Examination of Transfusion Practice in Cancer Related Anemia in Northern Nevada, A Pilot Study

A thesis submitted in partial fulfillment of the requirements for the degree of Master’s of Science in Nursing

by

Lillian Morton

Stephanie DeBoor/Thesis Advisor

May 2014
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We recommend that the thesis prepared under our supervision by

LILLIAN MORTON

entitled

Examination of Transfusion Practice in Cancer Related Anemia in Northern Nevada, A Pilot Study

be accepted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Stephanie DeBoor, Ph. D, Advisor

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Gwen Shonkwiler, Ph. D, Graduate School Representative

Marsha H. Read, Ph. D., Dean, Graduate School

May 2014
Abstract

Cancer related anemia may result from chemotherapy and/or radiation therapy related myelosuppression, disease process, hemorrhage, nutritional abnormalities, nephrotoxic interventions or hemolysis. The National Comprehensive Cancer Network (NCCN, 2013) recommends associated supportive transfusion therapy guidelines for symptomatic and asymptomatic patients who lean toward hemoglobin maintenance goals of: 7 to 9 g/dL in asymptomatic patients; 8 to10 g/dL in symptomatic patients; and >10g/dL for patients with associated cardiac history. This study was a retrospective chart review, quantitative evaluation, of the management of cancer related anemia in regards to red blood cell transfusion in the largest hospital in northern Nevada. A representative sample was obtained with the inclusion criterion for this study including: Any patient admitted to the hospital between January 1-March 31, 2013 (defining the ‘Pre’ guideline group) as well as between October 1 and December 31, 2013 (defining the ‘Post’ guideline group), with a cancer related diagnosis who received a transfusion of RBCs during their admission. Data analysis showed that the Pre and Post hemoglobin means (7.6 ± 1.2 g/dL Pre versus 7.1±1.1 g/dL Post) were not significantly different although there were a higher overall percentage of transfusions in the Post timeframe (31% Pre versus 43% Post). Also of significance was that the analysis of variable symptoms indicated the Pre data pertaining to shortness of breath, malaise/fatigue/weakness, dizziness, and pallor were shown to be proportionally higher than the Post data. This study established that the transfusion practice within this inpatient population at the largest facility in northern Nevada falls within the recommended evidence based guidelines.
Dedication

To my mother, who’s greatest desire was an education.
Acknowledgment

The warmest and most wholehearted thank you to …

Marcie for your patience, love, support, and company on this journey.

Dr. Stephanie DeBoor for your expertise, patience, wisdom, and humor.

Dr. Pelter for your insight and for being a statistical Yoda.

Dr. Shonkwiler for the chicken and dumplings and voice of reason.

Thank you mom, I feel your spirit in everything good and worthwhile.
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CHAPTER I

Introduction

Cancer related anemia may result from chemotherapy and/or radiation therapy related myelosuppression, disease process, hemorrhage, nutritional abnormalities, nephrotoxic interventions or hemolysis. The prevalence of anemia is dependent on the “diagnosis, stage of disease, timing of previous or current therapy, and concomitant conditions that could precipitate and intensify anemia” (Gillespie, 2002, p. 1). More significant anemia rates are seen in patients with lung, gynecologic, and genitourinary cancers, ranging from 50 to 60%. Anemia related signs and symptoms may include dyspnea, decreased sense of well-being, fatigue, pallor, depression, and/or inability to perform activities of daily living (Gillespie, 2002; Mercandante, et. al., 2009).

The symptoms associated with cancer related anemia warrant treatment, which may include correction of iron deficiencies, erythropoiesis stimulating therapies, or red blood cell transfusion. For the purpose of this research, the term transfusion represents the administration of red blood cells (RBCs) unless otherwise differentiated. “Red blood cell (RBC) transfusions should be considered in cases of acute anemia after hemorrhage and in patients for whom the anemic condition is severe enough that inadequate time exists to allow use of exogenous erythropoietin treatment” (Gillespie, 2002, p. 3). Gillespie (2003), identifies that transfusion is appropriate in symptomatic chronic anemia unresponsive to iron therapy. Patients with hemoglobin (Hgb) values less than 10 g/dL have reported high degrees of fatigue and weakness and can benefit from transfusion therapy, but most studies focus on a hemoglobin level of 8 g/dL or less (Mercandante, 2009). The National Comprehensive Cancer Network (NCCN, 2013) recommends
cancer related anemia supportive therapy transfusion guidelines for symptomatic and asymptomatic patients who lean toward hemoglobin maintenance goals of: 7 to 9 g/dL in asymptomatic patients; 8 to 10 g/dL in symptomatic patients; and >10g/dL for patients with associated cardiac history.

