

Relationship Between Time Under Anesthesia and Length of Stay in Hospital

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Relationship Between Time Under Anesthesia and Length of Stay in Hospital

By

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Abstract

The purpose of this question, “Is there a relationship between the time under anesthesia during an orthopedic surgery and the length of time post-operatively spent in the hospital?”, is to examine the impact of anesthesia on adults over the age of 18 that have undergone anesthesia during orthopedic surgery . This retrospective chart review and supporting reviews of numerous research articles assisted to acknowledge the importance of the relationship between surgical procedures on recovery time and discharge.

The findings demonstrated an inverse relationship between the time under anesthesia during an orthopedic surgery and the length of hospital stay. However, there was a statistically significant relationship between age and length of stay in the hospital. Some factors that may have skewed the results of this study include, how many surgeries were examined and the two different types of anesthesia. The conclusion of this research will potentially inspire the implementation of interventions for older adults undergoing orthopedic surgery.

Chapter One

Introduction

Researchable Problem

An increased stay of time in the postanesthesia unit (PACU) following an increased time under anesthesia during an orthopedic surgery results in a significant problem for surgical patients. The patient is at an increased risk for developing pneumothorax, airway obstruction, hypoventilation, pulmonary embolism, myocardial infarction (MI) and cardiac tamponade if in the PACU for an extended amount of time. All of these conditions listed are incredibly dangerous and could impose serious complications, even death. An airway obstruction and a pneumothorax, which results from collection of air in the pleural space (Hoffman & Sullivan, 2020) sequentially causes an inability to breathe. Hypoventilation, otherwise referred to as a resting respiratory rate of less than 12 breaths per minute, can result in hypoxia (Hoffman & Sullivan, 2020). A pulmonary embolism is an obstruction of one or more of the branches of the pulmonary artery by particulate matter that has an origin elsewhere in the body (Hoffman & Sullivan, 2020). This condition can consequently cause difficulty breathing for a patient. A substantial cardiac condition caused by overstay in the PACU is an MI, which is the result of decreased blood flow to the muscles of the heart which can be detrimental to the health of the patient, and can result in death. A cardiac tamponade includes Beck's Triad which consists of hypotension, jugular vein distention (JVD) and muffled heart sounds (Hoffman & Sullivan, 2020).

The study was feasible as the research was conducted from an acute care facility with an operating room that is accessible to the primary investigator. The collection of patient charts was also attainable and no direct patient interaction was necessary. The study is applicable to nursing because the results provide additional knowledge about interventions that directly impact patient care. These nursing interventions can provide better patient outcomes by allowing them to have a quicker and safer discharge after undergoing anesthesia with any orthopedic surgery. The prevention of complications secondary to a prolonged hospital stay such as pneumothorax, hypoventilation, cardiac tamponade and pulmonary embolism create a better chance of recovery. The current study advances the knowledge for patient safety by preventing prolonged hospital stays.

Purpose of the Study

This research study was essential to expand the data that surrounds the time under anesthesia during an orthopedic surgery and the correlation of time spent in the hospital. This research was significant because it is the first step in determining better outcomes for orthopedic surgical patients.

Terms and Variables

The independent variable was the time the patient spent under anesthesia in an orthopedic surgery in the operating room (OR). The definition of anesthesia is a medication that is given to temporarily cause amnesia and decrease awareness (National Institute of General Medical Sciences, 2023). Orthopedic surgery is a procedure that involves the musculoskeletal system to repair function of a certain anatomical structure. The conceptual definition consists of a more hypothetical reasoning and ideology. The

time spent under anesthesia during an orthopedic surgery could be determined by theoretical circumstances. Some of these circumstances include the surgical team and surgeons preparation time, the CRNA's roles and preparation time, consequences or emergencies during surgery, room setup, medication availability, surgical equipment malfunctions and/or availability and response of the patient to being under anesthesia and physical stress from surgery. This time will be recorded in minutes.

The dependent variable would be the time the patient spent in the hospital after surgery. Demographics included in the study are age and gender. The individuals being studied were over the age of eighteen. Gender was identified as the sex that the individual was assigned at birth.

Assumptions

While conducting a retrospective chart review, it was assumed that the charts were accurate. It was assumed that the type of surgery, the type of anesthesia, the age and sex of the patient, date of surgery, admission and date of discharge were all accurate in the patients charts. Data was collected from random patient charts that fit the inclusion criteria. It was assumed that there would be an adequate number of orthopedic patients for the study.

