it.” The finality of the loss that Jack expressed embodies the first theme of loss.

Loss of Independence

All participants described a loss of their independence, necessitating help from others to care for themselves. Loss of independence caused participants to rely on their partners, children, family, and friends for activities of daily living, household chores, shopping, and transportation.

All participants reported a loss of mobility and physical function due to their affected joint. Loss of mobility left individuals dependent on assistive devices like crutches, walkers, and wheelchairs. Participants recounted having to relocate their sleeping quarters to the first floor of their home, as they could no longer climb stairs. One individual felt that he might be more mobile with an above knee amputation than he was with the non-articulating knee spacer he had in place.

While all participants suffered from loss of independence and mobility, participants with excised hip joints and non-articulating or static spacers of the knee experienced the greatest loss of mobility and function.

Loss of Financial Security

Loss of financial security was encountered when individuals were no longer able to work due to missed days and physical limitations. The need for long-term disability was common. Loss of employment was a concern for many participants, but those aged 49–55 reported the greatest financial impact. This is likely a result of older individuals already being retired at

TABLE 2. EXEMPLARS

Theme	Sub-Theme	Exemplar
“The Nail in The Coffin”	Loss of independence	Deb—I’m used to walking, and I’ve been used to being independent, cleaning up my house, shopping, oh I love to shop, he’d have to hunt all over the place for me.
	Loss of financial security	Jack—...that was the nail in the coffin for me. I was walking one day, and I couldn’t walk. I had to go to the break room, and it was over for me working, that was it.
	Loss of identity	Stan—I feel older now because it’s really put a toll on me. I didn’t look like this, you know, 4 or 5 years ago. I was into weightlifting and course I was taking steroids, and I mean, I was a bouncer, I mean, I had to be big. Now I lost all my muscles and all that, can’t go to the gym, and that put a toll on me.
“Struggle with Living”	Pain	Jill—I’ve never been through nothing like this. (CRYING) I’ve never had the pain that I had with the surgery and I’ve had 2 knee replacements, 3 back surgeries, surgery on my shoulders, and I’ve never been through nothing like this, never had nothing this painful. Of all my surgeries.
	Balance of burden	Deb—I feel like I am a burden on him (husband)... not being able to function as well as I would like to function... And I feel so bad about it, because I felt like, I had to, you know, I relied on him. And I told him I’m so sorry, I’m so sorry.
	Uncertainty	Bonnie—Being afraid of what tomorrow’s going to bring with it, so I’m anxious to know, or I don’t know whether I want to know or not. Of what it might say that I don’t want to hear. That the infection is still here, that you can’t have your knee replacement. Which may not happen, but you can’t help but think that there’s that possibility.
	Emotional responses	Stan—...it’s kind of messed me up, as far as loosing my mind just about. ...I was sitting around the house, and this don’t feel good, and I’ve been through it for 5 years (CRYING). And all I’ve been doing was sitting around the house, crying. And my wife told me I needed to go and see a doctor, and he put me on some kind of depressant pill? And that kind of mellowed me out a little bit. So, I’m not crying as much.

the time of diagnosis with PJI. Ron, who was 55 years old described a long struggle of not being able to work, which led to bills backing up while he recovered from PJI.

Loss of Identity

Loss of identity encompassed changes in partner and family relationships, changes in sex life, inability to participate in hobbies and enjoyable activities, changes in energy levels, and changes in attitude/personality. All participants were affected by the loss of some facet of their identity. George described feeling “less than a man and husband and partner” due to the effects of PJI.

Loss of enjoyment was most common in those aged 56–70. Individuals in this age group were often retired, but still able to enjoy traveling and hobbies, prior to PJI. Participants described no longer being able to derive joy from activities that previously brought them joy. Examples of these activities included recreational activities like golf, hobbies like gardening, cooking, baking, participating in social gatherings like playing cards, attending church, shopping, and even the enjoyment of food.

THEME II: “STRUGGLE WITH LIVING”

Bill, when talking about his new reality of dealing with PJI said, “[I struggle with] living at times.” The struggle that Bill expressed embodies the second theme of living with a new reality.

Pain

All participants experienced pain. Several individuals also expressed concerns about their need for pain medications. Stan described his need for pain medication as “poppin more pills.” Deb recalled that she “just wanted some pain pills to help.” George explained,

Taking all of the medication, especially the pain meds, I had a nasty after effect, I didn’t wean myself off the pain meds. I was scared to get addicted to the pain meds, so I went cold turkey with it, which was a big mistake because I had pretty bad panic attacks because of withdrawal symptoms.

