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# Impact of Prolonged Operating Time and Intraoperative Challenges in Total Hip Replacement on Theater Staff's Routine Management and Psychological Health

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**Abstract**

Total Hip Replacement (THR) is a complex and time-consuming surgical procedure that needs close collaboration among operating room staff, still, prolonged duration of procedures due to intraoperative challenges, unanticipated complications and anatomical complexity can have significant impact on staff. Extended duration can contribute to increase physical and mental fatigue, elevated stress and reduced cognitive response which may impact outcomes. The purpose of this study is to evaluate how extended THR operations affect the regular management and mental well-being of theater employees, such as anesthetists, surgeons, scrub nurses, circulation nurses, and other support workers. The study investigates the effects of prolonged surgical length on healthcare workers' coping strategies, emotional flexibility, stress levels, and workload distribution in the operating room. Operational theater personnel in high-volume orthopedic units were surveyed quantitatively and qualitatively as part of a mixed-methods approach. To determine how long procedures affected staff well-being, standardized psychological stress and tiredness measurement instruments were used. Workflow disruptions and efficiency indicators were also looked at in order to understand how intraoperative issues affect daily management. Statistical analysis was used to look at correlations between the length of surgery and reported levels of stress, fatigue, and performance changes. Results shows that prolonged surgical time increases the level of psychological stress, overall discomfort, mental and physical exhaustion, participant reported more emotional strained, feeling trouble focusing and coordination among staff to make workflow which results in poor productivity and high error rates. A lack organized recovery time was also mentioned by numerous employees that may worsen the situation. The research highlights the pressing need for services like mental health assistance, coordinated break schedules, ergonomic improvements, and rotational staffing. By implementing these strategies, staff resilience, productivity, and a healthy workplace can all be increased, improving surgical outcomes.

**Keywords:** Complete hip replacement, prolonged surgery, operating room staff, mental health, fatigue, stress, intraoperative challenges, and efficiency of workflow.

## Introduction

Total hip replacements (THRs) have emerged as one of the most prevalent and successful orthopedic procedures globally, primarily aimed at alleviating severe hip joint pain and dysfunction caused by various conditions, including osteoarthritis, rheumatoid arthritis, traumatic fractures, and avascular necrosis. The procedure involves the surgical replacement of the damaged hip joint with a prosthetic implant, which typically consists of metal, ceramic, and plastic components. The primary objectives of THR are to reduce pain, enhance joint mobility, and enable patients to return to their daily activities, thereby significantly improving their quality of life (1).

The first successful THR was performed by Sir John Charnley in the 1960s, utilizing metal femoral heads and high-density polyethylene sockets. This groundbreaking innovation laid the foundation for the widespread adoption of THR, leading to improved patient outcomes (2). Over the years, advancements in prosthetic materials and surgical techniques have further enhanced the efficacy of THR. Modern prosthetics often incorporate durable materials such as titanium and ceramic, which offer greater biocompatibility and wear resistance (3). Additionally, the introduction of robotic-assisted systems and minimally invasive surgical techniques has improved surgical precision, reduced recovery times, and minimized complications.

As the global population ages and the incidence of hip-related conditions rises, the demand for THR procedures is increasing, placing additional pressure on surgical teams and healthcare systems. The success of THR is typically evaluated based on functional outcomes, implant longevity, and the occurrence of complications. Historically, research has focused on patient-related factors, including age, comorbidities, bone quality, and the specific surgical techniques and implant designs employed (4). Various surgical approaches, such as anterior, posterior, or lateral techniques, as well as cemented versus uncemented fixation, have been extensively studied. Furthermore, the implementation of enhanced recovery after surgery (ERAS) protocols, which emphasize early mobility and multimodal pain management, has been shown to reduce surgical stress and expedite postoperative recovery (5).

However, the surgical environment is a dynamic and complex system where patient safety and procedural success are closely linked to the performance and well-being of the surgical team. The operating room is a high-stakes environment that requires seamless coordination among orthopedic surgeons, anesthesiologists, nurses, surgical technicians, and other support staff (6). Each team member plays a vital role in maintaining an efficient surgical flow, and the demands of the operating room can be significant. Extended periods of focused attention, the need for rapid decision-making in the face of unforeseen challenges, and the physical and mental strain of performing intricate surgical procedures can all contribute to the stress experienced by surgical teams (7).