Chapter Two

Literature Review

Introduction

The proposed research question is as follows: Is there a relationship between the time under anesthesia during an orthopedic surgery and the length of time post-operatively spent in the hospital? To be successful in discovering more research related to the research question a literature review was completed by using CINAHL complete. Although the request of finding specific information that is closely related to the research topic was particularly tedious, search terms that were used to find articles included; orthopedic, surgical patients, anesthesia and length of stay in the hospital. The dates were also modified to find research within the last ten years. Sequentially, eight articles were gathered to approach the research topic of whether or not there is a relationship between the time an orthopedic surgical patient is under anesthesia and the length of time in the hospital.

General Versus Regional Anesthesia

Both general, or spinal, and regional anesthesia are suitable options for patients that undergo hip surgery. Vaz et al.(2022) organized a retrospective cohort study of patients that underwent hip surgery to see if there was a difference between general and regional anesthesia and if the type of anesthesia has an effect on the length of hospital stay and 30-day mortality rates. This quantitative research study identified 562 patients that had undergone hip surgery from January, 2017 to December, 2018. Vaz et al.(2022) omitted patients with multiple fractures, which was 73 cases, American Society of

Anesthesiologists physical state of classification more than IV, which was 14 cases, and patients that had undergone peripheral nerve block anesthesia, which was 52 cases. After removing these cases from the study, the final number of patients that were to be studied was 562. Factors that were considered included; age, gender, surgery type (Reduction and osteosynthesis, total hip arthroplasty, partial hip arthroplasty), waiting time (first 48 hours and more than 48 hours after admission), fracture type (subtrochanteric, intertrochanteric, femur neck), and ASA classification (1-4). Out of the 562 patients, 361 went under general anesthesia and the remaining 201 underwent regional anesthesia. Findings from the study determined that patients that underwent general anesthesia stayed an average of 11.28 days while patients that underwent regional anesthesia stayed, on average, 10.38 days. However, there were no findings that supported any statistically significant difference between the two types of anesthesia and the risk of perioperative mortality at 30 days (Vaz et al., 2022).

Improvement in Postoperative Pain Control

In this quantitative research study, patients that had distal radius open reduction and internal fixation (ORIF) were studied to determine if there was a difference in length of stay and patient's pain level at the time of discharge regarding the type of anesthesia for his/her surgery. The two types of anesthesia that were focused on in this research were peripheral nerve block without general anesthesia and general anesthesia. Johnson et al. (2022) conducted a nonrandomized, consecutive research study. In total, there were eighty-two patients that were included in the study that had ORIF from March to August 2016. The results of this study explained that the use of peripheral nerve blocks prior to

ORIF, lowered patient's pain scores at the time of discharge and decreased the length of stay for these patients (Johnson et al., 2022).

Smoking Associated With Blood Loss

McCunniff et al. (2015) conducted a quantitative research study to determine whether or not smoking causes increased blood loss after surgery and if there is an increase in transfusions after surgery. Multiple linear regression was used to analyze data for this study. The spine center was chosen for the location of this study and the research was conducted from 2005 to 2009. A total of 559 patients that underwent lumbar surgery were studied. Clients that were omitted from the study included; patients with underlying coagulopathy, patients receiving anticoagulants such as aspirin and platelet inhibitors and patients that have bleeding disorders. Some patient demographics that were focused on in this study were gender, the mean of levels decompressed, fused, instrumented and the mean of the number of discectomies. The outcome of the study revealed that smoking is associated with increased estimated surgical blood loss and transfusions (McCunniff et al., 2015).

Effects of Diabetes on Spinal Surgery Outcomes

Appurduay & Lo (2013) conducted a study to focus on diabetic patients and postoperative complications after lumbar surgery. The type of study design performed for this quantitative research study was a retrospective cohort study. The location of this research was conducted at the Royal Melbourne Hospital between 2001 and 2005. Some of the variables included in this study were; number and type of complications, age in years, diabetes and positive smoking history. A total of 902 patients were studied. An

issue with this study is that all of the factors that are considered complications are subjective and came from clinical notes. In conclusion, diabetic patients were more susceptible to complications after lumbar surgery than patients that smoked.