**Statement of the Problem**

The clinical circumstances regarding transfusion are found to be poorly documented and without clearly defined transfusion triggers (Friedman, 2006, p. 475). Although physicians commonly use hemoglobin concentrations to determine the need for a transfusion, Carson’s guidelines issued via the American Association of Blood Banks (AABB, 2012) and analyzed via a Cochrane review (2011), indicate that transfusion should be given for symptoms of anemia (pallor, shortness of breath, altered vital signs, labored breathing, etc.) rather than being based on hemoglobin concentrations alone. Despite the national blood supply being extremely safe, a blood transfusion is not a benign process. There exists risk of transfusion reaction, alloimmunization (the production of recipient antibodies against donor antigens introduced via transfusion), immunosuppression (the inhibition of the normal immune response), and transfusion related infections (Gillespie, 2003).

Understanding practice decisions can help with patient safety and ensure the blood supply (whether it is hospital specific, local, regional, or ultimately national) is properly managed. Evaluation of transfusion data would allow for analysis of the relationship between treatment guidelines and actual practice, thus providing opportunities to improve practice, minimize transfusions and the associated risks as well.
as evaluate cancer related anemia at high altitude (approximately 4500 feet above sea level).

**Purpose of the Study**

The purpose of this study was to explore current practice within one northern Nevada hospital for cancer related anemia and examine the indications associated with transfusion: hemoglobin level versus symptomatic presentation.

**Significance of the Study**

As previously stated, understanding the guidelines of practice decisions regarding transfusion therapy can help with patient safety and ensure the blood supply is properly utilized and managed. Understanding how and when physicians/clinicians are implementing transfusion therapy (hemoglobin level versus symptom presentation) will also provide a better understanding of the preemptive and preventative management of cancer related anemia and cancer associated transfusion needs. This data serves as an impetus to advance the management of cancer related anemia and potentially reduce the number of transfusions ordered, by default limiting exposure risk to the patient and the other assumed risks associated with transfusion therapy.

**Scientific and Theoretical Assumptions**

The co-morbidities associated with cancer patients and the complexities of cancer treatment provide a fluid environment that becomes individualized to a patient’s unique needs. Mickle (2007), advocates for standing clinician orders in the management of cancer related anemia. These standing orders are based on hemoglobin levels, iron studies, and presenting symptoms and incorporate the use of iron replacement, erythropoiesis therapy, and transfusion therapy. This student researcher surmised, based
on working knowledge, that two units of red blood cells are consistently ordered at an Hgb threshold of $<8$ g/dL regardless of symptom presentation unless a patient is “bloodless” or refuses transfusion therapy. A retrospective chart review of patients experiencing cancer related anemia provided for an evaluation of transfusion criteria and an opportunity to correlate results with the NCCN guidelines. Additionally, the standard of ordering two red blood cells units when one unit (or none) may suffice could be addressed.

**Research Question**

The question that guided this study was: What is the current practice criteria utilized in ordering red blood cells for cancer related anemia? Does this practice criteria correlate with the NCCN guidelines?

**Theoretical/Conceptual Framework**

The Iowa Model of Evidence Based Practice was developed by Marita Titler, et. al. (1994) to infuse research into practice and improve the quality of patient care and their associated outcomes. The model initiates with triggers, be they problem or knowledge focused and progresses through a systematic decision tree: assembling relevant data; critiquing and evaluating that data; determining an adequate research base to sufficiently (or not) guide practice changes; consult with experts as appropriate; evaluate if change is appropriate; implement practice changes; and monitor those outcomes.

The focus of this research study was to evaluate knowledge (trigger) primarily related to the national standard of care and associated guidelines for transfusions in cancer related anemia. A retrospective chart review was conducted to evaluate the criteria utilized for ordering a blood transfusion in cancer related anemia patients. The
results were evaluated against the National Comprehensive Cancer Network and American Association of Blood Bank transfusion guidelines.