Total hip replacement (THR) is a widely performed surgical procedure aimed at alleviating pain and restoring function in patients with hip joint issues, particularly osteoarthritis. Despite being a routine treatment, THR can be complex and time-consuming, leading to significant physical and psychological stress for the surgical team, including surgeons, anesthesiologists, and nurses. Extended operating times and unexpected intraoperative challenges contribute to heightened stress levels, mental exhaustion, and burnout among medical personnel. The literature highlights the critical relationship between the well-being of surgical staff and the quality of patient care, emphasizing the need for a comprehensive understanding of these challenges in high-stakes operating room environments (8,9,10).

Research has identified various factors contributing to burnout in surgical settings, including intense work schedules, decision-making pressures, and administrative burdens. Studies have shown that burnout not only affects individual surgeons but also impacts surgical team efficiency and patient safety. Specific pressures faced by orthopedic surgeons, such as the physical demands

of surgery and the need for precision, further exacerbate the risk of burnout (11). Strategies to mitigate these effects include organizational initiatives aimed at improving work-life balance, workload management, and fostering resilience among surgical staff. Overall, addressing burnout in the surgical workforce is essential for enhancing both employee well-being and the quality of care provided to patients undergoing THR (12).

One critical aspect of THR procedures is the length of the surgical operation and the potential for unexpected intraoperative complications. Prolonged operating times, defined as surgeries that exceed expected durations, can arise from various factors, including patient-specific characteristics such as obesity, complex anatomy, and comorbidities that complicate the procedure. Additionally, surgical circumstances, such as the need for intricate reconstructions or the emergence of intraoperative problems, can further extend operating times. Intraoperative challenges may include unexpected fractures, excessive hemorrhage requiring blood transfusions, nerve injuries leading to postoperative deficits, difficulties in achieving optimal implant placement, soft tissue complications, and equipment malfunctions (13,14,).

The implications of prolonged operating times and intraoperative challenges extend beyond the immediate surgical episode, affecting the routine management of the operating theater. Schedule disruptions can arise from extended surgeries, leading to increased pressure to expedite subsequent procedures and potential delays. Addressing these challenges may require additional staff, equipment, and resources, placing further strain on already limited resources and creating logistical difficulties. Moreover, the increased workload and time pressure can disrupt the team's workflow, resulting in poor communication, diminished attention to detail, and a decline in overall team performance (16).

The psychological impact on surgical team members is another critical consideration. The stress associated with managing complex and lengthy surgical operations, coupled with the challenges of addressing unforeseen complications, can significantly affect the mental and emotional well-being of the surgical team. Research has consistently shown that surgical staff, including nurses and surgeons, are particularly susceptible to burnout—a syndrome characterized by depersonalization, emotional exhaustion, and a reduced sense of personal accomplishment. Symptoms of burnout may include increased fatigue, cynicism, impatience, decreased job satisfaction, and difficulty concentrating. Factors contributing to burnout in surgical settings include long and unpredictable work hours, a demanding work environment, the necessity for rapid decision-making, and the psychological strain of managing patient morbidity and mortality (17).

Furthermore, organizational issues, communication barriers, and the hierarchical structure of surgical teams can exacerbate stress and contribute to burnout among staff. The consequences of burnout are far-reaching, as it has been linked to a decline in the quality of patient care, an increased risk of medical errors, reduced productivity, and higher turnover rates among healthcare workers. The personal lives and overall well-being of healthcare professionals may also suffer as a result of burnout. Additionally, the shift work common among nurses in perioperative settings can disrupt lifestyle patterns and elevate stress levels, further impacting employee well-being. The physical demands of operating room work, including prolonged (18).

## Materials and Methodology

### Study Design:

This study employs a cross-sectional descriptive design to assess the impact of prolonged operative time and intraoperative challenges in total hip replacement (THR) on operating room staff's routine management and psychological health. The research is based on self-reported questionnaires collected from surgical staff, including surgeons, anesthetists, and nurses.

