

Optimizing Anesthetic Care for Jehovah's Witnesses Regarding Alternatives to Blood Products

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Abstract

Jehovah's Witness are a vulnerable religious organization who have very strict beliefs when it comes to blood transfusions. In fact, they are well known to the healthcare community for refusing blood transfusions, even if it results in poor outcomes or death. Because the organization continues to grow in numbers, there is an increased chance that a Jehovah's Witness patient will present for surgery where there is a high probability for acute blood loss. In order for the nurse anesthetist to develop an appropriate plan of care for this patient, it is important to have a clear understanding of Jehovah's Witnesses and their beliefs. Furthermore, it is also vital to know what blood product alternatives and interventions are acceptable and available in order to provided ethically and culturally competent care. The goal of this scholarly project was to increase the knowledge base of AdventHealth University Student Registered Nurse Anesthetists (AHU SRNAs) in the 2019 cohort regarding Jehovah's Witnesses and blood product alternatives and interventions acceptable for surgery. After synthesis of the literature review synthesis was completed, a pre-test was given to 22 AHU SRNAs; followed by a 30-minute educational PowerPoint presentation. A posttest was given immediately after the presentation and the results were analyze by a paired t-test in SPSS to determine if the presentation was effective in increasing knowledge base. The results from the statistical analysis revealed a significant increase in the students' knowledge base following the presentation. It was concluded that the PowerPoint presentation was effective and therefore can lead to increased ethical and cultural competence among anesthesia providers who plan and implement anesthetic care for Jehovah's Witnesses.

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Introduction

Jehovah's Witnesses is a religious organization widely known for their strict religious beliefs regarding blood transfusions. Over the years, its members have continued to grow in number worldwide, and this increases the likelihood of one of Jehovah's Witnesses presenting to the hospital for surgical care. For the anesthesia provider, challenges present when planning anesthetic care for procedures that have a potential for blood loss. These surgeries included major cardiovascular surgical procedures.

Acute blood loss is a potential risk factor associated with cardiovascular surgical procedures. Traditionally, significant surgical blood loss is often managed with the administration of blood or blood product transfusions (Rosengart et al., 1997). For a Jehovah's Witness patient who requires cardiovascular surgery, managing care can be challenging for anesthesia providers. Though most refuse to consent to receive blood transfusions, conflicting knowledge exist among healthcare providers about what their current beliefs are and what alternatives to blood transfusions are acceptable.

It is the responsibility of the of anesthesia providers to become knowledgeable with Jehovah's Witnesses, their religious beliefs, and their individual preferences to provide ethically responsible and safe care. The SRNAs may lack knowledge and clinical experience caring for this population of people and would benefit from exposure to their beliefs, and in turn, expand their knowledge base regarding alternatives to blood products and interventions.

Regarding the problem presented, the following PICOT question was used to guide the literature review: In Jehovah's Witness patients (P) having major cardiovascular surgery, does the use of blood product alternatives and interventions (I) maintain cardiovascular stability and decrease morbidity and mortality (O) during the perioperative period (T)? This scholarly project

will be guided by the follow PICO: Will a 30-minute (T) educational PowerPoint presentation (I) for SRNAs attending ADU (P) about blood product alternatives and interventions improve their knowledge base (O) on how to optimize anesthetic care for Jehovah's Witnesses?

Literature Review

History & Current Beliefs

Jehovah's Witnesses are a Christian organization established in the late 1800s and was first under the leadership of Charles Taze Russell. Today, there are approximately 8.45 million members worldwide and 1.2 million members in the United States. They are now led by the "Governing Body" who oversee the organization including all publications produced by The Watchtower and Bible Tract Society. Within the healthcare community, they are well known for their unwavering refusal of blood transfusions.

Since 1945, Jehovah's Witnesses' reasons for refusing blood transfusion are not only centered around their interpretation of the Bible, but also around research findings entailing the potential dangers associated with receiving them. For example, they believe that scriptures such as Act 15:20,28-29, Leviticus 17:10-14, and Colossians 1:20 are just a few that teach that human blood is sacred and should not be consumed in any form. They are also well educated about current research about the risks associated with receiving blood transfusions to include potential for transmitted infections, antibody-mediated reactions, human error, and increased healthcare costs (Kumar, 2009; Redding & Plews, 2015). Moreover, showing their firm stance in these beliefs, most also carry a wallet-sized advanced directive card refusing blood.

As early as 2000, the organization has since updated its religious stance on blood transfusions. The Official Website of Jehovah's Witnesses lists their position on allogeneic and

autologous blood. They maintain that they do not practice faith healing and do accept medical treatment but red blood cells, white blood cells, platelets, plasma, and autologous blood (blood donated preoperatively) is prohibited and refused. Other fractions of blood including albumin, immunoglobulin, clotting factors, fibrinogen, interferon, and cell saver are potentially acceptable but still remains a personal decision of each individual (Brydon, 2016).