This suggested that pain was not only a physical symptom of PJI, but also caused psychological stress.

Balance of Burden

Social support played an important role in the lives of all participants. In some instances, social support was strong, in other cases, social support was absent. Social support systems elicited feelings of both gratitude and guilt from individuals. Feeling like a burden on loved ones was the source of guilt. For this reason, feelings of burden were more common in those with strong social support systems. Those who were married described feeling like they had become a burden on their spouse. George and his wife were newlyweds who had been married for about 2 years. George explained that being newly married, he did not expect to

have to rely on his wife as a caregiver. He had sought joint replacement to increase his physical capability and enjoy an active lifestyle with his new wife. Developing a PJI meant that George’s new wife had to care for him for months in addition to them not being able to live the life they had imagined. Jill, although not married, felt that she was a burden on her daughter, who she was living with. Throughout her interview, Jill repeatedly requested to be sent to a rehabilitation facility to relieve the burden on her daughter. At times, Jill cried and begged to be taken out of her daughter’s home.

Although participants felt the weight of being a burden on their loved ones, they were also profoundly grateful for their support. Bill laughed and explained, “So, the friends have been very important. In fact, I like to call them ‘family’.” Stan, among others, expressed not knowing what he would have done without his spouse, who allowed him to stay in his home instead of needing a care facility. Even in the most difficult situations, individuals expressed deep gratitude for their spouses, family, and friends.

Uncertainty

All participants reported that PJI had been an unwelcome and unexpected disruption to their normal lives. Lester explained that he knew infection was a risk of surgery, but he never thought it would happen to him. George, Deb, and Bonnie all explained that it was like their previous lives had stopped. This sense of disruption leads to uncertainty of if or when they would be able to return to their previous way of living. Bill wondered when he might be able to walk without crutches or a walker again. Stan explained that he didn’t know what was coming next. Bonnie described the torment of not knowing whether the antibiotics were working and what her outcome would be. Lester felt as though he would never be totally free of the bacteria, always having the infection in the back of his mind.

Uncertainty naturally causes anxiety for many people. In some cases, uncertainty, anxiety, and fear were inextricably intertwined. For example, Bonnie reported

Being afraid of what tomorrow’s going to bring with it, so I’m anxious to know, or I don’t know whether I want to know or not. Of what it might say that I don’t want to hear. That the infection is still here, that you can’t have your knee replacement. Which may not happen, but you can’t help but think that there’s that possibility.

Bonnie was uncertain, anxious, and afraid. Some developed other specific fears. For example, Stan developed a fear of needles and surgery, as well as a fear of losing his leg, due to the infection.

Emotional Responses

Depression, regret, blame, and anger were described by participants. Stan reported feeling like he was losing his mind and experienced daily crying spells. His wife encouraged him to see a doctor who started him

on antidepressants, which helped. George reported having a depressed state of mind. Bill recounted being depressed at times and struggling to live.

Regret appeared later in the data collection phase. Bonnie and Jack both regretted the decision to have their initial joint replacement. In Jack's case, his regret was also associated with blame and anger. As Jack questioned whether he needed the initial joint replacement, he blamed the judgment of his surgeon. Jack explained, "You said I need surgery. I didn't have no problem before then. I feel like I was alright, you know what I'm saying? But, you know, hey. Sometimes doctors know best, sometimes they don't." Jack also felt that his surgeon did something wrong to cause his infection.

Yeah [I feel like the doctors I had in the past did something wrong]. Most definitely. Most definitely. Last time I seen my orthopaedic, the doctor that actually did, they was going to try to let me see somebody else, I was like, nah, schedule me a day when I can see him. I want to look him in his eye and ask him, just basically ask him, now, what the hell did you do to me, man?

Jack expressed anger at his surgeon, his situation, and the fact that he had not received any retribution.

Like Jack, Joe, Luke, and Bonnie also expressed anger. Joe explained that he was angry because "somebody messed up." He also felt like his surgeon had done something wrong that caused his infection. Luke and Bonnie's anger was not associated with blame. They were not angry with their surgeons but were angry with their situations. Luke said, "Makes me mad as heck, I can't work and do nothin'." Bonnie expressed, "I don't see how anybody could deal with this any differently than what I'm dealing with. If they deal with it better, then let me meet them, I want to meet them. I don't see it." Two of the three participants who expressed anger also reported having limited social support.