Smoking Related to Complications

Althoff et al. (2018) conducted a study to determine if there were negative consequences related to post-procedure complications after extensor mechanism repair. Some variables used in this quantitative study are as follows: gender; age; obesity classification; race (white, african-american, or other); comorbidities (diabetes mellitus, hypertension, cardiac history, chronic obstructive pulmonary disease (COPD), steroid use, and dialysis); functional status and ASA classification. According to Althoff et al. (2018), 5208 patients were used as part of the study and of those, 843 were smokers. The hypothesis created by the authors was that tobacco use would cause higher rates of complications following an extensor mechanism repair. The hypothesis was supported by the findings. The study concluded that smokers are at a higher risk for experiencing complications after an extensor muscle repair.

Reducing Catheter Associated Urinary Tract Infection (CAUTIs)

A common occurrence in any field of healthcare is catheter-associated urinary tract infections. Without proper sterile technique performed by the health care worker, it is highly probable for a patient to suffer a catheter-associated urinary tract infection. Therefore, Singh et al. (2021) conducted a study, “to determine the prevalence of a UTI on admission among geriatric hip fracture patients and whether routine screening for UTI or predisposing factors at presentation resulted in reduced states of CAUTI (Singh et. al.,

2021.) The type of method that was used for this particular study was a retrospective observational study. A total of 183 patients that had a hip fracture were used for this study. Some demographic and clinical characteristics that were considered were, age, sex, mechanism of injury (fall from bed, chair, stairs, toilet, same level, unspecified), mortality (ICU length of stay and hospital length of stay), CAUTI, and hospital disposition. Comorbidities were also considered as part of the study. Researchers found that hypertension was the highest comorbidity identified with the participants. The research determined that if admission urinary analyses were conducted on geriatric post-hip-surgery patients, then there would be a significant decrease in the amount of CAUTIs experienced by this group.

Risk Factors

According to Efstathopolous et al.(2012), the number of surgical site infections and UTI following orthopedic procedures has decreased recently with the use of antimicrobial prophylaxis. There were 100 cases and 100 controls involved in the study. A case control study was performed to determine some of the risk factors that relate to negative outcomes after orthopedic surgeries. Some clinical parameters of the study included: age; gender(males); obesity; diabetes mellitus; American Society of Anaesthesiologists (ASA) score; anatomical location of surgery (knee, hip, fracture, other); chemoprophylaxis (cephalosporin and vancomycin); type of anesthesia (general, epidural, spinal); emergency of surgical procedure (scheduled or urgent); pre and postoperative glucose levels; pre-operation hospitalization days; total duration of hospital stay; number of days the patient had a urinary catheter; and site of infection (urinary,

surgical field, lung, surgical site infection (SSI) and UTI, acute cholecystitis, bacteremia and acute sinusitis). The study determined that “UTI was the most frequent hospital cross infection after orthopedic procedures” (Efsthathopolous et al. 2012, p. 252).

Postoperative Urinary Retention

Karaoz et al. (2017) conducted a quantitative research study to determine the effect of nursing interventions on prevention and management of postoperative urinary retention (PUR) for patients that underwent orthopedic surgeries after spinal anesthesia. PUR may occur in patients after surgery due to inflammation or effects of anesthesia. Some characteristics of the study are as follows: age; sexuality; medical diagnosis; history of surgery; educational status; marital status; frequency of urination. One hundred thirty-two patients were used for the research study with 66 patients each in the control and intervention groups. The method used for this quantitative research study was a randomized controlled clinical experimental study. The research study was conducted in a public hospital in Kocaeli between September 2013 and June 2014. In conclusion, the study was able to prove that nursing interventions decreased PUR incidences; therefore, also reducing urinary catheterization incidences (Karaoz et. al., 2017).

Conclusion

The need for this research was prompted because little has been studied regarding this particular topic. The importance of the research question: “Is there a relationship between the time under anesthesia during an orthopedic surgery and the length of time post-operatively spent in the hospital?” becomes profound because increased length of time in the hospital can result in deadly complications. After completion of this research,

it will be determined if there is a relationship between the time under anesthesia and the length of stay in the hospital. It is imperative to determine whether or not there is a relationship between the time under anesthesia in an orthopedic surgery and the length of hospital stay to determine factors that could potentially change the outcome for the patients that are at risk for suffering long-term and serious conditions after being put under general anesthesia. General anesthesia is more commonly used on patients with less comorbidities, while regional anesthesia is more commonly used by surgeons for patients with less comorbidities (Kentor et al.,2003, p. 867). This standard is important to consider because the goal is to determine the safest outcome for the patient. The purpose of this research is to determine whether or not length of time under anesthesia during an orthopedic surgery will have an overall detrimental impact to the patient's health as evidenced by a prolonged stay in the hospital. The articles investigated in the literature review are all quantitative in nature. Additionally, the sample sizes range from 132 individuals to 5208 individuals.