Preoperative Optimization

Preoperative (pre-op) planning has proven to be an essential step in formulating an anesthetic plan of care a Jehovah's Witness patient having major cardiovascular surgery. The anesthesia provider, along with coordinating members of the multidisciplinary team, should meet with the Jehovah's Witness patient to discuss the surgical procedure and the potential risk of bleeding. The anesthesia provider must also conduct a thorough review of medical history including significant current lab values. Furthermore, a detailed discussion about blood product alternatives and interventions that are acceptable to the patient should be noted (Brydon, 2016; Spahn & Goodnough, 2013; Lin, Kaye, & Baluch 2012). All acquired information will guide the anesthesia provider in developing appropriate blood conservation strategies that will correct coagulopathies, promote hemostasis, increase hemoglobin (Hgb) production, optimize oxygen delivery and consumption, and minimize blood loss (Campbell, Machan, & Fisher, 2016; Lawson & Ralph, 2015; Gohel, Bulbulia, Slim, Poskitt, & Whyman, 2005).

A major risk of having cardiovascular surgery is blood loss. Lawson et al. (2015) concluded that a rational thought process for ordering lab test and limiting phlebotomy can assist in blood conservation. When assessment of lab values is necessary, using pediatric or micro-tubes has also proven to be effective. Although excessive phlebotomy cannot be link directly to

increase blood transfusion, strict phlebotomy can aid in promoting blood conservation (Lawson et al, 2015; Kumar 2009; Smoller & Kruskall, 1986).

Plans to minimize blood loss also include correcting both acquired and inherited coagulopathies. This includes discontinuing medication and herbal supplements that impair clotting and administration of known reversal of such medication (Vitamin K). Multiple studies also prove that desmopressin, a synthetic analogue of vasopressin, is an effective therapy used with Jehovah's Witness patients, but a 2004 Cochran review reports its clinical use as non-significant and only suggests its use in patients inherited bleeding disorders (Beholz, Lui, Thoenk, Spiess, & Konertz, 2001; Carless et al 2004; Salzman et al, 1986). Recombinant factor VII and IX concentrates are also shown to improve coagulation. Although licensed for use in hemophilia, Bolliger et al (2009) and Tanaka et al. (2003) prove their off-label use to be successful in cardiac surgery.

Strategies proven to increase Hgb production and optimize oxygen delivery and consumption include the use of recombinant human erythropoietin (EPO) and intravenous (IV) iron therapy (Kumar 2009). Although preop IV iron therapy is not recommended as a primary therapy (Vaislic et al, 2012), studies show that IV iron along with EPO decrease morbidity and mortality (Harwin 2014). The meta-analysis study by Vasques et al. (2016) and the retrospective studies by Tanaka et al. (2015), Jasser et al. (2012), and Vaislic et al. (2012) all conclude that pre-op optimization with EPO and iron therapy contribute to improved outcomes in Jehovah's Witness patients who had complex CV surgeries. Though all show significant findings ($P < .001$), Vasques et al. (2016) also compares Jehovah's Witness patients optimized with EPO and iron to unoptimized non-Jehovah's Witness patients who received blood transfusions, showing a non-significant decrease in morbidity and mortality ($P=0.318$).

Furthermore, a study conducted at Duke University by McCartney et al. (2014) finds a significant decrease in 90-day mortality in Jehovah's Witnesses having CV surgery, but this study was conducted at a single institution. All studies show that 3-4 weeks of pre-op iron and EPO therapy is most effective.

Intraoperative Interventions & Blood Product Alternatives

During the intraoperative (intra-op) period there are several interventions and blood product alternatives that are successfully used to minimize blood loss, optimize oxygen delivery, correct coagulopathies, and promote hemostasis (Lawson & Ralph, 2015; Gohel, Bulbulia, Slim, Poskitt, & Whyman, 2005). Reports by Brydon (2016) and Manjuladevi & Upadhyaya (2014) show that interventions like correct patient positioning, maintaining normothermia, and minimal use of peep during positive pressure ventilation reduces surgical blood loss. Other interventions include intra-op interventions like hemodilution during cardiopulmonary bypass (CPB) and controlled hypotension all help to improve outcomes for the Jehovah's Witness patient (Lawson et al., 2015; Brydon, 2016; Gohel et al., 2005; Kumar, 2009; Emmerson et al., 2010). The use of these interventions in studies conducted by Vasques et al. (2016) and Tanaka et al. (2015) both show significant acceptable outcomes ($P < .001$).