**Chapter Summary**

Chemotherapy and/or radiation therapy induced myelosuppression, disease process, hemorrhage, nutritional abnormalities, nephrotoxic interventions or hemolysis are possible effects that a patient may experience during treatment. Although there are practice recommendations issued by various agencies to guide the treatment of cancer related anemia each physician may individualize treatment based on patient needs or their own experiences. Determining current practice in relation to transfusion criteria is important to ensure compliance in standards of care, as well as safeguard proper utilization of the community, regional or national blood supply.
CHAPTER II

Review of Related Literature

Cancer related anemia can be a relatively slow process with hemoglobin levels declining subsequent to chemotherapy or as a result of malignancy, providing an opportunity for compensation in oxygenation by the patient. The experience of sudden blood loss, for instance in a trauma, gives rise to a sudden onset of change in blood pressure, hemoglobin levels, oxygenation and mentation resulting in different criteria in regards to transfusion therapy than the chronic anemia often seen in cancer patients. The cancer patient experiences varying degrees of anemia related clinical symptoms that can be associated with disease process (blood cancers), myelosuppression secondary to chemotherapy or radiation, nutritional deficits, hemolysis, infection, inflammation, comorbidities, etc. Fatigue associated with cancer and/or cancer treatment needs clarified and evaluated to ensure the appropriate issue is addressed and treatment plan instituted (Gillespie, 2003).

Gillespie (2003) surmises that the typically accepted parameter for cancer related anemia, as well as a transfusion trigger, is hemoglobin of 8 g/dL. A review of the literature in cancer related anemia correlates with this parameter. A review of the literature regarding transfusion triggers as noted in a Cochrane Review (Carson, 2012) correlates with an hemoglobin of 8 g/dL, except in transfusion associated with cardiac issues, which recommends baseline hemoglobin of greater than 10g/dL. Interestingly, the rationale of why this hemoglobin level was designated is sparse. Sabbatini (as cited in Gillespie, 2002) does indicate that hemoglobin of less than 7.9 g/dL can be associated with increased complaints of “dyspnea, headaches, fatigue, dizziness, decreased
cognition, sleep disorders, sexual dysfunction, and significant debilitation” (p. 2).

Mercandante (2009) states that “data have shown that patients with mean starting hemoglobin values of approximately 8 g/dL benefitted from blood transfusion, with a clinical improvement in dyspnea, well-being, and fatigue” with the effects experienced for approximately 15 days post transfusion (p.62). Mercandante also found that following this fifteen-day period, although the hemoglobin value is maintained above 8 g/dL, dyspnea and fatigue begin to return. Lynn (2013) found that in otherwise healthy Jehovah’s Witness patients (individuals that do not receive blood transfusions) with chronic anemia, hemoglobin levels between 3-5 g/dL could be well tolerated depending on the patient’s clinical situation (p.28).

The National Comprehensive Cancer Network (NCCN, 2013) does provide practice recommendations indicating that in the management of asymptomatic cancer and chemotherapy induced anemia the desired hemoglobin level be kept between 7-9 g/dL. In symptomatic patients, the NCCN recommends transfusing to stabilization with the maintenance goal between 8-10 g/dL or >10 g/dL in acute coronary syndromes. The NCCN guidelines were enhanced in July 2013 (NCCN 2.2014) to better reflect incorporating patient reported symptomology in relation to myelosuppressive cancer related anemia as well as the caveat that “a more aggressive transfusion target” could be utilized based on associated treatment protocols. The AABB Red Blood Cell Transfusion Practice Guidelines (Carson, 2012) are also referenced in the NCCN guidelines.

Although cancer related anemia is not specifically addressed in the AABB Guidelines the recommendations do encourage a more conservative (restrictive) transfusion criteria of 7 g/dL and symptomatic for non-cardiac patients.
Given the practice guidelines for cancer related anemia lean toward a transfusion trigger of approximately 8 g/dL and symptomatic, evaluation of practice in northern Nevada would provide data on how this community follows national guidelines. This data could provide information in the areas of safety and improvement by reducing the number of blood transfusions, thereby minimizing risk to cancer patients as well as conserving the blood supply, a vital resource.