Research Question

In order to determine if there is an increased risk for postoperative complications due to an increased length of stay in the hospital after undergoing anesthesia, a research study was conducted. A lack of research on this topic prompted the study to be conducted. The research question to be addressed was, "Is there a relationship between the time under anesthesia during an orthopedic surgery and the length of stay in the hospital?"

Chapter Three

Methodology

Introduction

There have been limited studies focused on whether or not there is a correlation between the time under anesthesia, particularly referring to orthopedic surgery, and the length of hospitalization. The importance of this study was to determine if there is an increased amount of time of hospitalization post-operatively, resulting in an increased risk for health complications. The primary investigator (PI) completed the Institutional Review Board (IRB) at Lenoir Rhyne University prior to initiating data collection. The “Protection of Human Resource Participants” course was completed by the PI in October 2023.

Study Design

The design of this research was correlational, quantitative and non-experimental. A correlational design studies the relationship between two or more variables. The study was quantitative because it is focused on numbers. In addition, the study was non-experimental because there was no intervention or manipulation of the participants. The study involves an independent variable and dependent variable. The independent variable being the time under anesthesia and the dependent variable being the length of hospitalization post-operatively.

Setting and Sample

This study included all patient charts that fit the previously described criteria in an acute care facility in Western, North Carolina. A convenience sample size of 60

participants was included to satisfy the rule of thirty for each variable. Data was collected from the confidential, medical records of patients who underwent orthopedic surgery at an acute care facility in Western, North Carolina. Inclusion criteria for the study included individuals over eighteen years of age having some type of orthopedic surgery. Variables collected included age, gender, type of orthopedic surgery, type of anesthesia, and length of time under anesthesia and length of hospital stay. The data was collected from previous patient charts. Examples of exclusion criteria were patients who did not undergo anesthesia during an orthopedic surgery, patients who did not undergo orthopedic surgery and patients under the age of eighteen.

Data Collection, Methods and Procedures

The data was collected on an Excel spreadsheet. The data was collected from a group of patients that fit the criteria of being eighteen years of age or older, gender (male or female), type of orthopedic surgery, length of stay in the hospital, type of anesthesia (general or non-general), and length of time under anesthesia. The document was stored on a computer that was passcode locked to ensure patient information was secure and private. No patient identifiers were taken outside of the hospital. All data collected throughout the study was deleted after completion of the study.

Statistical Analysis

This study focused on the relationship between the length of time spent under anesthesia during an orthopedic surgery and length of stay in the hospital. Pearson r was used to determine the relationship between the length of time under anesthesia and the length of stay in the hospital. Patient's age was analyzed as a ratio level allowing for a

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mean, median, mode, standard deviation and range to be calculated. Patient gender was a nominal level variable and was calculated as a total number and percentage.

Chapter Four

Introduction

The primary investigator addressed the research question, “Is there a relationship between the time under anesthesia during an orthopedic surgery and the length of time post-operatively spent in the hospital?” A total of sixty participant charts were reviewed to meet the rule of thirty for a relationship between the two variables. The primary investigator completed the Institutional Review Board at Lenoir-Rhyne University (Appendix A). In addition, the PI completed the “Protecting Human Research Participants” course prior to initiating the study (Appendix B).

Characteristics of Sample

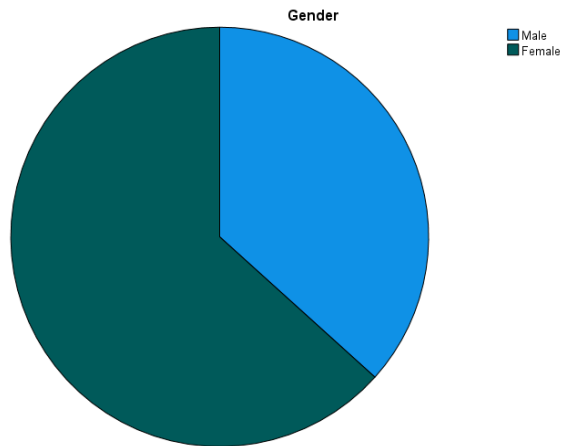
There were sixty participants reviewed at an acute care facility in Western North Carolina. There were 22 male (36.7%) and 38 female (63.3%) participants in the study. (See Table 1, Figure 1)