Blood product alternatives can also be utilized in major CV surgery during the intra-op period to minimize blood loss, optimize oxygen delivery, correct coagulopathies, and promote hemostasis for major CV surgeries. Alternatives that may be acceptable to the Jehovah's Witness patients are cell salvage, the use of antifibrinolytics like tranexamic acid (TXA) and amicar, and intravenous volume expanders like albumin. Studies conducted by Tanaka et al. (2015), Pattakos et al. (2012), and Vasques et al. (2016) all show significant favorable outcomes using these interventions. Although Pattakos et al. (2012) and Vasques et al. (2016) both show

overall significant outcomes ($P<.001$) when comparing Jehovah's Witness patients to non-Jehovah's Witnesses who received blood transfusions, decrease in mortality and lower incidence of postoperative complications were non-significant when compared ($P=0.318$). Pattakos et al. (2012) also reported a better 1-year survival rate among Jehovah's Witness patients ($P=.007$).

Contribution and Dissemination

This scholarly project contributed to an increase knowledge base about Jehovah's Witness patients and their religious beliefs regarding blood transfusions, alternative blood products, and interventions to minimize or correct bleeding. A 30-minute educational PowerPoint was presentation to the senior SRNAs at AHU regarding the accepted blood product alternatives and interventions that can be utilized during the peri-op period. This information can be used to help future anesthesia providers to develop an appropriate anesthesia care plan to optimize the anesthetic care for Jehovah's Witness patients when they present to the hospital for surgery.

This presentation was disseminated according to the timeline during the fall semester on November 8, 2018 after Institutional Board Review/Scientific Review Committee (IRB/SRC) approval was received. The target population for this scholarly project was the SRNA class of 2019, ($N=23$). One student was excluded due to late arrival and failure to sign an informed consent. In the future, this scholarly project may lead to the development of a protocol or set of guidelines for the perioperative care of the Jehovah's Witness patient having cardiovascular surgery.

Project Aims

The goal of this quantitative scholarly project was to increase the SRNA's knowledge base regarding Jehovah's Witnesses, their current religious beliefs about blood products, and blood product alternatives and interventions. After their beliefs were better understood, and possible misconceptions were dismissed, the aim of this project was to validate the effectiveness of the educational PowerPoint presentation. The information presented on possible blood product alternatives and interventions that can be utilized during the perioperative period to optimize anesthetic care for Jehovah's Witnesses, may minimize the possible need for blood transfusion, while maintaining cardiovascular stability. This scholarly project was presented to the currently enrolled senior SRNAs at AHU on November 8, 2018. The independent variable in this study was the educational PowerPoint Presentation, and the dependent variable was the difference between pre-test and posttest scores.

Project Methods

This scholarly project was quantitative in design. A review of the literature about Jehovah's Witnesses, their religious beliefs about blood transfusions, alternative blood products, and interventions to optimize anesthetic care to decrease morbidity and mortality. After IBR/SRC approval was received and informed consent (Appendix C) was signed, a 30-minute educational PowerPoint presentation (Appendix E) was administered to 23 senior SRNAs attending AHU. One student was excluded due to late arrival and failure to sign an informed consent, making the total participants N=22. A 10-question multiple choice pre-test (Appendix D) was administered and turned into the investigator, followed by the PowerPoint presentation. Then a 10-question multiple choice posttest (identical to pre-test) was administered and turned

into the investigator. The pre- and posttest did not contain any personal identifiers. The test and test scores were kept anonymous using envelopes and a numbering system.

The test results were then placed into a Microsoft Excel Spreadsheet (Appendix F). The results were then analyzed using a paired t-test to look for a difference between the mean pre- and posttest scores. The anticipated outcome of this scholarly project was the educational PowerPoint presentation was effective in increasing the knowledge base of AHU SRNAs as evidenced by higher posttest scores. Exclusion criteria include the participant's refusal to sign an informed consent and physical absence on the day of the presentation. Participants who arrived late and missed the pre-test were allowed to stay for the presentation but were excluded from this scholarly project. Inclusion criteria included current enrollment in the AHU NAP class of 2019 and a signed informed consent.

The statistical data was analyzed and included in the results section of this scholarly project. All data collected from testing was stored on the investigator's password-protected computer to conceal any possible personal information and ensure the privacy of all participants. After the scholarly project was completed, the test results were deleted from all personal computer sources.

Timeline

The timeline for this research project took place over three academic semesters. During the Summer semester, May-August 2018, the topic was chosen and approved by the AHU NAP faculty. During the research process, the literature review was started and was under the continuous review of project mentor John Ryan Statton, CRNA and project chair Dr. Steve Fowler, CRNA while revisions took place. Final revisions were completed and sent for approval with appropriate forms to project mentor, project chair, and program administrator. After

approval was received, the research project proposal was submitted for IRB/SRC review in July 2018.

After IRB/SRC review and approval was received, a 30-minute PowerPoint presentation was presented to the senior SRNAs during the Clinical Conference course on November 8, 2018. This included completion of an informed consent as well as the pre- followed by a post-test after the PowerPoint presentation. After testing was complete, each test was scored out of 100%. The results were then presented the AHU research office for statistical analysis and the results were added to the conclusion of the research project. During the Spring semester, January-April 2019, the final research project poster board will be presented during a planned presentation day on April 8, 2019. Finally, the project will be submitted to the AHU library repository for future review and education.

