



Gender differences effects on hospital length of stay and postoperative complications

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Abstract

The purpose of this study is to determine the different effects of anesthesia between men and women to create an anesthetic plan that is better suited to each sex and to determine if these changes can reduce poor outcomes. If successful, these guidelines should be implemented in hospitals to better optimize patients for surgery and anesthesia. The study will compare two pre-screened groups of men and women who underwent similar procedures, but the women of one group were prepped for surgery with a modified prep that emphasizes specific variables that only effect women. The study finds that the women who were treated with the modified medical plan that was specific to women, were less likely to have postoperative complications and shorter hospital stay times. This research can be utilized to make medicine safer and more efficient for women and men. The idea that medicine can become more individualized will also benefit other individuals who have transitioned between genders. The hope is to create a safer healthcare system for all people.

Introduction

In the past, the mortality rate of women was much higher than that of men due to the dangers of childbirth. Since then, science and medicine have advanced, and the number of pregnancy-related deaths has decreased. However, in 2009 the number of pregnancy-related deaths increased 2.5% since 1987 (Gronowski, 2014). This increase in pregnancy-related mortality is likely a cause of the higher rate of pre-existing health conditions found in modern women that affects their hospital experiences. That being said the top five leading causes of death for women in the United States are heart diseases, lung and colon cancers, and respiratory diseases. The aforementioned conditions increase women's chances of perioperative complications in surgery and anesthesia. The lack of a comprehensive study of women's health has led to inadequate education on early detection of these diseases and their prevention. Women are less likely to screen for diseases of the heart and lungs most reasonably due to the scarcity of encouragement from women's health clinics. Women are also more likely to develop arthritis which hinders their joint mobility throughout the body (Pascale, 2016). Patients with a poor range of motion due to deteriorating joints often experience airway irritation after anesthesia and might be considered a difficult airway. If a patient is a difficult airway, they are at an increased risk for hypoxia during intubation. Based on these findings and the increase of women in the medical field, the issue of substandard preventative health in women has come to light. New research and studies that analyze women's health on a holistic level will increase the popularity of sex-specific medicine to optimize patient safety and improve outcomes. All baseline medical values for an adult in the United States stem from values of a 70 kg adult male. These values are considered the baseline for adult women, despite the biological differences between men and women that affect the presentation and development of diseases they share (Gronowski, 2014). Typically, women's health is synonymous with reproductive health, and research on women's health consists mainly of reproductive complications. Although reproduction plays a significant role in women's lives, it should not dictate their healthcare. The health of a woman should be more focused on a holistic view of her life. Women's health should include early detection and prevention of diseases that are considered comorbidities that increase the likelihood of complications during anesthesia. For instance, colon cancer is the second leading cause of death in women in the United States, yet less than 60% of women report being up to date with colon cancer screening (Pascale, 2016). To provide the most effective and safe anesthesia to a patient, anesthesiologists and all healthcare providers need to be separating normal baselines for women and men.

Methods and Materials

This study will be done in two groups, group 1 will be 500 participants who will be undergoing anesthesia using current American Society Anesthesiologist (ASA) standards and group 2 will be 500 participants that will undergo anesthesia with the modifications that are specific to each sex. The participants for this study will be chosen from the HCA Florida University Hospital in Davie, FL. There should be at least 500 genetically male and female participants each for a total of 1000 participants for the study, all of whom are undergoing elective surgeries that are not sex specific. The 1000 participants will be split into two groups that contain the following specifications to reduce confounding variables. Sex specific surgeries would be those that involve primary or secondary reproductive organs. The surgeries should also be elective in nature and not a high-risk factor for postoperative nausea and vomiting (PONV) which is more likely to occur in females. The surgeries should also be performed under general anesthesia with volatiles. Once the participants are selected, they will be paired together one male to one female by age, surgery type, and comorbidities. This is to ensure that the male and female groups are as similar as possible to each other. Patients should be relatively healthy and not originate from the ICU or be above an ASA 3 status. All participants will be informed that their specific health information will not be revealed in the study and that there are no specific identifiers that could relate the results back to them. The goal of the selection is to eliminate as many confounding variables as possible through highly specific participant selection. The goal of the selection is to make the two groups as identical as possible. The study matched male and female patients based on age (± 5 years), American Society of Anesthesiologists (ASA) patient rankings, and surgery type (Buchanan, 2017). Before admission to the hospital each group will be given a survey asking whether they attend their annual physical, what their current medications and ailments are, and their lifestyle habits. The women from group 1 will undergo the preoperative survey that is typically given for their case. While the women from group 2 will be evaluated on a modified surveys that have prep questions specific to females. These modified questions will incorporate the data that has been collected over various studies. Group 2 women will be screened for unknown, and therefore uncontrolled, chronic diseases that are typically overlooked with the male centric prep questions. Men from both groups will be evaluated in the typical prep fashion. The anesthesiologist assigned to group 2 will prepare the participants based on the sex specific prep. Within the OR, each participant will undergo general anesthesia with propofol and sevoflurane for induction and maintenance. Their vital signs will be recorded and any incidences that occur will also be reported for the study. After the procedure, all participants will go to the post-anesthesia care unit (PACU) for observation until being moved to another location. No matter if the patient is immediately discharged or kept in the hospital the study will continue to observe them for 3 weeks. Every patient will receive a daily survey asking them to indicate their pain and nausea levels. A survey will be given to the hospital staff to indicate the speed of each participant's recovery. The observed data from both groups will then be compared with one another with statistical analysis to locate significant differences between the women who received female specific prep care and women who did not.