**Chapter Summary**

Although national cancer related anemia guidelines recommend asymptomatic, non-cardiac patients hemoglobin be maintained between 7-9 g/dL, a transfusion trigger for symptomatic patients is established at 8 g/dL. The literature reviewed also suggests transfusion be correlated to symptom presentation: shortness of breath, fatigue, dizziness, etc. This researcher’s clinical experience has been that red blood cell transfusions are generally Hgb based (at 8 g/dL), regardless of symptoms, with a standard two units ordered to be transfused. Reviewing patient charts for associated anemia symptoms, as well as corresponding lab results, may provide a better understanding of transfusion therapy as it relates to cancer related anemia treatment in the largest hospital in northern Nevada.
CHAPTER III

Methodology

Research Design

This study was a retrospective chart review, quantitative evaluation, of the management of cancer related anemia in regards to red blood cell transfusion in the largest hospital in northern Nevada. The research was designed to review the practice of ordering blood transfusions (RBCs) for patients with suspected cancer related anemia. Data was used descriptively to identify patients with inclusion criteria who received blood transfusions demonstrating low hemoglobin levels and or symptomology associated with cancer-induced anemia.

Sample Selection

A retrospective representative sample was obtained from Decision Support at Renown Regional Medical Center (RRMC) and used to select patient charts whose key characteristics approximate the population of interest. The inclusion criterion for this study included: Any patient admitted to the hospital between January 1-March 31, 2013 (defining the ‘Pre’ guideline group) and between October 1 and December 31, 2013 (defining the ‘Post’ guideline group), with a cancer related diagnosis who received a transfusion of RBCs during their admission. Pre and Post were determined by release of the July 2013 updated NCCN 2.2104 guidelines pertaining to transfusion therapy in cancer related anemia.

Protection of Human Subjects

Approval of this study was sought and received from the Institutional Review Boards (IRB) of Renown Regional Medical Center (Appendix 1: IRB 2014-007) and
from the University of Nevada, Reno, which deferred to the approval criteria of RRMC based on a collaborative agreement already in place. The Director for Decision Support and Manager of Health Information at Renown Regional Medical Center were contacted to obtain permission to access medical records for chart review. Decision Support provided a report based on the inclusion criteria.

**Privacy and Confidentiality**

Any information obtained in this study remains confidential. IRB protocols were followed regarding the storage of data. All data will remain stored in a locked cabinet at the University of Nevada, Reno for the required period of time as identified by IRB protocol. After the storage time has expired the information gathered will be destroyed.

**Data Generation and Analysis Procedures**

**Data Generation**

This study was a closed chart review of patients who were admitted to the hospital with a cancer related diagnosis and received a blood transfusion during that hospital stay. The researcher review of the electronic medical record included: hematology/complete blood count results, vital signs, progress notes, physician consults, and nursing communication orders regarding standing transfusion guideline criteria for up to 48 hours prior to red blood cell transfusion. Data was collected with the clinical variables determined to be: hemoglobin, hematocrit, blood pressure, heart rate, respiration rate and symptom variables determined to be: shortness of breath, fatigue/malaise/weakness, headache, dizziness, and/or pallor. Gender was excluded as a variable for this study.
Data Analysis

Analysis of the data was completed using SPSS version 22 (Chicago IL). Descriptive Statistics (mean, median, mode, standard deviation, minimum, and maximum) were used to assess patient characteristics, and hospital variables. Independent t-tests were used to assess statistical differences for continuous variables and chi-square tests were used when assessing categorical variables. A critical value of $p < .05$ was used when determining statistical significance.

Data was recorded for transfusion day and the two days prior to transfusion, if applicable, with some patients receiving multiple transfusions during the admission reviewed. The data analyzed and associated results reflect transfusion day for the first transfusion received during the admission review. The determined criteria were correlated against the NCCN guidelines to determine practice within those standards as they pertain to transfusion therapy for cancer related anemia.

Chapter Summary

This chapter provided an overview of the research design utilized for this study, which included information on sampling, protection of human subjects, along with instrumentation, collection & analysis of data. Data from staff nurses and physician notes in relation to symptoms, vital signs, and lab results for associated time frames were reviewed and results were statistically analyzed.
CHAPTER IV

Results

Sample

There were 187 potential Pre subjects and 222 potential Post subjects identified that met the cancer related anemia diagnosis criteria. Subjects with multiple admissions were excluded and only a single admission, longest length of stay meeting inclusion criteria, was retained for consideration. Of these potential subjects, 58 Pre and 95 Post subjects were determined to meet inclusion criteria. Given that this was a pilot study, 100 total subjects, 50 Pre and 50 Post subjects were selected for analysis. Further review of transfusion rationale and associated data disqualified subjects from inclusion (i.e. acute blood loss secondary to non-cancer related surgery, no hemoglobin or hematocrit value on day of transfusion, etc.). The resultant ‘n’ for the Pre and Post groups was determined to be 49 and 46 respectively.