Data Collection Plan

Informed consent for voluntary participation was handed out and obtained from 22 senior SRNA students in the Fall of 2018. One student was excluded due to take arrival and failure to sign an informed consent. A pre-test consisting of 10 multiple choice questions about the research topic was handed out and collected before the educational PowerPoint presentation was given. After the educational PowerPoint presentation was finished, a posttest (same questions as the pre-test) was given to the students to reassess their knowledge base. The posttest was collected, and data was retained only by the investigator. The pre and posttest scores were transcribed and placed into an Excel spreadsheet (Appendix F) for analysis. To ensure that students identities were kept confidential, only the corresponding numbers placed on each envelope was used during data collection.

Evaluation

The pre and posttest collected from the participants was scored out of 100% and data collected was stored in a private computer with the document only accessible to the investigator. This data was then turned into Dr. Lukman, the ADU statistician, for statistical analysis. The data was analyzed through the SPSS program. A paired t-test was used to analyze the data (mean pre- and posttest scores). After analysis was completed, the data was evaluated, and the results were added to the scholarly project for completion. The goal of this scholarly project was to see a significant increase in knowledge base about the topic presented as evidence by higher mean post-test scores as compared to mean pre-test scores, thereby indicating the presentation was effective in increasing the knowledge base of AHU senior SRNAs.

Results

After the researchers graded the pre-tests and posttests, the results yielded a mean pretest score of 4.045 points (40.45%) out of 10, a mean posttest score of 8.182 points (81.82%) out of 10, and a mean score improvement of 4.137 points (41.37%). A paired t-test in SPSS was performed which indicated a statistically significant increase in mean scores between the pretest and post-test based on a p-value < 0.001 and a t-value of -12.754. From the results, it can be inferred that the PowerPoint presentation was significantly successful in increasing the knowledge base of the senior SRNA's regarding the current beliefs of Jehovah's Witnesses and acceptable alternatives to blood. The statistical analysis is summarized in charts, which can be viewed in Appendix G.

Conclusion/Limitations

In conclusion, this educational PowerPoint presentation was successful in significantly improving the knowledge base of senior SRNAs attending AHU regarding the current beliefs of Jehovah's Witnesses and acceptable alternatives to blood. This was proven through statistical analysis by an overall improvement in average test scores by 41.37% and average post-test scores of 81.82%. Furthermore, the need for this educational PowerPoint was proven by the average pre-test scores of 40.45%.

It was concluded that the knowledge gained through this scholarly PowerPoint presentation can be used by the AHU SRNAs in the clinical setting. It can also be utilized throughout their anesthesia career and help them to provide improved ethically and culturally competent care to Jehovah's Witnesses who present to the hospital for surgery. In the future, this scholarly project may lead to the development of a protocol or set of guidelines for the perioperative care of the Jehovah's Witness patient having cardiovascular surgery.

Although the goal of this scholarly project was successfully met, noted limitations were the small homogenous sample size of only 23 AHU SRNAs. Further limitations were the exclusion of one student for late arrival and failure to sign an informed consent, making the final sample size N=22. Moreover, the presentation was only presented to a small group of students and took place in one setting at a single institution. The time between the pre-test and posttest may also be a limitation to learning. Time allotted was very short and may have limited the ability of the senior SRNA's to draw appropriate conclusions, therefore hindering learning and an increase in knowledge base.

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Appendix A

Jehovah's Witnesses' Stand on Blood Products

Position	Allogeneic blood				Autologous blood
Refused	Whole blood				<ul style="list-style-type: none"> • Preoperative autologous blood collection and storage for later reinfusion
Potentially acceptable	Red cells ↓ Fractions from red cells <ul style="list-style-type: none"> • Hemin • Hemoglobin 	White cells ↓ Fractions from white cells	Platelets ↓ Fractions from platelets	Plasma ↓ Fractions from plasma <ul style="list-style-type: none"> • Albumin • Clotting factors • Fibrinogen • Immunoglobins 	<ul style="list-style-type: none"> • Acute normovolemic hemodilution • Dialysis • Cardiopulmonary bypass • Blood salvage
<i>Witnesses make personal decisions on what they can accept in good conscience. It is important to discuss in advance what products or procedures are acceptable to each patient.</i>					

Figure 1. Jehovah's Witnesses' Position on Allogeneic and Autologous Blood

Abbreviations: Blood salvage, blood cell salvage.

Appendix B

Advent Health Blood Product Refusal Policy

Appendix C

Advent Health Blood Product Refusal Consent

Appendix D

ADU NAP CAPSTONE PROJECT – INFORMED CONSENT

This is a Capstone Project called *Optimizing Anesthetic Care for Jehovah's Witnesses Regarding Alternatives to Blood Product*. This project is being supervised by a faculty member of the Nurse Anesthesia Program (NAP). I would like to invite you to participate in this project. The main purpose of this form is to provide information about the project, so you decide if you want to participate.