Table 1

Gender

		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	22	36.7	36.7	36.7
	Female	38	63.3	63.3	100.0
	Total	60	100.0	100.0	

Figure 1

Gender

There were nine different orthopedic surgeries that were noted with data collection. There were four (6.7%) arthroplasty partial hips, two (3.3%) open reduction internal fixation humerus, four (6.7%) insertion intramedullary nail femurs, four (6.7%) arthroplasty reverse shoulders, twenty-three (38.3%) arthroplasty total knees, eight (13.3%) open reduction internal fixation hips, one (1.7%) closed reduction hip, twelve (20.0%) arthroplasty total hips, and two (3.3%) partial knees. (See Table 2, Figure 2)

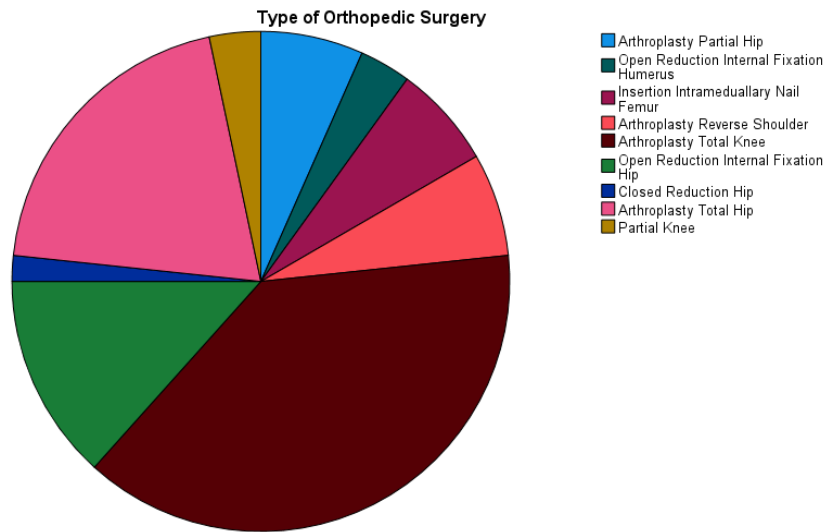
Table 2

Type of Orthopedic Surgery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arthroplasty Partial Hip	4	6.7	6.7	6.7
	Open Reduction Internal Fixation Humerus	2	3.3	3.3	10.0
	Insertion Intrameduallary Nail Femur	4	6.7	6.7	16.7
	Arthroplasty Reverse Shoulder	4	6.7	6.7	23.3
	Arthroplasty Total Knee	23	38.3	38.3	61.7
	Open Reduction Internal Fixation Hip	8	13.3	13.3	75.0
	Closed Reduction Hip	1	1.7	1.7	76.7
	Arthroplasty Total Hip	12	20.0	20.0	96.7
	Partial Knee	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

Figure 2

Type of Orthopedic Surgery



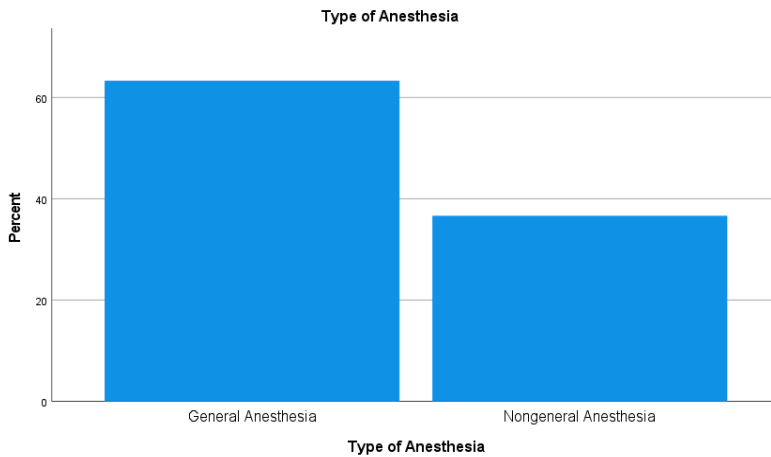
There were two types of anesthesia that were examined during the study which include general and non-general. (See Table 3, Figure 3)

