

Research Article

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Early Ambulation in Hip Replacement Patients Regarding Length of Hospital Stay

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Hip revision

Abstract

Background: Total hip replacement surgeries are one of the most common orthopedic surgeries performed today¹. This number continues to rise. One way to accommodate the growing need for inpatient orthopedic beds is through high hospital turnover. High turnover can possibly be accomplished through early ambulation. The goal of the study is to see if standing or walking before eight hours post-operative decreased overall length of hospital stay.

Methods: This research study is a retrospective chart review that looked at 92 randomly selected general anesthesia total hip replacement patients from Nebraska Medicine in Omaha, NE from August 2017 to August 2018. This research study makes a clear definition of early ambulation after total hip replacement surgery: standing or walking within eight hours of surgery.

Results: From the analyzed research the average length of stay for all 92 total hip replacement patients was 4.23 days. For those total hip replacement patients who were ambulated within eight hours of surgery completion the average length of stay was 2.83 days. For the total hip replacement patients who were ambulated after eight hours of surgery completion the average length of stay was 5.14 days.

Conclusion: There is a statistically significant difference in length of hospital stay for total hip replacement patients at Nebraska Medicine who were ambulated within eight hours of surgery completion compared to those who were not.

Introduction

Benefits of Early Ambulation in Hip Replacement Patients Regarding Length of Stay.

About one million total hip replacement surgeries are performed in the US each year making it one of the most common orthopedic surgeries performed today¹. This number continues to rise. One way to accommodate the growing need for inpatient orthopedic beds is through high hospital turnover. This ensures that patients who need hip replacement surgery are seen sooner. It is also cost effective for both hospitals and patients as the cost of inpatient care following total hip replacement surgery averages \$3,300 a day².

One study found that early ambulation in hip replacement patients can decrease the length of inpatient hospital stay by up to four days. Currently, there is no definitive time limit to what classifies "early ambulation" meaning that there is much room for interpretation. This research study makes a clear definition of early ambulation after general anesthesia total hip replacement surgery: standing or walking within eight hours of surgery completion marked by extubation time. This study also defines late ambulation as

standing or walking after eight hours of general anesthesia surgery completion. This study aims to find out if in total hip replacement patients does early ambulation compared to late ambulation decrease length of hospital stay?

With healthcare costs continuing to rise while reimbursement rates stay the same or decline, healthcare companies need to start finding ways to reduce health care cost. One way to do this is by reducing length of hospital stay. By reducing length of stay hospitals can reduce costs while improving patient outcomes. The researcher hypothesizes that there will be a statistically significant difference ($p < 0.05$) in length of hospital stay for total hip replacement patients who stood or walked within eight hours of surgery completion compared to total hip replacement patients who did not stand or walk within eight hours of surgery completion marked by extubation time.

Nebraska Medicine's Current Ambulation Protocol

In 2016 the Nebraska Medicine's orthopedic quality improvement team verbally put together an expectation that all orthopedic total joint patients should stand or walk within eight hours of surgery completion as it improves patient outcomes. This was never put into a formal policy. Rather, it has become the orthopedic unit's culture to do so with little knowledge as to why it is happening. With the use of this project the investigator will find out what patient outcomes, specifically length of hospital stay, are improved by the verbal guideline of having patients stand or walk within eight hours of surgery completion.

Review of literature

A review of literature was conducted to find gaps in knowledge, consequences of those gaps, current protocols, and proposed solutions. To start the review the researcher searched Google Scholar, CINAHL, Ebscohost, and ProQuest. A search limitation was used for date to find articles that were from 2013 or more recent. Search terms of early ambulation AND total hip replacement, early ambulation AND treatment outcomes, early ambulation after surgery, and effects of early ambulation were used. Through these searches three articles were found.

Another search was conducted in CINAHL using search terms arthroplasty, replacement hip, AND early ambulation. No limitation was put in by date or any other criteria. From this search three articles were found. A third search was performed on Ebscohost using search terms arthroplasty, replacement hip, AND early ambulation. Again, no limitations were used, and two articles were utilized with this search.