WHAT IS THE PROJECT ABOUT?

The purpose of this project is to increase SRNA knowledge base regarding alternatives to blood products and interventions for Jehovah's Witnesses having major cardiac surgery.

WHAT DOES PARTICIPATION IN THIS PROJECT INVOLVE?

If you decide to participate in this project, you will be asked to complete an anonymous pre-assessment, attend a classroom presentation, and then complete an anonymous post-assessment. The assessment will address Jehovah's Witnesses, their current religious beliefs about blood products, and acceptable blood product alternatives and interventions. Your participation by attendance at the presentation and completion of the assessments is anticipated to take approximately 45 minutes.

WHY ARE YOU BEING ASKED TO PARTICIPATE?

You have been invited to participate as part of a convenience sample of students currently enrolled in the ADU NAP. Your participation in this study is voluntary. You may choose to not to participate. The decision to participate or not participate in this research study is completely up to you. If you choose not to participate your refusal to participate in this research study will involve no penalty or loss of benefits to you. If you choose to participate, you can change your mind later and withdraw your consent and

discontinue participation from this study at any time. If you chose to withdraw informed the PI of your wishes.

WHAT ARE THE RISKS INVOLVED IN THIS PROJECT?

Although no project is completely risk-free, we don't anticipate that you will be harmed or distressed by participating in this project.

ARE THERE ANY BENEFITS TO PARTICIPATION?

We don't expect any direct benefits to you from participation in this project. The possible indirect benefit of participation in the project is the opportunity to gain additional knowledge

HOW WILL THE INVESTIGATORS PROTECT THE PARTICIPANTS' CONFIDENTIALITY?

The results of the project will be published, but your name or identity will not be revealed. To maintain confidentiality of assessments, the investigators will conduct this project in such a way to ensure that information is submitted without participants' identification. All data collected from testing will be stored on an PI's, password-protected computer to conceal personal information and ensure the privacy of all participants. Once the scholarly project is completed the test results will be deleted from all personal computer sources. Thus, the investigator will not have access to any participants' identities.

WILL IT COST ANYTHING OR WILL I GET PAID TO PARTICIPATE IN THE PROJECT?

Your participation will cost approximately 45 minutes of your time but will require no monetary cost on your part. You will not be paid to participate.

VOLUNTARY CONSENT

You do not have to participate in this research study and choosing not to participate in this study will not involve any penalty or loss of benefit to you. The decision to participate or not participate in this research study is completely up to you. If you choose to participate, you can change your mind later and withdraw your consent and discontinue participation from this study at any time. If you chose to withdraw from the study informed the PI of your wishes. By signing this form, you are saying that you have read this form, you understand the risks and benefits of this project, and you know what you are being asked to do. The investigator will be happy to answer any questions you have about the project. If you have concerns about the project process or the investigators, please contact the Nurse Anesthesia Program at (407) 303-9331.

Date _____**Participant Signature**

Participant Name (PRINTED LEGIBLY)

Appendix E**Pre-& Post Test Questionnaire****Correct answer in bolded print*

1. All of the following blood product alternatives may be acceptable to Jehovah's Witnesses except _____?
 - a. Cell Saver
 - b. Preoperative autologous blood donation**
 - c. Albumin
 - d. Concentrated clotting factors

2. The Society of Thoracic Surgeons and Society of Cardiovascular Anesthesiologists recommends preoperative therapy _____?
 - a. EPO alone
 - b. EPO with IV Iron**
 - c. IV Iron alone
 - d. None of the Above

3. The onset of action for recombinant human erythropoietin (EPO) _____, provided that the patient has sufficient stores of vitamin B12, folate, and iron?
 - a. 1 month
 - b. 1-2 hours
 - c. 3-4 weeks
 - d. 4-6 days**

4. A reversal agent acceptable to Jehovah's Witness for coumadin reversal is _____?
- a. **Vitamin K**
 - b. Protamine Sulfate
 - c. FFP
 - d. None of the Above
5. Approximately how many Jehovah's Witness that reside in the United States today?
- a. 800,000
 - b. 90,000
 - c. **1.2 million**
 - d. None of the Above
6. All interventions can help to minimize blood loss during the intraoperative period except?
- a. **Hypothermia**
 - b. Normothermia
 - c. Controlled hypotension
 - d. Correct patient positioning
7. Current research has proven that _____ of preoperative EPO & Iron therapy has been effective in Jehovah's Witness patients have major cardiac surgery?
- a. **3-4 weeks**
 - b. 7 days
 - c. 12 hours
 - d. None of the Above