**Settings:**
The study was conducted at Adil Hospital and Doctors Hospital, two well-established healthcare facilities with dedicated orthopedic departments and a high volume of THR procedures.
**Study Duration:**
The research was carried out over a period of four months following the approval of the synopsis.
**Sample Size:**
A total of 50 participants were included in the study, consisting of surgeons, anesthetists, and nurses involved in THR procedures. The sample size was determined based on previous reference studies and calculated using appropriate statistical formulas.
**Sampling Technique:**
A purposive sampling technique was utilized to select participants based on their direct involvement in total hip replacement surgeries.
**Sample Selection**
**Inclusion Criteria:**

- Operating room staff (surgeons, anesthetists, and nurses) with at least one year of experience in THR procedures.
- Individuals who have participated in at least five THR surgeries within the last year.
- Willingness to provide informed consent for participation.

**Exclusion Criteria:**

- Operating room staff who do not participate in THR procedures.
- Individuals with incomplete or inconsistent responses in the questionnaire.

**Equipment(s)**
The study primarily utilized structured questionnaires as the data collection instrument. Additionally, statistical software SPSS (Statistical Package for the Social Sciences) version [27] was employed for data analysis.
**Scanning Technique**
No imaging or scanning techniques were required for this study, as it focused on qualitative and quantitative survey-based data collection from operating room staff. This methodology ensures a systematic approach to assessing the impact of prolonged THR procedures on surgical staff, allowing for insightful analysis and practical recommendations.

**Data Collection Procedure:**
A structured approach was followed to collect data for this study. The researcher ensured accurate measurement of variables and maintained ethical standards throughout the data collection process.
**I. Identification of Study Variables**
The study focused on the psychological impact and routine management challenges faced by operating theater staff during prolonged total hip replacement procedures. The key variables were:
**Independent Variables:** Duration of surgery, intraoperative challenges, staff role (surgeon, anesthetist, nurse, etc.), workload, and frequency of total hip replacement procedures.
**Dependent Variables:** Psychological stress, fatigue, impact on routine management, and staff well-being.
**II. Methods for Collection of Data**
Data was collected through a cross-sectional survey using structured questionnaires distributed among operating theater staff at Adil Hospital and Doctors Hospital. Participants were approached individually, and responses were collected after obtaining informed consent.

**III. Data Collection Tools (Questionnaire)**

A structured questionnaire was used to collect information from participants. The questionnaire included sections on:

1. Demographic details (age, gender, professional role, years of experience)
2. Workload and duration of surgeries
3. Perceived intraoperative challenges
4. Psychological impact and stress levels (using validated scales, if applicable)
5. Effects on routine management and patient care

**IV. Outcome Measurements**

- The primary outcome measured was the impact of prolonged total hip replacement surgeries on the psychological well-being and routine management of operating theater staff.
- Secondary outcomes included identifying specific stressors, workload distribution, and coping mechanisms adopted by the staff.

**V. List of Dependent and Independent Variables**

- Independent Variables:
- Length of surgery
- Frequency of procedures
- Intraoperative challenges
- Professional role (surgeon, anesthetist, nurse, etc.)
- Workload

**Dependent Variables:**

- Psychological stress levels
- Fatigue and burnout
- Impact on routine management
- Effect on patient care

**Data Analysis Procedure**

The data for this thesis consisted of quantitative measures related to Total Hip Replacement (THR) surgeries and their impact on operating room staff. The following procedures were used to analyze the data:

**Descriptive Statistics:**

- Frequencies and percentages for categorical variables such as gender and severity of intraoperative challenges.
- Means and ranges for continuous variables like operative time and agreement levels on coping strategies.

**Comparative Analysis:**

- Gender and Operative Time: A comparative analysis was conducted to examine differences in operative times between male and female patients. The operative times were categorized, and the distribution of cases across these categories was compared between the two groups.
- Intraoperative Challenges and Surgeon Stress: The relationship between the number of intraoperative challenges encountered during THR and surgeon-rated stress levels was analyzed. This involved presenting the distribution of stress levels alongside the challenges encountered.
- Severity of Intraoperative Challenges: The distribution of intraoperative challenges across different severity levels (Minor, Moderate, Severe, and Very Severe) was analyzed to understand the nature of surgical complexity in THR.