Blood Utilization Pre & Post Initiation of NCCN Guidelines

Evaluation of the transfusion rates as they compare to cancer related anemia admissions can be seen on Table A1. For the Pre related timeframe, of the 187 admitted patients 58 (31%) received transfusions. The Post transfusion timeframe reflects that of the 222 patients admitted with a cancer related anemia diagnosis 95 (43%) received a transfusion.

Clinical Variable Findings

Clinical variables such as hemoglobin, hematocrit, blood pressure, heart rate and respirations were assessed Pre and Post initiation of NCCN guidelines and are shown in Table A2. The mean hemoglobin in the Pre group was $7.6 \pm 1.2$ g/dL and was $7.1 \pm 1.1$
g/dL in the Post group. These group means were not statistically different. There were no differences in blood pressure or heart rate between the two groups. Mean respiratory rate was significantly lower, although not clinically significant, in the post group (20 versus 18; $p = 0.028$). Differences in mean age were also found, with the post group being older (64 versus 65; $p = 0.006$), but were not clinically significant.

**Symptom Variable Findings**

Symptom variables such as shortness of breath, malaise/fatigue/weakness, headache, dizziness, and pallor were assessed Pre and Post and are shown in Table A3. A high proportion (42.2%) of those in the Pre group experienced shortness of breath as compared with those in the Post group (14%), and this difference was statistically significant ($p=0.003$).

A high proportion (71%) of those in the Pre group experienced malaise, fatigue or weakness as compared with those in the Post group (49%), and this difference was also statistically significant ($p=0.033$). A statistical test could not be completed on symptomatic headache as there were only 5 total values (6% of the entire sample), four Pre and one Post. A higher proportion (24%) of those in the Pre group experienced dizziness as compared with those in the Post group (7%), this was statistically significant ($p=0.025$). A higher proportion (24%) of those in the Pre group experienced pallor as compared with those in the Post group (7%), this was statistically significant ($p=0.032$).

**Chapter Summary**

Data provided by Decision Support pertaining to patients admitted during the defined ‘Pre’ and ‘Post’ timeframes for cancer related anemia, who also received a blood transfusion, were evaluated for inclusion in a pilot study that examined transfusion
practice in this population. Data analysis showed that the Pre and Post hemoglobin means (7.6 ± 1.2 g/dL Pre versus 7.1±1.1 g/dL Post) were not significantly different although there were a higher overall percentage of transfusions in the Post timeframe (31% Pre versus 43% Post). A chi-square analysis of variable symptoms also indicated that the Pre group data pertaining to shortness of breath, malaise/fatigue/weakness, dizziness, and pallor were shown to be significantly higher than in the Post group data.
CHAPTER V

Discussion

Description of Study

This study was a closed chart review of patients who were admitted to the hospital with a cancer related diagnosis and received a blood transfusion during that hospital stay. Electronic medical record data review and collection included: hemoglobin, hematocrit, blood pressure, heart rate, respiration rate, level of consciousness, and/or other anemia related symptoms documented, but not limited to: shortness of breath, fatigue, headache, dizziness, and/or pallor for up to 48 hours prior to red blood cell transfusion. Data reviewed included two separate time frames (January through March 2013 and October through December 2013) in relation to an update in the NCCN guidelines in July 2013. These updates were influenced by the 2012 AABB transfusion guidelines and encouraged a more thorough evaluation of symptoms including the importance of the patients’ evaluation of their symptoms, as well as addressing therapy regimens/protocols that may require more aggressive target hemoglobin levels.

Summary of Major Findings

Transfusion practice for cancer related anemia, as it is addressed in an inpatient setting in northern Nevada, appears to occur within the guidelines established by the National Comprehensive Cancer Network, an organization that serves as a resource for all cancer related treatment and helps establish standard of practice for this population. The findings of this study support and contribute to the current literature as the results also reflect the treatment recommendations of the AABB in relation to anemia, which were evaluated in a Cochrane (2012) review.
Review of the data indicates the overall percentage of transfusions administered for patients admitted for cancer related anemia was higher in the Post group than the Pre group, but the symptoms associated with the subjects evaluated indicate that the Pre group was statistically more symptomatic than the Post group. It is important to mention that in August 2013 the facility where the associated research was conducted underwent a policy change for blood management practices including clinical and symptom variables that encouraged more thoughtful patient evaluation when considering transfusion therapy.