Table 3

Type of Anesthesia

		Type of Anesthesia			Cumulative Percent
		Frequency	Percent	Valid Percent	
Valid	General Anesthesia	38	63.3	63.3	63.3
	Nongeneral Anesthesia	22	36.7	36.7	100.0
	Total	60	100.0	100.0	

Figure 3



The average age for the sample was 71.08 (12.29%). The minimum age was thirty-two years and the maximum age was ninety-three years. (See Table 4)

Table 4

Age

N	Valid	60
	Missing	0
Mean		71.0833
Median		72.0000
Mode		82.00
Std. Deviation		12.29895
Range		61.00
Minimum		32.00
Maximum		93.00
Sum		4265.00

The average length of stay was 2.95 days (2.78%). The minimum stay was one day and the maximum stay was thirteen days. (See Table 5, Figure 5)

Table 5

Length of Hospital Stay

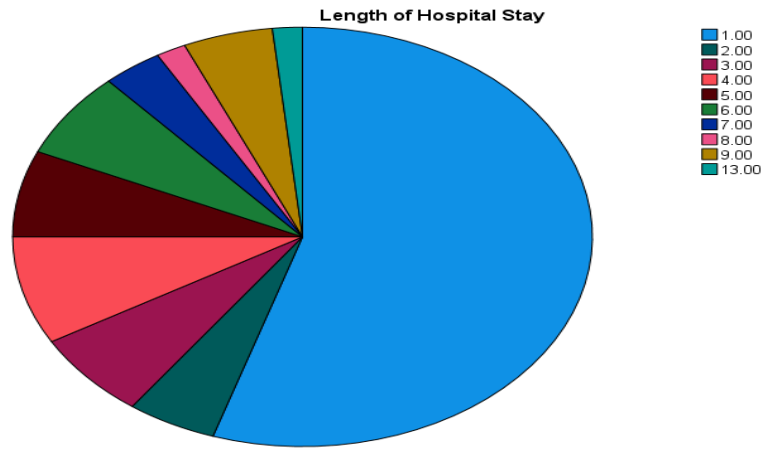
Statistics

Length of Hospital Stay

N	Valid	60
	Missing	0
Mean		2.9500
Median		1.0000
Mode		1.00
Std. Deviation		2.78266
Range		12.00
Minimum		1.00
Maximum		13.00
Sum		177.00

Figure 5

Length of Hospital Stay



The average length of time under anesthesia was 162.93 minutes (58.48%). The minimum amount of time under anesthesia was sixty-five minutes and the maximum amount of time under anesthesia was 382 minutes. (See Table 6, Figure 6)

Table 6

Length of Time Under Anesthesia

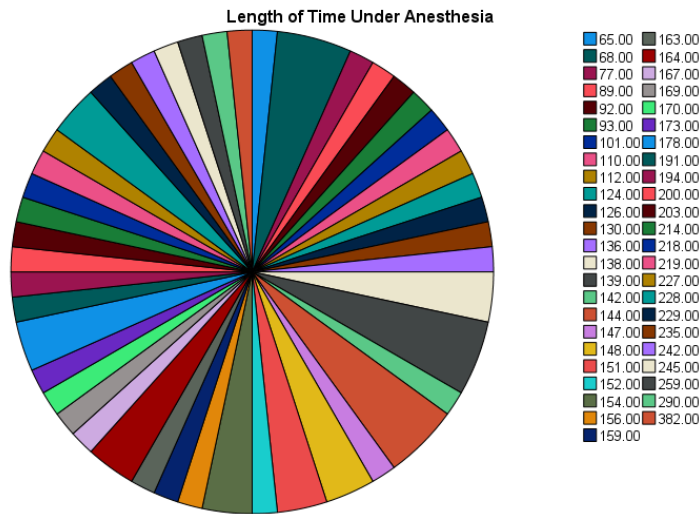
Statistics

Length of Time Under Anesthesia

<i>N</i>	<i>Valid</i>	60
	<i>Missing</i>	0
<i>Mean</i>		162.9333
<i>Median</i>		153.0000
<i>Mode</i>		68.00 ^a
<i>Std. Deviation</i>		58.48131
<i>Range</i>		317.00
<i>Minimum</i>		65.00
<i>Maximum</i>		382.00
<i>Sum</i>		9776.00

Figure 6

Length of Time Under Anesthesia



Presentation of Findings

A Pearson r statistic was conducted to answer the research question, “Is there a relationship between the time under anesthesia during an orthopedic surgery and the length of time post-operatively spent in the hospital?” There was an inverse relationship between length of stay in the hospital and length of time under anesthesia ($r=-0.092$, $p=0.485$). The finding was not statistically significant (See Table 7).