**Analysis of Staff Perceptions:**

- Agreement on Coping Strategies: The level of agreement among operating room staff regarding various strategies for managing increased workload was analyzed. Mean agreement levels were calculated for each strategy (implementing checklists, efficient task delegation, regular team briefings, and rotating staff during long procedures) to determine the perceived effectiveness of each.
- Frequency of Feeling Overwhelmed: The frequency with which people in general feel overwhelmed or burned was presented to provide context for the stress experienced by operating room staff.

**Data Visualization:**

Bar charts and line graphs were used to present the data visually. These visualizations aided in understanding the distribution of data, comparing groups, and identifying trends.

**Software Used:**

SPSS software used for analysis

**Assumptions and Limitations:**

The analysis assumes the data was collected accurately and represents the phenomena of interest. The limitations of the data should be acknowledged, such as the generalizability of findings on feeling overwhelmed to the specific context of THR.This procedure provided a framework for understanding the relationship between factors like operative time, intraoperative challenges, and their impact on the well-being of operating room staff.

**Results:**

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Stress level | 5.44 | 2.111 | 50 |
| challenges during THR | 1.94 | .240 | 50 |

This table presents the descriptive statistics for stress levels faced by operating room staff during total hip replacement (THR) procedures. The data includes 50 valid responses. The mean stress level reported by staff is 5.44, with a standard deviation of 2.111, indicating moderate variability in perceived stress among individuals. The challenges faced during THR procedures have a mean score of 1.94 with a relatively low standard deviation of 0.240, shows that responses about challenges were relatively consistent across participants.

**Overview of the Regression Model for Stress and THR Challenges**

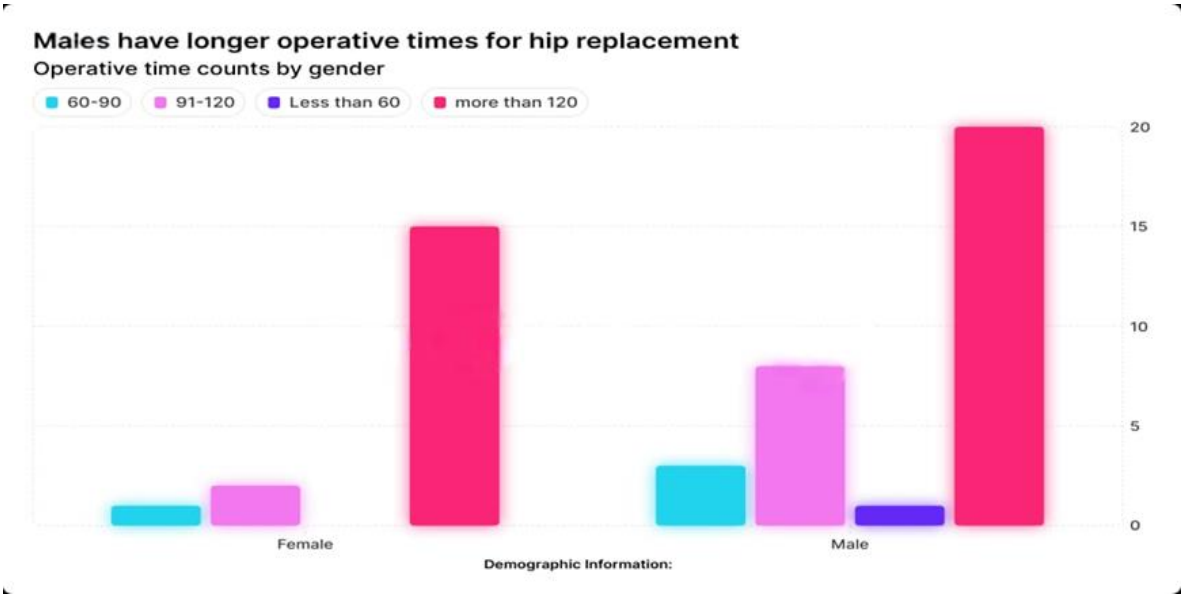
**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .027a | .001 | -.020 | 2.132 |