Limitations

This retrospective chart review is a quantitative evaluation of the management of cancer related anemia treated with blood transfusion in the largest hospital in northern Nevada, but it is limited to inpatient anemia treatment. As the data reviewed was limited to one geographic location with one institution and focused on inpatient therapy, the generalizability to other institutions may be limited in scope. As stated in Chapter 2, cancer related anemia clinical symptoms can be associated with disease process (e.g. blood cancers, tumor burden), myelosuppression secondary to chemotherapy or radiation, nutritional deficits, hemolysis, infection, inflammation, comorbidities, etc. Inpatient treatment of anemia in cancer patients may be related to comorbidities or non-cancer related surgical interventions and not necessarily from myelosuppressive therapy. Although associated surgery is cancer related, it is representative of acute therapy as opposed to the chronic therapy that may results from disease or treatment process.

Variations in charting styles and habits of nurses and providers directly effects the retrospective evaluation of a patient’s health status and unique circumstances associated with a time period. Charting by exception may limit the amount of objective data
recorded during patient assessment. The collection of associated study data regarding symptom variables may have been limited based on the style, accuracy, and thoroughness of the clinicians recording the original data.

Cancer is increasingly an “outpatient” disease. Data related to red blood cell transfusion in an outpatient setting, i.e. an infusion center, would provide another valuable perspective in cancer related anemia treatment. An outpatient perspective at the same facility would allow a more comprehensive evaluation of associated transfusion therapy and ultimately a better overall understanding of cancer related anemia treatment. At that point it may be possible to generalize these results to the inpatient population, at least within this one community.

Hospital specialists, hospitalists, are increasingly managing patient admissions to the hospital. In the experience of this researcher even when patients are admitted for a cancer related diagnosis or are post surgery, hospitalists are utilized to manage medical issues and associated complications. The utilization of the NCCN guidelines may not be taken into consideration by a generalist but there may be practice awareness of the AABB transfusion guidelines or the blood utilization policy within a facility. During the timeframe of this study there was a shift at the facility as a result of recommendations from the Blood Utilization Committee in conjunction with a third party practice analysis review to better manage and control blood transfusion across all services. The associated transfusion guideline protocols went into effect in approximately August 2013 and although it could have potentially influenced transfusion practice during the timeframe in which the Post values were collected, blood utilization during the Pre data timeframes
were actually lower. The practice, as it pertains to this population, appears to have remained consistent and fell within recommended guidelines.

**Discussion**

Review of the literature showed the NCCN provides practice recommendations that indicate management of asymptomatic cancer and chemotherapy induced anemia to desired hemoglobin level be kept between 7-9 g/dL. In symptomatic patients, the NCCN recommends transfusing to stabilization with the maintenance goal between 8-10 g/dL or >10 g/dL in acute coronary syndromes. Correlating the research findings based on the hemoglobin values alone, the Pre mean of 7.6 g/dL and Post mean of 7.8 g/dL indicates transfusions were ordered within the suggested guidelines, even before they were implemented. Additionally, patients were assessed to be statistically more symptomatic in the Pre group than the Post group, which may indicate a change in transfusion related rationale resulting from the August 2013 facility policy change in blood utilization. A topic of further study could be to evaluate and compare the increased blood utilization in the Post group to determine if these proportionally less symptomatic patients also received fewer units per transfusion.

The results of this study indicate transfusion practice for cancer related anemia within the largest hospital in the region is in line with guideline recommendations for this population. Establishing that associated practice is within these guidelines is encouraging with respect to the reduced risks associated with fewer transfusions. As transfusion therapy is not a benign process, there is reduced risk of alloimmunization and blood borne pathogen exposure as well as the conservation of a valuable resource, our blood supply.
Implications for Nursing Practice

Nursing practice in relation to transfusion therapy is more than reporting associated lab results or following a policy to administer a transfusion with the right supplies. Those are tasks, nursing is what happens in between those tasks. Understanding disease process, symptomology, practice guidelines, and established practice are important components in providing treatment to cancer patients. Understanding disease pathophysiology provides the basis for critical thinking in anticipation of expected changes and symptomology within a disease process. This pilot study provides an opportunity for better understanding of transfusion practice in relation to cancer related anemia within an inpatient setting. Familiarizing oneself with standards of care, i.e. national guidelines as they pertain to a patient population, allows for the utilization of evidence based practice, ultimately providing the best circumstances for improved patient outcomes. Familiarity with practice guidelines and established practice also provides an opportunity to anecdotally evaluate nursing practice when orders and practice seem out of the ordinary.