Brennan & Parsons (2017) conducted a research study that focused on implementing an enhanced recovery program for orthopedic patients involving epidural analgesia, early mobilization, enteral nutrition, and

interprofessional care regarding length of hospital stay³. The study found that with the program length of stay was reduced from an average of five days to two days. Epstein (2014) conducted a systemic review from multiple studies and their early mobilization protocols⁴. The review found that early mobilization reduced hospital complications and average length of stay. Oldmeadow et al. (2006) conducted a study that found that hospitalized patients who increased their step count by at least 600 steps per day were discharge two days earlier than patients who did not⁵. Andreasen et al. (2017) conducted a research study on total hip replacement patients and total knee replacement patients that showed less postoperative morbidity and shorter length of hospital stay for patients who were ambulated early⁶. Okamoto et al. (2016) conducted a research study on total hip replacement patients and found that patients who were mobilized the day of surgery were ready for discharge before patients who were ambulated the day after surgery⁷. Buddle (2012) conducted a research study on total hip replacement patients and found that patients who were ambulated the day of surgery had a shorter hospital stay and fewer re-admissions than those who were not⁸. Husted, Holm, and Jacobsen (2008) conducted a research study to identify patient characteristics associated with length of hospital stay after total hip and knee replacement surgery⁹. Kehlet (2013) conducted a research study that found fast-track total hip and knee replacement recovery programs reduced length of hospital stay¹⁰.

Knowledge Gaps

After going through the literature pertaining to early mobilization and length of hospital stay regarding total hip replacement patients, the researcher found that there are mixed reviews and significant gaps in knowledge. For example, with every research article found pertaining to rapid mobilization after surgery there was no time limit put on what "early mobilization" is other than having the patient walk or stand on postoperative day zero. Currently, there is no standard evidenced based protocol for early ambulation in total hip replacement patients. There are also significant differences in results pertaining to early mobilization and length of hospital stay with some studies finding there is a statistically significant difference in length of stay for patients who are mobilized early compared to those who are not, and some studies saying there is no statistically significant difference in length of stay.

Overall, the review of literature did provide interesting information regarding total hip replacement patients, early mobilization, and length of hospital stay. However, it did not provide conclusive information. All of the studies found significant benefits to patient outcomes regarding early mobilization, but again, they did not show conclusive information about length of stay.

Research Purpose

The purpose of this study is: In total hip replacement patients does early ambulation compared to late ambulation decrease length of hospital stay for Nebraska Medicine patients? This research study will provide a definition of early mobilization: having total hip replacement patients stand or walk within eight hours after general anesthesia surgery completion marked by extubation time. The study will aim to find out if having a strict definition of early mobilization shows a statistical significance in length of hospital stay compared to total hip replacement patients who are not mobilized early.

Methods

This study is a quantitative retrospective chart review from Nebraska Medicine that examines 92 randomly selected total hip replacement patients. Simple random sampling was done through a computer-generated algorithm. No direct contact was made with the subjects and only information pertinent to the study was obtained. The only other required inclusion criteria for the 92 randomly selected total hip replacement patients was that their surgery had to occur under general anesthesia between August 2017 and August 2018, and participants had to be 19 years of age or older. There were no exclusion criteria based on race, religion, orthopedic surgeon, surgical method, comorbidities, maximum age, sociodemographic status, or gender.

There are 809 inpatient beds at Nebraska Medicine. From August 2017 to August 2018 there were just over 100 patients who were admitted for total hip replacements under general anesthesia. Originally, the author wanted to evaluate 100 randomly selected total hip replacement patients as this was over 90% of the general anesthesia total hip replacement population from August 2017 to August 2018. One hundred patients were randomly selected but eight of those patients could not be used in the study due to lack of charting for either exact extubation time, ambulation time, or discharge time, so 92 patients ended up being evaluated for the final study.