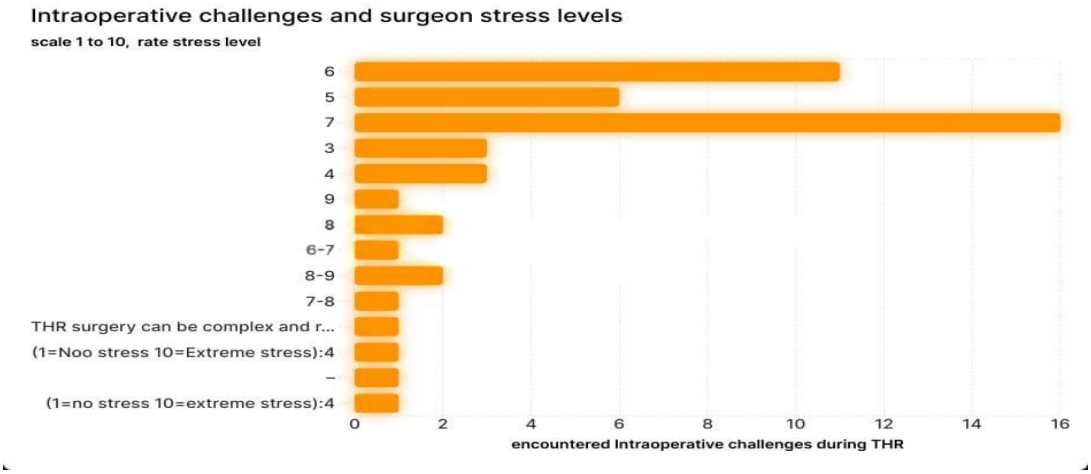
a. Predictors: (Constant), challenges during THR

b. Dependent Variable: Stress level

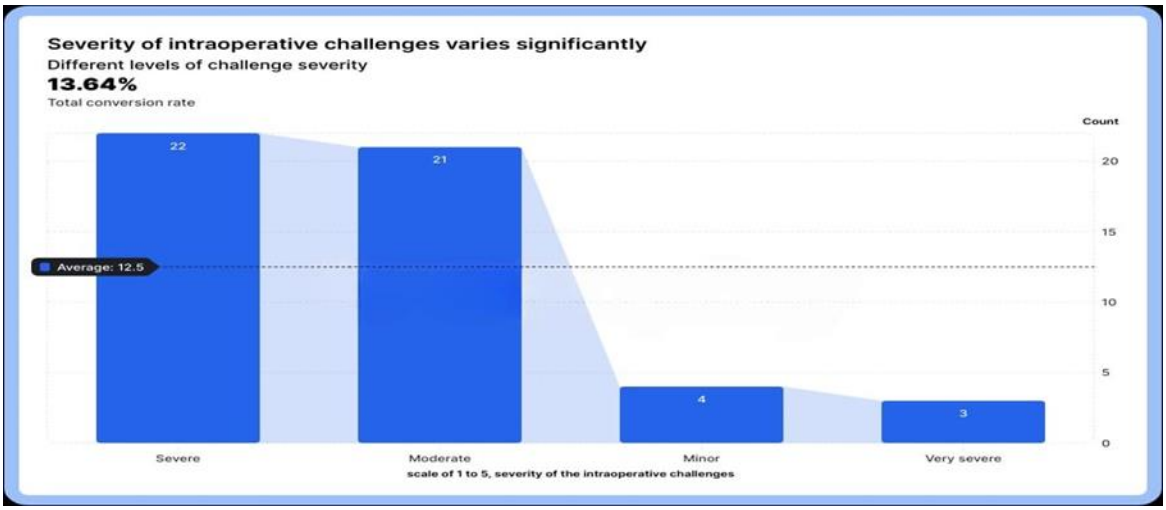
R: The correlation between the expected and actual stress levels is 0. 027.R Square ($R^2$) = 0.001: This shows that the difficulties encountered during THR account for a very little 0.1% of the variation in stress levels. The number of predictors in the model is taken into account by the adjusted R Square, which is -0.020. A negative score indicates that only utilizing the mean stress level as a predictor does not enhance the model. The average difference between the actual and anticipated stress levels is measured by the Standard Error of the Estimate, which is 2. 132.This suggests high variability in stress levels that is not explained by the challenges during THR.