TWO-YEAR SURGICAL OUTCOMES

Two years after interviews began, a chart review was conducted to evaluate surgical outcomes. Half of the participants went on to be successfully treated for PJI, with one of these individuals being placed on life-long suppressive antibiotics. The other half of the participants had undesirable outcomes. Four had ongoing infections that required additional surgeries, one had an above the knee amputation of their leg, and one was deceased. Those with polymicrobial and drug-resistant infections had overall worse outcomes than those with negative cultures or single isolated susceptible organisms. This is consistent with PJI outcomes (Rudelli et al., 2020; da Silva & Salles, 2021; Wimmer et al., 2016).

Discussion

This study identifies commonality in the experiences of patients with hip and knee PJI. Participants "made

sense of" their experience with PJI by conceptualizing their experience through losses, a new reality, and the sub-themes that were identified within. These themes and sub-themes resonate with previous findings in similar studies (Mallon et al., 2018; Moore et al., 2015; Palmer et al., 2020).

The physical impact of PJI caused a loss of mobility and function, which led to a loss of independence for many. Echoing the findings of previous studies, participants with excised hip joints and non-articulating or static spacers of the knee experienced the greatest impact on their mobility and function (Mallon et al., 2018; Moore et al., 2015; Palmer et al., 2020). The four participants with nonfunctioning joints had the strongest emotions during interviews, with outburst of crying and loud or angry responses.

Previously unreported age-specific trends included: the importance of loss of financial security to those aged 49–to 55 and the impact of loss of enjoyment in those aged 56–70. This finding suggests that the type of impact PJI has on an individual may be affected by their stage of life.

As in previous studies, all participants reported that PJI had been an unwelcome and unexpected disruption to their normal lives and that they had lost some facet of their identity because of PJI (Mallon et al., 2018). All participants experienced pain and some expressed concerns related to opioid pain medication. Opioid pain medication use in patients with PJI has not been explored and is identified as an area for future research.

Burden was more common in those with strong social support systems and had a major impact on relationships. As in previous studies, social support and relationships were the main source of positivity for participants (Palmer et al., 2020). Those with limited social support were more likely to experience anger, which suggests that social support provides emotional benefits.

Uncertainty was closely related to anxiety, fear, and depression. Uncertainty about permanent loss of mobility, efficacy of treatment, recurrence, and medication side effects was reported. This supports previous reports of increased psychological stress in the "in between stages" of PJI treatment (Lueck et al., 2022; Mallon et al., 2018; Moore et al., 2015; Palmer et al., 2020). Half of the participants reported feeling depressed because of pain, loss of mobility, function, and independence, as well as changes in relationships and routines. These findings are supported by previous studies. In 2020, a German study described PJI as a measurable, relevant psychosocial stressor for patients, comparing quality of life and fear of disease progression to that of oncology patients (Knebel et al., 2020). They concluded that PJI causes depression and anxiety in a significant number of patients who require psychological treatment, and that the quality of life, life satisfaction, and progression of anxiety are comparable to that of cancer patients (Knebel et al., 2020).

Two participants regretted their decision to have their initial joint replacement. Although regret was

identified later in the study, this finding is supported by a recent study on decision regret in PJI. Sequeira et al. (2022) had 96 patients with PJI complete a survey based on the Decision Regret Scale, which measures remorse associated with healthcare decisions. They reported that overall, levels of regret in patients with PJI may be lower than previously thought, with most patients undergoing two-stage revision for PJI not regretting the decision to have their index TJA (Sequeira et al., 2022). In their study, only 28% of patients agreed or strongly agreed when asked if they regretted the choice to have their index TJA (Sequeira et al., 2022). This correlates with 2 of the 12 (approximately 17%) participants expressing regret in our study.

The incongruous finding of severe negative impact on quality of life from PJI with willingness to undergo index TJA again, without pervasive regret, is unexpected (Sequeira et al., 2022). Sequeira et al. (2022) propose two possible explanations for this contradictory result: (1) regret as a counterfactual emotion and (2) regret as an error of inaction. Simply put, regret is the private comparison between two decisions that we could have made (Coricelli & Rustichini, 2010). In our study, two participants blamed their surgeons for their infection; interestingly, only one of these participants reported regretting their decision to have their index joint replacement. Regret is identified as another underexplored facet of the psychological impact of PJI.