Table 7

Correlation

Correlations

		<i>Length of Hospital Stay</i>	<i>Length of Time Under Anesthesia</i>
<i>Length of Hospital Stay</i>	<i>Pearson Correlation</i>	1	-.092
	<i>Sig. (2-tailed)</i>		.485
	<i>N</i>	60	60
<i>Length of Time Under Anesthesia</i>	<i>Pearson Correlation</i>	-.092	1
	<i>Sig. (2-tailed)</i>	.485	
	<i>N</i>	60	60

Incidental Findings

The private investigator reviewed the data and ran additional statistics on related variables. A Pearson *r* statistic was conducted on the relationship between age and the length of stay in the hospital. There was a statistically significant correlation identified between age and length of stay in the hospital ($r=0.275$, $p=0.03$). (See Table 8).

Table 8

Correlation of Age and Length of Stay

Correlations

		<i>Age</i>	<i>Length of Hospital Stay</i>
<i>Age</i>	<i>Pearson Correlation</i>	1	.275*
	<i>Sig. (2-tailed)</i>		.033
	<i>N</i>	60	60
<i>Length of Hospital Stay</i>	<i>Pearson Correlation</i>	.275*	1
	<i>Sig. (2-tailed)</i>	.033	
	<i>N</i>	60	60

*. Correlation is significant at the 0.05 level (2-tailed).

The Length of stay for males and females was explored with a cross tabulation. While there were more women in the study (N=38, 63.3%) than men (N=22, 36.7%) the number of men and women were similar in that more individuals left the hospital at one day. (See Table 9).

Table 9

Length of Hospital Stay- Gender Cross Tabulation

Length of Hospital Stay * Gender Cross Tabulation

Count

		Gender		Total
		Male	Female	
Length of Hospital Stay	1.00	15	18	33
	2.00	0	3	3
	3.00	1	3	4
	4.00	2	3	5
	5.00	0	4	4
	6.00	0	4	4
	7.00	1	1	2
	8.00	0	1	1
	9.00	2	1	3
	13.00	1	0	1
Total		22	38	60

The PI also looked to see if there was a difference in length of stay based on gender. There was a statistically significant finding ($t=8.212, p<.001$), indicating a difference in the mean times of length of stay and gender (See Table 10).

Table 10

One-Sample Test

One-Sample Test							
Test Value = 0							
	t	df	Significance		Mean Difference	95% Confidence Interval of the Difference	
			One-Side d p	Two-Side d p		Lower	Upper
Length of Hospital Stay	8.212	59	<.001	<.001	2.95000	2.2312	3.6688
Gender	26.034	59	<.001	<.001	1.63333	1.5078	1.7589

Women had a longer length of time under anesthesia (See Table 11).

Table 11

Length of Time Under Anesthesia for Both Genders

Report

Length of Time Under Anesthesia

Gender	Mean	N	Std. Deviation
Male	159.6364	22	64.44233
Female	164.8421	38	55.55544
Total	162.9333	60	58.48131

Chapter Five

Discussion of The Findings

The quantitative study consisted of 60 patient charts that were used to comprise a statistical analysis. The completion of the study revealed that there was not a statistically significant relationship between the amount of time spent under anesthesia during an orthopedic surgery and the time spent in the hospital. The average length of time under anesthesia was 192.63 minutes. The average length of stay in the hospital was 2.95 days. The most frequent type of orthopedic surgery among the case studies was total knee arthroplasty. Analysis of the data also demonstrated that there was a statistically significant relationship between age and length of stay in the hospital. The analysis of data also proved that women spent a longer amount of time under anesthesia than men in this study.