The charting system used at Nebraska Medicine is *Epic*. The researcher had to go through a lengthy process with various Nebraska Medicine officials to be allowed access to certain parts of *Epic*. After IRB approval, the researcher applied to Nebraska Medicine stating the purpose and benefits of the study. The researcher had to state the specific parts of that she needed information from to continue to the study. These areas included: admission date and time, surgery date and time, extubation date and time, first ambulation date and time, and discharge date and time.

Extubation time was needed as this point was considered time of surgery completion to the researcher.

First ambulation date and time was considered charting from either PT, OT, or a nursing progress note that included: up in chair, ambulating in room, assisted to commode, stood at bedside, or ambulating in halls. Discharge was based on standardized clinical criteria specific to Nebraska Medicine such as, stable vital signs, post-surgical IV antibiotic completion, appropriate wound healing, and physical therapy and occupational approval to discharge based on the patient's ability to dress, toilet, and mobilize with assistance.

A Nebraska Medicine coder went through Nebraska Medicine charts looking for the requested information. The Nebraska Medicine coder used a computer-generated algorithm to randomly select the patients used for this study. After patients were selected the coder took the acquired data and made an Excel spreadsheet for the researcher to interpret. The Excel data was sent to the researcher via email, was downloaded and permanently deleted from that email, and then kept on a private and passcode locked personal laptop until the completion of data interpretation. After this, the data was permanently deleted from the researcher's personal computer.

Ethical considerations include: informed consent, do not harm, confidentiality, and anonymity. No personal identifying information was given or used at any time to conduct the presented research; therefore, no patient consent was needed. This was a retrospective chart review so beneficence was not a consideration during research as no risks were involved. Complete anonymity was kept throughout research as there was no personal identifying health information given to the researcher at any time.

Results

This research study will provide a definition of early mobilization: having total hip replacement patients stand or walk within eight hours after general anesthesia surgery completion. The study will aim to find out if having a strict definition of early mobilization shows a statically significant result ($p < 0.05$) in length of hospital stay compared to total hip replacement patients who are not mobilized early. The null hypothesis for this study is: There is no relationship between early ambulation in total hip replacement patients and length of hospital stay. The alternative hypothesis for this study is: There is a statistically significant relationship ($p < 0.05$) between early ambulation in total hip replacement patients and length of hospital stay. A confidence interval of 95% was used.

The type of test used for this study was the independent samples t-test. The α -level is 0.05. The total degrees of freedom are 90. The critical value for the t-statistic is 1.99. The average time of first ambulation for all the patients in this study was 16.57 hours. The average length of stay

for all patients in this study was 4.23 days. Of the 92 total hip replacement patients used for this study 36 (39.1%) were ambulated within eight hours of extubation. Of the 36 patients who were ambulated within eight hours of extubation the average length of stay was 2.83 days. Standard deviation 1.81. For the 56 patients who were not ambulated within eight hours of extubation (60.9%) the average length of stay was 5.14 days. Standard deviation 3.16.

Note that there were no exclusion criteria based on race, religion, orthopedic surgeon, surgical method, comorbidities, maximum age, sociodemographic status, or gender. These 92 patients were randomly selected from NE Medicine total hip replacement patients whose surgery had to occur under general anesthesia between August 2017 and August 2018, and participants had to be 19 years of age or older.

The data between groups was input into SPSS and analyzed as an independent t-test with equal variances not assumed (sig. 0.007). With a p-value of 0.05 the independent t-test with equal variances not assumed p=0.000. Therefore, the result is significant and the null hypothesis should be rejected. This means that total hip replacement patients who were ambulated within eight hours of extubation had a statistically significant shorter length of stay than total hip replacement patients who were not ambulated within eight hours of extubation.