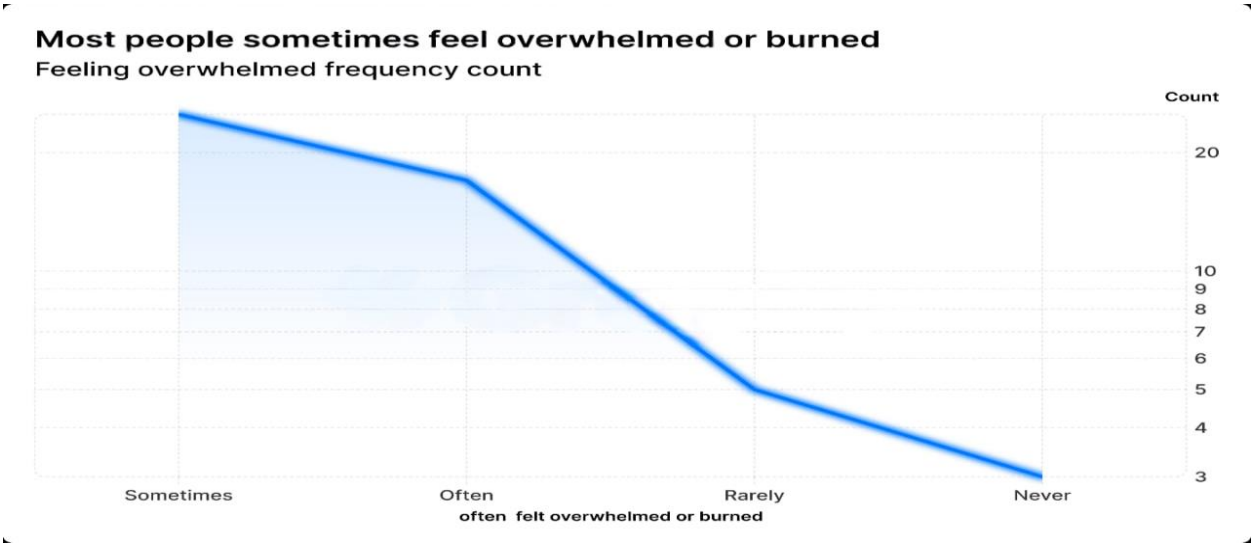

The chart indicates a trend toward longer operative times for male patients undergoing hip replacement compared to female patients: For the "more than 120 minutes" category, the count for males is significantly higher than that for females. In the "less than 60" minute category, males have the lowest count. For the 60-90- and 91-120-minute categories, females have slightly higher counts.