Social support had a major impact on attitude and emotional resilience. This supports previous reports of the importance of social support and the role of friends and partnerships in emotional resilience and stability in PJI (Lueck et al., 2022; Palmer et al., 2020).

At 2-year follow up, half of the participants were successfully treated for PJI, with one being placed on life-long suppressive oral antibiotics. The other half of the participants had the undesirable outcomes of additional surgeries, amputation, and death. This correlates with outcomes in larger quantitative studies, which have reported that in up to 30% of patients with PJI, persistent infection can lead to multiple surgeries, readmissions, resection arthroplasty, amputation, or even death (Cochran et al., 2016; Lamagni, 2014).

Limitations

Limitations of this study include single-center design, convenience sampling, and the limited experience of a novice qualitative researcher. Although this study was performed at a single site and a convenience sampling method was used, an appropriate sample was obtained. The limited experience of a novice qualitative researcher was mitigated through guidance and mentorship from several experienced qualitative researchers, including regular open discussions during data collection and analysis. Dual coding of a portion of the transcripts ensured rigor. The achievement of thematic saturation increases the likelihood that results of this study are generalizable and transferable.

IMPLICATIONS FOR RESEARCH AND EDUCATION

As burden and relational impact were important to those with robust social support, future research should include the perspective of spouses and caregivers in PJI. Other areas for future research include social support-based interventions to improve the experience of PJI treatment and recovery. Opioid use and regret in PJI are also identified as areas for future research.

Orthopedic education in undergraduate and graduate nursing programs is limited, with most nurse practitioners receiving fewer than 10 hours of musculoskeletal education (Benham et al., 2016). This study supports the need for inclusion of orthopedic infections, like PJI, in nursing education. While musculoskeletal injuries are often isolated, PJI affects the body, mind, spirit, and social system. An emphasis on holistic nursing care of individuals with orthopedic infections is important in mitigating the negative psychosocial impact of PJI.

Conclusion

This study supports previous findings that loss of independence and identity are impactful experiences for individuals with PJI. Individuals with nonfunctioning joint constructs experienced the greatest impact on mobility and exhibited the strongest emotional responses. We also found that loss of financial security was a concern which was particularly impactful for younger individuals. Additionally, loss of enjoyment was particularly impactful for those aged 56–70. These findings suggest that the type of impact PJI has on an individual may be affected by their stage of life. Findings also support previous reports that pain, burden on loved ones, and emotional responses are impactful experiences for individuals with PJI. This study introduces uncertainty, blame, and anger as important aspects of the lived experience of PJI. Lastly, our findings coincide with prior descriptions of the importance of support systems during PJI treatment and recovery.

REFERENCES

- Benham, A. J., Geier, K. A., & Salmond, S. (2016). How well are nurse practitioners prepared to treat common musculoskeletal conditions? *Orthopaedic Nursing, 35*(5), 325–329. <https://doi.org/10.1097/NOR.000000000000027>
- Berbari, E., Baddour, L. M., & Chen, A. F. (2019). Prosthetic joint infection: Epidemiology, microbiology, clinical manifestations, and diagnosis. In D. Spelman (Ed.), *Up to date*. Retrieved November 24, 2019, from <https://www.uptodate.com/contents/prosthetic-joint-infection-epidemiology-microbiology-clinical-manifestations-and-diagnosis>
- Cahill, J. L., Shadbolt, B., Scarvell, J. M., & Smith, P. N. (2008). Quality of life after infection in total joint replacement. *Journal of Orthopaedic Surgery (Hong Kong), 16*(1), 58–65. <https://doi.org/10.1177/230949900801600115>
- Cochran, A. R., Ong, K. L., Lau, E., Mont, M. A., & Malkani, A. L. (2016). Risk of reinfection after treatment of infected total knee arthroplasty. *The Journal*