Comparison to Current Literature

There were no studies identical to this study, however the study conducted by Vaz et al. (2022) completed a retrospective cohort study to determine if there was a difference between general and regional anesthesia and the impacts each had on the length of hospital stay and 30-day mortality rates. There were a total of 562 patient cases studied. Conclusion of this study found that patients that underwent general anesthesia stayed a mean of 11.28 days while patients that underwent regional anesthesia stayed on average 10.38 days. This retrospective cohort study was similar in the aspect of studying two different types of anesthesia.

A quantitative research study conducted by Appurduay & Lo (2013) looked at 902 patients. This research proved that diabetic patients were more susceptible to complications after lumbar surgery than patients that smoked. Although this study is not identical to the study focused on in this research, it is comparable because a specific type of orthopedic surgery was focused on in this study. Spinal surgeries were also examined in this research.

Risk factors were analyzed in the study performed by Efstathopolous et al. (2012). Specifically, surgical site infections and UTI cases were focused on after orthopedic procedures. This information is relevant to this study as it explains why some patients may experience longer hospital stays after an orthopedic surgery. There were a total of 200 cases and controls involved in this study. This study revealed that UTIs were the most frequent hospital infections after orthopedic procedures.

Another research study that focused on the complications after an orthopedic surgery was the Karaoz et al. (2017) study. This research studied 66 patients. The results of this study determined that nursing interventions implemented after surgery did decrease the incidences of postoperative urinary retention. This study is relevant to the current study because it also determines a complication that can occur after a surgical procedure.

Implications for Nursing

Decreasing the length of hospital stay for orthopedic surgical patients can potentially decrease the opportunity for the patient to experience a hospital-acquired infection. However, after completion of this study it is especially imperative to focus on

the age and gender of the patient undergoing orthopedic surgery instead of the length of time under anesthesia during an orthopedic operation. This study found that women spent more time under anesthesia than men. Additionally, the study also determined that the older the patient was, the longer time they spent in the hospital. This study can support that more interventions may be needed for women and the older population rather than patients that spent more time under anesthesia during their orthopedic procedure.

Limitations to The Study

Some limitations to the study would include the smaller sample size and only one geographical area used to complete this research. Additionally, there were nine types of orthopedic surgeries identified and studied during this research. Another limiting factor was that there were two types of anesthesia that were studied. There were outliers found in the study that included the maximum time spent under anesthesia was 382 minutes. There was also a substantial difference between the number of total knee arthroplasties performed in comparison to the other types of surgeries. There were 23 of those cases studied while the next most frequent surgery was reported as only 12.

Recommendations For Future Studies

Recommendations for future studies would be to collect data at more than one acute care facility and from different geographical areas around North Carolina. The time span studied for this research was limited to only three months so increasing the time spent researching patient charts may be beneficial for future studies. A larger sample size is also recommended. Future studies need to select orthopedic surgeries with the same

type of anesthesia to determine if correlations and differences make an impact on length of stay.

Conclusion

The study did not find a statistically significant relationship between the time spent under anesthesia during an orthopedic surgery and the time spent in the hospital. Instead, it was determined that there was a statistically significant relationship between length of hospital stay and gender and time spent in the hospital and age of client also demonstrated a statistically significant relationship.

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Appendix A



Lenoir-Rhyne IRB

Protocol Exemption Notification

To: Chloe Falowski
From: Randall Bergman, IRB Chair
Subject: Protocol #2023/11/14
Date: 12/05/2023

The protocol **2023/11/14. Relationship Between Time Under Anesthesia and Length of Stay in Hospital** has been verified by the Lenoir-Rhyne University Institutional Review Board as **Exempt** according to 45CFR46.101(b)(4): (4) Secondary Research Uses of Data or Specimens on 12/04/2023.

Please note that changes to your protocol may affect its exempt status. Please contact me directly to discuss any changes you may contemplate.

Thanks,

Randall Bergman,
IRB Chair
randall.bergman@lr.edu

Appendix B

Protecting Human Research Participant Certification of Completion



CERTIFICATE OF COMPLETION

PHRP Online Training, Inc. certifies that

Chloe Falowski

has successfully completed the web-based course "Protecting Human Research Participants Online Training."

Date Completed: **2023-10-04**

Certification Number: **2993080**



PHRP
Protecting Human
Research Participants
Online Training

Appendix D

Vita

Chloe Falowski

Hometown

Hickory, NC

Education

Lenoir-Rhyne University, Hickory, North Carolina, May 2024

Bachelor of Science in Nursing

Honors

Junior Marshal, 2023