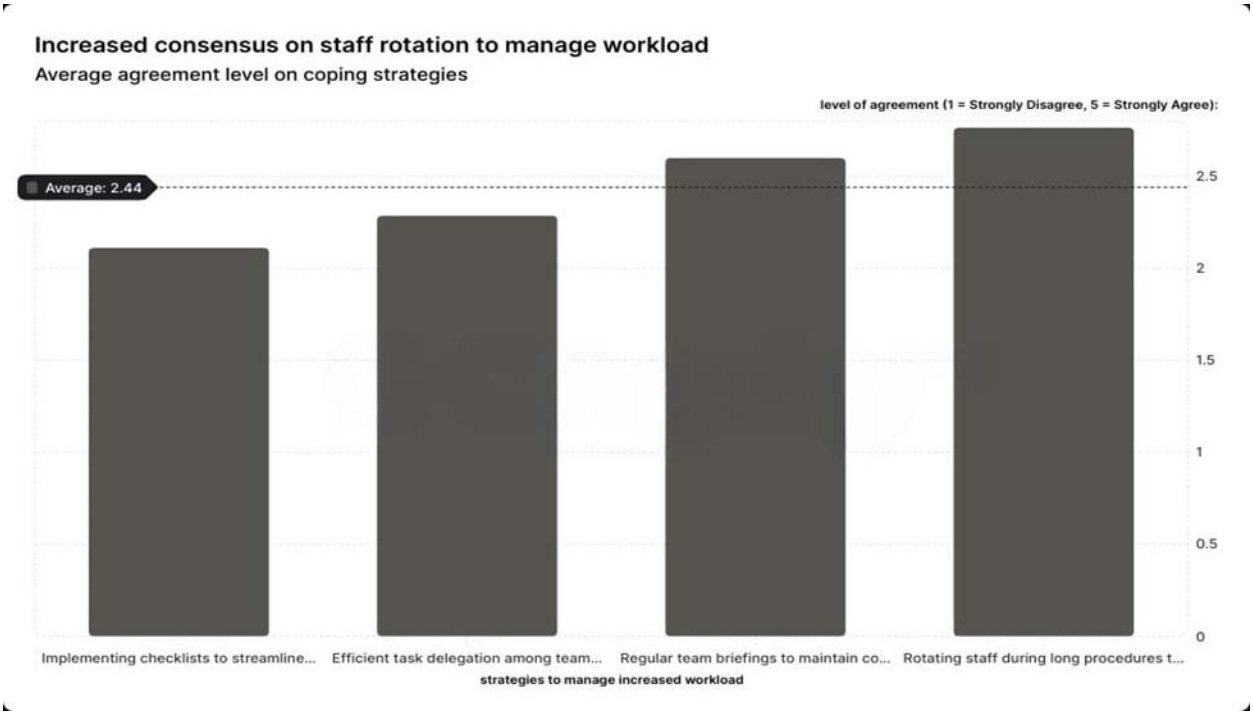

- The image directly correlates intraoperative challenges with increased surgeon stress.
- It visually demonstrates that as the complexity and difficulty of the surgery increase, so does the stress on the surgeon.
- When combined with the data showing that male THR surgeries tend to take longer, it suggests that surgeons may experience higher stress levels during male THR procedures due to the increased likelihood of encountering more challenges over time.




The x-axis represents the severity of intraoperative challenges, categorized as 'Minor', 'Moderate', 'Severe', and 'Very Severe'. A scale of 1 to 5 is implied, with higher numbers indicating greater severity. The y-axis represents the 'Count' or frequency of these severity levels. The chart also notes a "Total conversion rate" of 13.64% and an "Average" severity of 12.5. It seems there might be an issue with the labeling, as the average severity (12.5) is outside the 1-5 scale.




The image, titled "Most people sometimes feel overwhelmed or burned," is a line graph showing the frequency with which people feel overwhelmed. The x-axis represents the frequency (Sometimes, Often, Rarely, Never), and the y-axis represents the count. The graph indicates that most people sometimes feel overwhelmed, with the count decreasing as the frequency of feeling overwhelmed decreases.




The chart indicates the following:

- Among the strategies presented, "Rotating staff during long procedures" has the highest average agreement level (around 2.5 on the scale).
- The agreement levels for the other strategies (checklists, task delegation, and team briefings) are slightly lower.
- The overall average agreement level across all strategies is 2.44, suggesting a moderate level of agreement, leaning slightly towards disagreement.

**Discussion:**

This paper investigated the impact of extended operating hours and intraoperative challenges on the health of operating room personnel during total hip replacement (THR) surgeries. The findings reveal a complex interplay between surgical demands, staff responses, and patient-specific characteristics, which have significant implications for both patient care and the well-being of the medical team. Notably, the study found that male patients often experienced longer THR procedures, aligning with existing literature that identifies various patient-specific factors such as older age, higher body mass index, and comorbidities that can contribute to increased surgical duration. However, the study did not specifically analyze the prevalence of these factors, indicating a potential area for future research similar findings were observed by (19,20).