Results

The expected results are a significant (p value < 0.05) difference between the women of group 2 and the women of group 1. The study discovered that women, specifically premenopausal women, were faster to emerge from general anesthesia than men, but experienced longer and worse recovery times (Buchanan, 2017). The women of group 2 should have shorter hospital stay times, lower pain scores, less of them sent to the ICU, and quicker recovery than the women of group 1. More women in group 2 should have a significantly faster recovery time than women in group 1 since they were treated in prep as women and not men. The expected outcome amongst the men in both groups is no significant difference between the two groups. The lack of significant discrepancy between the men of both groups indicates that the significant change between the women is due to the modifications made in their medical care. Although men and women often arrived at hospitals with similar diseases and for the same treatments, women often had more complications intraoperatively and postoperatively and remained in the hospital longer than their male counterparts (Filipescu, 2021). The data from the women of group 2, who were treated in prep using female specific medicine for their comorbidities, will likely express greater comfort, shorter hospital stay, and less complications compared to the women of group 1. There was also a significant difference in BIS scoring between pre and postmenopausal women which was due to the differing levels of progesterone and estrogen between them (Buchanan, 2017). Group 1 women were treated with the current medical system that is heavily based off men and these women will likely exhibit longer stays and more complications than their female counterparts in group 2. Not only will the women of group 1 show signs of being worse off than those of group 2, but they will also exhibit longer stays and more complications postop than the males from either group 1 or 2. Unsurprisingly, the women of group 2 will display recovery times and pain levels equal their male counterparts from either group within their surgery type.

Discussion

The creation of sex-specific medicine is significant to the increase in patient safety before, during, and after anesthesia. A study performed in 1997 showed that women are more likely to have increased hospital stay and increased mortality rates than men after mechanical ventilation (Kollef, 1997). Mechanical ventilation is a significant portion of anesthesia and is often used to maintain patients during surgery. Women typically have a lower fraction of reserved volume in the lungs and thus likely need different ventilator settings than men. With the use of sex-specific medical practice, hospitals can avoid high mortality rates and costly hospital stays. Separating preventative medicine for men and women combats the idea of a referral bias; this is the idea that women admitted to the hospital are sicker than men and is an argument for their higher mortality rate (Kollef, 1997). Although this rationale has merit, many fail to address the issue of the symptomatic differences between the sexes for diseases that they share. Both men and women are at equal risk for acute myocardial infarction (AMI), yet the disease presents itself differently between them (Gronowski, 2014). Women are less likely to feel chest pains than men when they experience an AMI (Paul, 1995). This lack of an external symptom often causes women to be underdiagnosed for acute myocardial infarctions. Underdiagnosis of AMI in women provides a false sense of security that their health is stable. The cumulation of shared and specific diseases makes evaluating women for anesthesia difficult since most women are not provided with preventative treatments. In the world of anesthesia, uncontrolled hypertension can be life-threatening in the OR, and thus it is pertinent that patients are educated on preventative health measures (Gronowski, 2014). This false-negative leads women to be more likely to arrive at the hospital when they are in a more serious condition. Ultimately setting them up for longer hospital stays and increased risk peri and postoperatively. With the increase of women in the health sciences, more studies can be done to distinguish medicine between men and women to provide optimal care for all patients. Separating the sexes will allow hospitals to provide more individualistic care that increases patient comfort and optimizes their safety.

Conclusions

The hypothesis of this study stated that the preoperative assessment for patients is male centric and that the lack of specification between men and women has caused women to have more postoperative complications in the hospital. This study is pertinent to the evolution of medicine in our changing and modern world. As many people begin to come out as trans-individuals, they will need to find doctors and a medical system that can properly care for their health without sacrificing their safety. Many trans-individuals are taking medications that alter their hormone levels, this requires that medicine become more individualistic. Instead of attempting to diagnose a woman or an individual who has hormone levels that are similar to that of a woman like that of a man, we should be creating new systems that separate individuals who have more of some sex hormones than others. Every person has varying levels of sex hormones that control a large part of their homeostasis and thus present similar diseases in different ways. It is pertinent that medicine also changes with society and begins to think of individuals as unique. A flaw with the study is that we did not include any individuals that had transitioned; however, this can easily be done in future studies on the topic. Another short coming of this study is the presence of possible confounding variables such as, social factors and the fact that some participants may not be telling the full truth on their surveys. This study proves that sex hormones and societal factors cause various representations of the same diseases among males and females. Therefore, these factors need to be accounted for when physicians and healthcare professionals approach diagnosis of a patient. An understanding of an individual's social factors and their health history will allow healthcare providers to give safer and more efficient care.

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