- of *Arthroplasty*, 31(9), 156–161. <https://doi.org/10.1016/j.arth.2016.03.028>
- Coricelli, G., & Rustichini, A. (2010). Counterfactual thinking and emotions: Regret and envy learning. *Philosophical Transactions of the Royal Society of London*, 365(1538), 241–247. <https://doi.org/10.1098/rstb.2009.0159>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches* (4th ed). Sage.
- da Silva, R. B., & Salles, M. J. (2021). Outcomes and risk factors in prosthetic joint infections by multidrug-resistant gram-negative bacteria: A retrospective cohort study. *Antibiotics (Basel, Switzerland)*, 10(3), 340. <https://doi.org/10.3390/antibiotics10030340>
- Fischer, C. T. (2009). Bracketing in qualitative research: Conceptual and practical matters. *Psychotherapy Research*, 19(4–5), 583–590. <https://doi.org/10.1080/10503300902798375>
- Helwig, P., Morlock, J., Oberst, M., Hauschild, O., Hübner, J., Borde, J., Südkamp, N. P., & Konstantinidis, L. (2014). Periprosthetic joint infection—Effect on quality of life. *International Orthopaedics*, 38(5), 1077–1081. <https://doi.org/10.1007/s00264-013-2265-y>
- Hennink, M. M., Kaiser, B. N., & Weber, M. B. (2019). What influences saturation? Estimating sample sizes in focus group research. *Qualitative Health Research*, 29(10), 1483–1496. <https://doi.org/10.1177/1049732318821692>
- Knebel, C., Menzemer, J., Pohlig, F., Herschbach, P., Burgkart, R., Obermeier, A., von Eisenhart-rothe, R., & Mühlhofer, H. M. L. (2020). Peri-prosthetic joint infection of the knee causes high levels of psychosocial distress: A prospective cohort study. *Surgical Infections*, 21(10), 877–883. <https://doi.org/10.1089/sur.2019.368>
- Kunutsor, S. K., Beswick, A. D., Peters, T. J., Goberman-Hill, R., Whitehouse, M. R., Blom, A. W., & Moore, A. J. (2017). Health care needs and support for patients undergoing treatment for prosthetic joint infection following hip or knee arthroplasty: A systematic review. *PloS One*, 12(1), e0169068. <https://doi.org/10.1371/journal.pone.0169068>
- Lamagni, T. (2014). Epidemiology and burden of prosthetic joint infections. *Journal of Antimicrobial Chemotherapy*, 69(suppl 1), i5–i10. <https://doi.org/10.1093/jac/dku247>
- Lindbohm, M.-L., Kuosma, E., Taskila, T., Hietanen, P., Carlsen, K., Gudbergsson, S., & Gunnarsdottir, H. (2014). Early retirement and non-employment after breast cancer. *Psycho-Oncology*, 23(6), 634–641. <https://doi.org/10.1002/pon.3459>
- Lueck, E., Schlaepfer, T. E., Schildberg, F. A., Randau, T. M., Hischebeth, G. T., Jaenisch, M., Ossendorff, R., Wirtz, D. C., & Wimmer, M. D. (2022). The psychological burden of a two-stage exchange of infected total hip and knee arthroplasties. *Journal of Health Psychology*, 27(2), 470–480. <https://doi.org/10.1177/1359105320948583>
- Mallon, C. M., Goberman-Hill, R., & Moore, A. J. (2018). Infection after knee replacement: A qualitative study of impact of periprosthetic knee infection. *BMC Musculoskeletal Disorders*, 19(1), 352. <https://doi.org/10.1186/s12891-018-2264-7>
- Moore, A. J., Blom, A. W., Whitehouse, M. R., & Goberman-Hill, R. (2015). Deep prosthetic joint infection: A qualitative study of the impact on patients and their experiences of revision surgery. *BMJ Open*, 5(12), e009495. <https://doi.org/10.1136/bmjopen-2015-009495>
- Morse, J. M. (1994). Designing funded qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. Sage (pp. 220-235).
- Moustakas, C. (1994). *Phenomenological research methods*. Sage.
- Niedzwiedz, C. L., Knifton, L., Robb, K. A., Katikireddi, S. V., & Smith, D. J. (2019). Depression and anxiety among people living with and beyond cancer: A growing clinical and research priority. *BMC Cancer*, 19(1), 943. <https://doi.org/10.1186/s12885-019-6181-4>
- Palmer, C. K., Goberman-Hill, R., Blom, A. W., Whitehouse, M. R., & Moore, A. J. (2020). Post-surgery and recovery experiences following one- and two-stage revision for prosthetic joint infection—A qualitative study of patients’ experiences. *PloS One*, 15(8), e0237047. <https://doi.org/10.1371/journal.pone.0237047>
- Parvizi, J., & Zmistowski, B. (2013). A quarter of patients treated for PJI dead within 5 years. *Orthopaedics Today*. <https://www.healio.com/news/orthopedics/20130104/a-quarter-of-patients-treated-for-pji-dead-within-5-years>
- Polkinghorne, D. E. (1989). *Existential-phenomenological perspectives in psychology: Exploring the breadth of human experience*. Plenum Press.
- Premkumar, A., Kolin, D. A., Farley, K. X., Wilson, J. M., McLawhorn, A. S., Cross, M. B., & Sculco, P. K. (2021). Projected economic burden of periprosthetic joint infection of the hip and knee in the United States. *The Journal of Arthroplasty*, 36(5), 1484–1489.e3. <https://doi.org/10.1016/j.arth.2020.12.005>
- Rudelli, B. A., Giglio, P. N., de Carvalho, V. C., Pécora, J. R., Gurgel, H. M. C., Gobbi, R. G., Vicente, J. R. N., Lima, A. L. L. M., & Helito, C. P. (2020). Bacteria drug resistance profile affects knee and hip periprosthetic joint infection outcome with debridement, antibiotics and implant retention. *BMC Musculoskeletal Disorders*, 21(1), 574. <https://doi.org/10.1186/s12891-020-03570-1>
- Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing and Health*, 18(2), 179–183. <https://doi.org/10.1002/nur.4770180211>
- Sequeira, S. B., Kamalapaty, P. N., Polit, R. E., Penberthy, J. K., Novicoff, W. M., & Browne, J. A. (2022). Treatment decision regret in patients who develop periprosthetic joint infection and require two-stage revision surgery. *The Journal of Arthroplasty*, 37(6S), S291–S296.e3. <https://doi.org/10.1016/j.arth.2022.01.033>
- Sloan, M., Premkumar, A., & Sheth, N. P. (2018). Projected volume of primary total joint arthroplasty in the U.S., 2014 to 2030. *Journal of Bone and Joint Surgery*, 100(17), 1455–1460. <https://doi.org/10.2106/JBJS.17.01617>
- Stanton, T. (2017). PJI and cancer: More similar than different? *AAOS Now*. <https://www.aaos.org/aaosnow/search/?q=%22PJI+and+cancer%3A+More+similar+than+different%3F%22#>
- Tande, A. J., & Patel, R. (2014). Prosthetic joint infection. *Clinical Microbiology Reviews*, 27(2), 302–345. <https://doi.org/10.1128/CMR.00111-13>
- Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups.