8. Jehovah's Witnesses may carry a "No Blood Card" that is recognized as a _____?
- a. reminder to refuse blood
 - b. legal Advanced Directive & Durable Power of Attorney**
 - c. is illegal in the United States
 - d. proof of baptism
9. Jehovah's Witness refusal of blood transfusions is center around all the following except _____?
- a. their Bible beliefs
 - b. its increase healthcare cost
 - c. their refusal for medical treatment**
 - d. potential adverse transfusion reactions
10. Current research has proven off label use of _____ successfully improves coagulation in cardiac surgery?
- a. Recombinant factor VII and IX**
 - b. Tranexamic Acid
 - c. Heparin
 - d. Amicar

Appendix F

PowerPoint Presentation

Optimizing Anesthetic Care for Jehovah's Witnesses Regarding Alternatives to Blood Products

Jenisha K. Welcome RN, BSN, SRNA

Project Mentor: John Ryan Statton, MSN, CRNA, USAP Medical Group

Project Chair: Steve Fowler, DNP, CRNA, ADU-NAP Faculty

Nurse Anesthesia Program, Adventist University of Health Sciences


Learning Objectives

- Jehovah's Witness's belief regarding blood transfusions
- Anesthetic plan development
- Identify Alternatives to Blood Products
- Review Current Literature
- Increase the knowledge base of senior Student Registered Nurse Anesthetists (SRNA's) attending Adventist University of Health Sciences (ADU) regarding the use of alternative blood products in the Jehovah's Witness patient

Clinical Scenario:

A 53 year old male presents to the preoperative area for CABG x3. Reported medical history includes CAD, HIN, Afib, and DM2. Current v/s 168/82, NSR 82, O2 sat 96%, RR 17. Current labs H/H 9.8/32, Ptt 198, BUN/Crea 26/1.0, PTT 30, INR 2.0. Home med list include coreg, atorvastatin, aspirin, coumadin, glyburide, multivitamin, and garlic. Patient has a MET score of 6 and currently has no c/o of chest pain or SOB at this time.

The patient tells the CRNA he is a Jehovah's Witness and will not consent to receive any blood transfusions regardless of risk. Patient is surrounded in preop by multiple family members and a few friends from the Kingdom Hall for moral and emotional support.



Problem

- Acute blood loss is a potential risk factor for surgery
- **Cardiovascular surgery** may warrant blood & blood product transfusion
- Jehovah's Witness refuse blood transfusions
- Conflicting knowledge among healthcare providers about current beliefs
- Managing anesthetic care can be challenge
- SRNA's may lack knowledge and clinical experiences caring for this population.

PICOT

- In Jehovah's Witness patients (P) having major cardiovascular surgery, does the use of blood product alternatives and interventions (I) maintain cardiovascular stability and decrease morbidity and mortality (O) during the perioperative period (T)?
- Will a 30-minute (T) educational PowerPoint presentation (I) for SRNAs attending ADU (P) about blood product alternatives and interventions increase their knowledge base on how to optimize anesthetic care (O) for Jehovah's Witnesses?

History

- Established in the late 1800s
- Under the leadership of Charles Taze Russell
- "The Governing Body"- oversee the organization and all publications produced by The Watchtower and Bible Tract Society
- 8.45 million members worldwide
- **1.2 million members in the United States**
- Jehovah's Witnesses worship 240 countries
- Publications and website available in over 300 languages



Beliefs

- 1945- Refuse all forms Blood transfusion & Blood products
- Beliefs center around Bible scripture interpretation & Research
- **Bible Scripture:**
 - Ex. Act 15:20-29, Leviticus 17:10-14, and Colossians 1:20
 - Abstain from blood
 - Human Blood is sacred
 - Should not be consumed
 - Blood represents life
- **Current research:**
 - Transmitted infections
 - Antibody-mediated reactions
 - Human error
 - Increased healthcare costs



Beliefs

- Jehovah's Witnesses updated stand on blood products as of early 2000:

Position	Allogeneic blood	Autologous blood
Refused	Whole blood	
Potentially acceptable	Red cells Fractions from red cells • Human • Hemoglobin White cells Fractions from white cells Platelets Fractions from platelets Plasma Fractions from plasma • Albumin • Clotting factors • Fibrinogen • Immunoglobulins	• Preoperative autologous blood collection and storage for later transfusion • Acute normovolemic hemodilution • Dialysis • Cardiopulmonary bypass • Blood salvage

Figure 1. Jehovah's Witnesses' Position on Allogeneic and Autologous Blood
Abbreviations: Blood salvage, blood cell salvage

Beliefs

- Wallet-sized no blood card
- **Advanced Directive**

Preoperative Planning

- Discuss surgical procedure & all risk factors
- Team coordination: surgeon, anesthesia team, nursing, lab, etc.
- Thorough review of medical history and current lab values
- Detailed discussion about blood product alternatives and interventions acceptable to the patient
- **GOAL:**
 - Increase hemoglobin (Hgb) production: **IV Iron & Recombinant human erythropoietin (EPO)**
 - Minimize blood loss: D/C medication and herbal supplements that impair clotting
Correct coagulopathies (acquired and inherited)
Minimize phlebotomy (pediatric tubes)
- Optimize oxygen delivery and consumption- Acute normovolemic hemodilution (ANH)
- Promote hemostasis