Recommendation for Future Practice

Establishing outpatient transfusion practice, within the same community for cancer related anemia, would provide a broader evaluation of transfusion practice as it pertains to the NCCN guidelines. Provided with supporting data, comprehensive transfusion practice in the community could be generalized to other communities.

Conclusion

The research question guiding this study was: “What is the current practice criteria utilized in ordering red blood cells for cancer related anemia and does this
practice criteria correlate with the NCCN guidelines?” A study to evaluate the established transfusion practice pertaining to cancer related anemia was undertaken utilizing the electronic medical records of patients admitted with a cancer related anemia diagnosis and who received a red blood cell transfusion. The timeframes reviewed were before and after the associated NCCN guideline changes (January-March and October-December, 2013, respectively). These guidelines recommend management of asymptomatic cancer and chemotherapy induced anemia with the desired hemoglobin level being managed between 7-9 g/dL. In symptomatic patients, the NCCN recommends transfusing to stabilization with the maintenance goal between 8-10 g/dL or >10 g/dL in acute coronary syndromes. Analysis of the data showed that for the initial timeframe reviewed, the Pre mean hemoglobin was 7.6 ± 1.2 g/dL with a subsequent timeframe Post mean hemoglobin of 7.8+1.1. The associated symptoms of shortness of breath, headache, weakness, dizziness, or pallor may contribute to the transfusion rationales associated with higher hemoglobin values, but overall symptomology was not significant, as the average hemoglobin values associated with transfusion therapy fell within the recommended practice criteria.

Transfusion practice may be influenced by the physician specialty, patient diagnosis, associated comorbidities and therapies, facility policy, etc. Nursing practice is influenced by the same criteria in addition to the nuances of familiarity with population specific treatment guidelines versus actual practice. This study established that the transfusion practice within this inpatient population at the largest facility in northern Nevada falls within the recommended evidence based guidelines.
Appendix A
IRB 2014-007 Approval

Renown Regional Medical Center
Institutional Review Board
1155 Mill St., X-19
Reno, NV 89502

January 29, 2014

RE: IRB# 2014-007

Dear Stephanie De Boor PhD, RN,

John Rothrock, M.D., Board Designee for Daniel Shapiro, M.D., Interim-Chair, has provided a Expedited review and approved your new study submission package and protocol for the study:

Examination of Transfusion Practice

On January 26, 2014. The Institutional Review Board of Renown Regional Medical Center will meet on January 30, 2014 at which time Dr. Cohen and Dr. Daniel Shapiro will inform them of this approval.

As part of this New Study Package the Board understands and agrees with the following materials for the initiation of research:

- IRB Application
- Statement of Confidentiality
- Investigator Agreement
- Waiver of Consent & Waiver of HIPAA
- Waiver of IRB Fees
- CVs and NIH/CTTI Training Certification Materials for PI and Co-PIs
- Protocol

IRB Approval necessitates the following:
- It is required that you notify the IRB (and as appropriate; the FDA, institutional officials and sponsors), within 10 days, of the following:
  Any changes in their research activities, including study completion (amendments must be submitted in consecutive order).
  Any unanticipated problems involving risk to human subjects.
  Any adverse reactions, morbidity or mortality.
  (This timely reporting to the IRB is not limited to local occurrences/findings but also includes multisite discoveries as well)
- It is required that a progress report be reviewed by the IRB within 365 days of your approval date, or before January 25, 2015. This report will need to include the number of patients included in the protocol and any complications or adverse reactions. If you do not have a form for such reporting, one can be obtained from the IRB.
• If your study is completed prior to the expiration date, please submit a progress report indicating closure to the IRB.
• All revisions to the protocol and consent form are to be approved by the IRB prior to implementation.