International Journal for Quality in Health Care, 19(6), 349–357. <https://doi.org/10.1093/intqhc/mzm042>

Wimmer, M. D., Friedrich, M. J., Randau, T. M., Ploeger, M. M., Schmolders, J., Strauss, A. A., Hischebeth, G. T. R., Pennekamp, P. H., Vavken, P., & Gravius, S. (2016). Polymicrobial infections reduce the cure rate in prosthetic joint

infections: Outcome analysis with two-stage exchange and follow-up \geq two years. *International Orthopaedics*, 40(7), 1367–1373. <https://doi.org/10.1007/s00264-015-2871-y>

Zabora, J., BrintzenhofeSzoc, K., Curbow, B., Hooker, C., & Piantadosi, S. (2001). The prevalence of psychological distress by cancer site. *Psycho-Oncology*, 10(1), 19–28.



Editor-in-Chief:
Mary F. Rodts, DNP, CNP, ONC, FAAN

NATIONAL ASSOCIATION OF ORTHOPAEDIC NURSES

Orthopaedic Nursing

The International Leader in Education, Practice and Research

Orthopaedic Nursing is an international journal providing continuing education for orthopaedic nurses. Focusing on a wide variety of clinical settings — hospital unit, physician's office, ambulatory care centers, emergency room, operating room, rehabilitation facility, community service programs, the client's home, and others — **Orthopaedic Nursing** provides departmental sections on current events, organizational activities, research, product and drug information, and literature findings.

Call for Papers

Articles should reflect a commitment to professional development and the nursing profession as well as clinical, administrative, academic, and research areas of the orthopaedic specialty.

The journal is seeking contributions through its online submission site:
www.editorialmanager.com/onj.

For more information please, visit the journal's website: www.orthopaedicnursing.com

 Wolters Kluwer

 **NAON**
National Association of
Orthopaedic Nurses

4-K121A