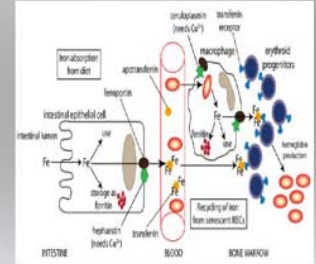
Preoperative Planning

- **D/C Anticoagulation therapy:** Coumadin, Aspirin, Plavix, Brilinta, Effient, Argatroban, Heparin
****Herbals:** Echinacea, Garlic, Ginkgo, Ginseng, St John's wort
- **Reverse Coagulopathies:** Protamine sulfate, **Vitamin K**, Prothrombin complex concentrate (PCC), tranexamic acid (TXA), ****aprotinin**
- **Phlebotomy:** **No current research evidence associated with phlebotomy and blood loss**
- **ANH:** Utilized in major surgery w/ predicted moderate to high blood loss
 Preoperative removal of blood immediately prior to surgery, dilution with crystalloid or colloid, returned at end of surgery ****Not acceptable to JW's**
- **Hemostasis:** Techniques coordinated with surgeon

Preoperative Planning

IV Iron

- Mineral obtained from diet
- Essential for Hgb production
- **IV therapy** recommended over oral
- Varying dosages- 200mg- 500mg
 3x's/wk
- Onset 1 week- max effect 2 weeks
- **Recommend therapy start 3-4 weeks preop**
- **Not recommend as a primary therapy pre-op**

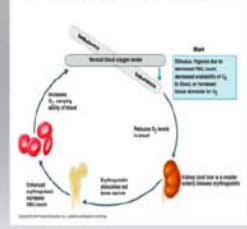


Preoperative Planning

EPO

- Endogenous glycoprotein hormone
- Increases RBC production
- **Dependent on sufficient Iron, B12, & Folate stores**
- **Used in conjunction with IV Iron**
- Traditionally used to treat anemia 2nd CKD
- Varying dosage recommendations
- **Onset of action 4-10 days (varies)**
- **Recommend therapy start 3-4 weeks preop**
- Other research : EPO discouraged in CV surgery d/t increase risk thrombotic event

ERYTHROPOIETIN MECHANISM



Literature Review

Recombinant human erythropoietin (EPO) and Intravenous IV Iron therapy

Jasser et al. (2012)	Retrospective Study	91 JW's Major CV surgery Urgent & elective 2000-2010	Low incidence adverse outcomes (P<0.01)
McCarthy et al. (2014)	Chart Review	Duke University 500 JW's CV surgery 2005-2012	Significant decrease 90-day mortality JW's (P<0.01)
Tanaka et al. (2015)	Retrospective Study	144 JW's Major CV surgery 1999-2014	Improved surgical outcomes (P<0.01)
Vasilev et al. (2012)	Meta Analysis	500 JW's CV surgery 1991-2002	Improved surgical outcomes (P<0.05)
Vasquez et al. (2014)	Meta Analysis	1,467 patients JW w/ therapy vs non-JW Adult cardiac surgery	non-significant decrease in morbidity and mortality (P=0.318)

Intraoperative Planning

- Team coordination: surgeon, anesthesia team, nursing, lab ect.

GOAL:

- Minimize blood loss:
 - Monitor intraop labs (Hgb/Hct, coagulation)
 - Minimize phlebotomy (pediatric tubes)
 - Correct coagulopathies (acquired and inherited)
 - Patient positioning**
 - Maintaining normothermia**
 - Minimal peep during positive pressure ventilation
- Optimize oxygen delivery and consumption:
 - Controlled hypotension, ANH, hemodilution**
- Promote hemostasis

Intraoperative Planning

- **Normothermia:** Mild hypothermia (35 °C)- induces mild platelet dysfunction
 Hypothermia 33 °C affects synthesis and kinetics of other clotting enzymes and plasminogen activator inhibitors
- **Blood Product Alternatives:** ****Recombinant factor VII and IX, Protamine sulfate, Vitamin K, PCC, TXA, ***Aprotinin**
****Prophylactic Recombinant factor VII and IX concentrates improve coagulation. Although licensed for use in hemophilia research shows successful off label use in cardiac surgery.**
*****Aprotinin: Taken off market in 2007, returned to market in Europe in 2012**
- **Patient positioning:** Incorrect positioning can obstruct venous return, cause engorgement, increase blood pooling at surgical site
 (ex. Head/neck flexed decrease jugular venous return)