The results indicate that longer operating times are not merely a technical issue; they create a cascading effect that impacts the surgical team. Data on intraoperative challenges and surgeon stress levels suggest that the severity and frequency of these challenges correlate with increased stress among surgeon's similar findings were observed by (21). This finding is supported by existing literature that emphasizes the demanding nature of THR surgeries and their psychological toll on surgical personnel. The prevalence of moderate to severe intraoperative challenges in a significant percentage of THR procedures underscores the high-pressure environment of the operating room, which can lead to serious repercussions for both staff and patient outcomes similar findings were observed by (22).

The paper also explored the coping strategies employed by operating room personnel in response to the increasing workload associated with lengthy surgeries. Staff rotation emerged as the most common strategy, indicating that management recognizes the need to distribute the workload to mitigate fatigue similar findings were observed by (23). However, the moderate level of agreement on this approach suggests a lack of consensus on the best practices for managing surgical tasks, highlighting a potential gap in current operational protocols similar findings were observed by (24). This calls for a more systematic, research-based approach to task management in the operating room to enhance both efficiency and staff well-being similar findings were observed by (25).

Overall, the findings of this paper have important implications for patient care and the welfare of operating room personnel. Increased stress levels and prolonged operating durations are linked to a higher risk of complications, which can adversely affect patient outcomes (26). The complexity of THR procedures not only poses challenges for surgical teams but also increases the likelihood of staff burnout, leading to decreased job satisfaction, higher turnover rates, and potentially compromised patient care similar findings were observed by (27). The thesis integrates qualitative insights into staff attitudes and coping mechanisms with quantitative data on operating hours and intraoperative difficulties, providing a comprehensive perspective on the issue. However, limitations exist, such as the generalizability of findings related to feelings of being overwhelmed and the lack of specific analysis on the relationship between patient characteristics and intraoperative challenges, suggesting the need for further research with larger sample sizes and more detailed data collection similar findings were observed by (28).

**Conclusions:**

The conclusions of this research highlight the challenging nature of total hip replacement (THR) surgery and the significant workload it imposes on the surgical team. The study reveals a complex interplay between patient-specific factors, surgical demands, and staff responses, which has important implications for both patient care and the mental well-being of medical personnel. Notably, the findings indicate that male patients tend to have longer surgeries, suggesting a correlation between patient gender and operating duration. This aligns with existing literature that identifies factors such as age, body mass index (BMI), and comorbidities more prevalent in male

patients as contributors to longer and more complex surgical procedures. However, the specific causes of these associations were not thoroughly investigated in this study, indicating a potential area for future research.

Extended operating times are not merely a technical concern; they are associated with an increased likelihood of encountering intraoperative difficulties, which significantly elevate stress levels among surgeons. The data clearly demonstrate that the psychological toll on the surgical team escalates in relation to the frequency and severity of these challenges. This finding is consistent with other studies that emphasize the demanding nature of THR and its negative impact on employee well-being. The high-stress environment of the operating room, characterized by prolonged procedures and intricate intraoperative circumstances, renders healthcare workers particularly vulnerable to stress and burnout. While the data on feelings of being overwhelmed are not exclusive to THR, they provide crucial context regarding the susceptibility of operating room personnel to work-related stressors.

The study also examined the strategies employed by operating room staff to manage the increased workload resulting from these demands. Staff rotation emerged as the most common approach during lengthy procedures, reflecting an awareness of the need to distribute effort and mitigate fatigue. However, the moderate level of agreement on this strategy suggests potential weaknesses in current practices and indicates a lack of consensus on the most effective course of action.

Several limitations of the thesis were identified, including the lack of specific analysis on the relationship between patient characteristics and the difficulty of intraoperative challenges, as well as the general nature of the data on feelings of being overwhelmed. Future research should address these limitations and explore the long-term effects of occupational stress on surgical teams. In summary, this study provides compelling evidence that operating room personnel face significant burdens due to extended operating hours and intraoperative difficulties during THR. By recognizing the demands placed on surgical teams and implementing targeted interventions, healthcare systems can work towards fostering a safer, more sustainable, and supportive environment for both healthcare professionals and the patients they serve.

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