Discussion

From the review of literature there was no conclusive information about length of hospital stay related to early ambulation in total hip replacement patients. This research study was able to provide a standard definition for early ambulation, walking to standing within eight hours of surgery completion marked by extubation time, and found that there is a statistically significant difference regarding length of hospital stay for total hip replacement patients at Nebraska Medicine who were ambulated within eight hours of surgery completion compared

to those who were not. This information adds to the overall body of knowledge regarding the benefits of early ambulation related to length of hospital stay as it sets a clear definition for early ambulation that can be used in future research studies. Results from this study can also be used as standard practice for total hip replacement patients at Nebraska Medicine to help decrease length of hospital stay although more research studies with similar findings would be beneficial to solidify overall findings, account for confounding factors, and generalize for larger populations.

One limitation of this study is that the researcher was unable to find any previous research regarding total hip replacement patients and early ambulation related to exact length of hospital stay. Although the results of this study are statistically significant for the selected Nebraska Medicine population, more research needs to be done with reproducible results. Another large limitation of this study is the lack of exclusion criteria. Race, religion, orthopedic surgeon, surgical method, comorbidities, maximum age, sociodemographic status, or gender were not considered or analyzed in this study. Due to the lack of exclusion criteria there is a high risk of confounding factors within this study which does make these research findings hard to generalize. Some of the strengths of this study include the randomly selected sample size and that the study was an objective, retrospective chart review. It would also be beneficial for future studies to include more information on about the effects of general anesthesia on recovery time relating to postoperative limb weakness.

It should be noted that overall Nebraska Medicine has 809 patient beds and serves a population that is similar to the state of Nebraska. The age group served by Nebraska Medicine related to this study is 62.1% of patients aged 18-64 and 11.9% of patients aged 65 and up¹¹. This is very similar to the overall population of the state of Nebraska with 60.7% of the population being aged 18-64 years of age and 14.4% of the population aged 65 and up.

Patient race is also similar for Nebraska Medicine’s patient population compared to the state of Nebraska. For Nebraska Medicine’s patient population Whites make up 83.1%, Blacks 8.3%, and all other races making up 8.5%¹¹. The state of Nebraska has a population of 88.2%

Table 1: T-Test, Group Statistics, Average Length of Stay

	Group	N	Mean	Std. Deviation	Std. Error Mean
Length of Stay	1	36	2.8261	1.81805	0.30301
Length of Stay	2	56	5.1395	3.16060	0.42235

Table 2: Independent Samples Test

		Lavene’s Test for Equality of Variances					t-test for Equality of Means		95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Length of Stay	Equal variances assumed	7.489	0.007	-3.984	90	0.000	-2.31335	0.58073	-3.46707	-1.15964
	Equal variances not assumed			-4.450	89.097	0.000	-2.31335	0.51980	-3.34618	-1.28053

Whites, 4.6% Blacks, and 7.3% all other races¹¹. The largest difference in demographic data can be seen in urban to rural population. The urban to rural percentage of Nebraska Medicine patients is 92.1 and 7.9 respectively compared to the state of Nebraska with 73.1 and 26.9¹¹.

With similar patient demographic information for Nebraska Medicine and the state of Nebraska excluding differences in the urban and rural populations it can be assumed that the random selection of the patient's included in this study is reflective of the demographic information of the state of Nebraska as a whole and therefore should make the proposed research findings generalizable to the state the Nebraska.

Conclusion

At this time, the researcher suggests that all total hip replacement patients be ambulated as soon as they are able to after surgery to improve clinical outcomes and decrease length of hospital stay. From the analyzed research the average length of stay for all 92 total hip replacement patients was 4.23 days. For those total hip replacement patients who were ambulated within eight hours of surgery completion the average length of stay was 2.83 days. For the total hip replacement patients who were ambulated after eight hours of surgery completion the average length of stay was 5.14 days, making the results of this study statistically significant for the NE Medicine population. In the future, more studies should be done with a clear definition of early ambulation for total hip replacement patients related to length of hospital stay with more confounding factor analyzed.

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Conflict of Interest

The author has no conflicts of interest to declare.

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