Intraoperative Planning

- | | |
|---|--|
| <ul style="list-style-type: none"> • Normovolemia Hemodilution/ANH: | <p>Preoperative removal of blood immediately before surgery, dilution with crystalloid or colloid, returned at incision closure</p> <p>***Not acceptable to JN17</p> <p>Hemodilution CPB, Cell saver, & Hemodialysis acceptable</p> |
| <ul style="list-style-type: none"> • Controlled Hypotension: | <p>Controlled decrease MAP 50-70 mmHg with use of IAs, sympathomimetics, Propofol</p> <p>***Caution in FMH CAD, CVA, uncontrolled HTN</p> |
| <ul style="list-style-type: none"> • Hemostasis: | <p>Techniques coordinated with surgeon</p> |

Literature Review

Demson et al. (2012)	Meta Analysis	302 JBR's Major CV surgery urgent & elective	Decreased mortality and morbidity (p=0.1)
Bedon (2012)	Chief Review	287 CV surgery 2003-2012	Significant decrease 10 day mortality (p<0.01)
Tanaka et al. (2015)	Retrospective Study	144 JBR's Major CV surgery 1999-2014	Improved surgical outcomes (p=0.1)
Stahel et al. (2008)	Meta Analysis	300 JBR's CV surgery 1995-2003	Improved surgical outcomes (p<0.05)
Vassalos et al. (2014)	Meta Analysis	1,457 patients 28 on therapy vs non-28 Adult cardiac surgery	Non-significant decrease in morbidity and mortality (p=0.216)
Pothof et al. (2012)	Prospective Study	81 JBR's Major CV surgery at Cleveland Clinic 28 on therapy vs non-28	Wenther 1-year survival rate (p=0.07)

Limitations

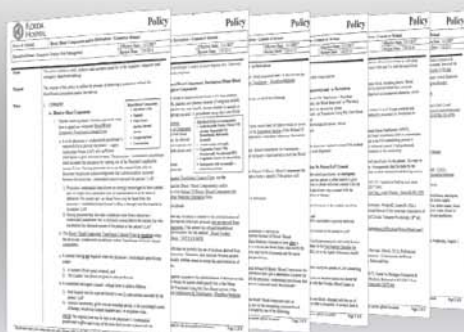
- Research available is limited, outdated
- Blood conservation program or Bloodless program? Program details?
- Many noted differences about patient condition: Healthy? Comorbidities? Routine or Emergent surgery? Low risk vs High risk?
- Conflicting data about recommended therapies
- Preoperative medication & interventions: Realistic? Emergency?

Limitations



Florida Hospital (FH):

- No Blood conservation or Bloodless surgical program
- **Anesthesia works closely with Dr. Juliana Gallan, FH pathologist**
- Dr. Gallan is nationally recognized expert in the field of transfusion medicine
- **FH currently has a "Blood/blood component consent and refusal" policy**
- **FH also has a "Refusal of blood/blood component for transfusion" consent that includes authorization for "Bloodless medicine alternatives"**
- Permit is available in English and Spanish only
- Any acceptable blood products/components/factors are documented on the preoperative anesthesia assessment form as well as the refusal of blood/blood transfusion consent form

[illegible]

Summary

- Jehovah's Witnesses are a vulnerable population
- Detailed discussion with patient about acceptable therapy
- Multidisciplinary coordination
- Refusal of blood products vary patient to patient
- Goal of anesthetic plan:
 - Increase hemoglobin (Hgb) production
 - Minimize blood loss
 - D/C medication and herbal supplements that impair clotting
 - Correct coagulopathies (acquired and inherited)
 - Optimize oxygen delivery and consumption
 - Promote hemostasis
 - Ethically responsible and safe anesthetic care

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Questions??

Appendix G

Capstone Pre- & Posttest Results

Test	Pre-Test Correct Answers Out of 10 questions	Post-Test Correct Answers Out of 10 questions
1	40%	90%
2	50%	90%
3	30%	70%
4	80%	90%
5	60%	80%
6	30%	90%
7	70%	100%
8	50%	90%
9	50%	80%
10	70%	90%
11	50%	80%
12	10%	80%
13	30%	80%
14	70%	90%
15	40%	80%
16	40%	90%
17	10%	60%
18	30%	80%
19	0%	50%
20	20%	80%
21	30%	80%
22	30%	80%

***The same 10 question Pre- & Posttest given**

**** Total of 22 informed consents signed, total of 22 Pre- & Posttest taken**

Appendix H

Statistical Analysis

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreTest	.4045	22	.21264	.04534
	PostTest	.8182	22	.10970	.02339

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	PreTest - PostTest	-.41364	.15211	.03243	-.48108	-.34619	-12.754	21	.000

The paired samples t test was conducted to analyze your data. The obtained t value (-12.754) is associated with $p < .001$ which is statistically significant. It therefore can be concluded that the average percentage scores increased significantly between PreTest (40.45%) and PostTest (81.82%) administrations.