Sincerely,

Matthew J. Free
Renown Regional Medical Center
IRB Coordinator
Renown Regional Medical Center
Institutional Review Board

APPLICATION FOR APPROVAL TO CONDUCT RESEARCH INVOLVING HUMAN SUBJECTS

FOR EMERGENCY USE please include a letter from the attending physician and an independent physician indicating emergent situation

COMPASSIONATE USE EXEMPTED STUDIES only: All exempt studies must complete the Statement of Exemption Form in addition to the application and a letter indicating why the individual requires compassionate use.

<table>
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<tr>
<th>IRB ACTION ON PROTOCOL &amp; INFORMED CONSENT</th>
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<td>DATE RECEIVED: 1/1/14</td>
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<tr>
<td>TYPE OF REVIEW: Regular</td>
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<td>DATE REVIEWED: 7/26/14</td>
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<tr>
<td>Approval as submitted (IRB approval expires on)</td>
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<td>Disapproved, for reason below:</td>
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Signature of Chairperson: [Signature] Date: 1/30/14

Application Form Page 2 rev. 14 March 2005
Table A1

This table compares Pre and Post blood utilization as it relates to cancer related anemia admissions and transfusion therapy.

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<thead>
<tr>
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<th>Pre</th>
<th>Post</th>
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<td>- Cancer related anemia admission</td>
<td>187</td>
<td>222</td>
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<td>- Received a transfusion</td>
<td>58 (31%)</td>
<td>95 (43%)</td>
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<td>- Evaluated for study inclusion</td>
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<td>50</td>
</tr>
<tr>
<td>- Included for study analysis (N)</td>
<td>49</td>
<td>46</td>
</tr>
</tbody>
</table>
This table depicts clinical variables associated with Pre and Post criteria groups.

Descriptive statistics were used to analyze the data.

<table>
<thead>
<tr>
<th></th>
<th>PRE: n=49</th>
<th>Median</th>
<th>Mode</th>
<th>Min</th>
<th>Max</th>
<th>POST: n=46</th>
<th>Median</th>
<th>Mode</th>
<th>Min</th>
<th>Max</th>
<th>p value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg</td>
<td>7.6 ± 1.2</td>
<td>7.7</td>
<td>7.8</td>
<td>4.4</td>
<td>11.7</td>
<td>7.8 ± 1.1</td>
<td>7.8</td>
<td>7.5</td>
<td>4.5</td>
<td>10.3</td>
<td>.369</td>
</tr>
<tr>
<td>Hct</td>
<td>23.48 ± 3.7</td>
<td>23.4</td>
<td>25.4</td>
<td>13.1</td>
<td>35.3</td>
<td>23.27 ± 3.5</td>
<td>23.35</td>
<td>21.9</td>
<td>12.5</td>
<td>31.3</td>
<td>.772</td>
</tr>
<tr>
<td>BP</td>
<td>110/64 ± 20/10</td>
<td>109/64</td>
<td>98/64</td>
<td>70/44</td>
<td>177/89</td>
<td>112/63 ± 18/12</td>
<td>107/64</td>
<td>104/59</td>
<td>73/30</td>
<td>153/86</td>
<td>.716</td>
</tr>
<tr>
<td>HR</td>
<td>84 ± 17</td>
<td>83</td>
<td>76</td>
<td>58</td>
<td>140</td>
<td>92 ± 17</td>
<td>89</td>
<td>82</td>
<td>67</td>
<td>140</td>
<td>.634</td>
</tr>
<tr>
<td>R</td>
<td>20 ± 6</td>
<td>18</td>
<td>18</td>
<td>13</td>
<td>52</td>
<td>18 ± 3</td>
<td>18</td>
<td>18</td>
<td>11</td>
<td>26</td>
<td>.028</td>
</tr>
<tr>
<td>Age</td>
<td>64 ± 12</td>
<td>64</td>
<td>64</td>
<td>33</td>
<td>90</td>
<td>65 ± 12</td>
<td>66</td>
<td>67</td>
<td>41</td>
<td>88</td>
<td>.006</td>
</tr>
</tbody>
</table>

* Comparing Mean Pre to Post
Hgb=hemoglobin, Hct=hematocrit, BP=blood pressure, HR=heart rate, R=respirations/minute
Table A3

This table shows symptom data in the Pre and Post criteria groups. Chi-square tests were used to compare symptom differences.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Total n= 88 n (%)</th>
<th>Pre n = 45</th>
<th>Post n = 43</th>
<th>p-value Comparing Pre to Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short of breath</td>
<td>25 (28%)</td>
<td>19 (42%)</td>
<td>6 (14%)</td>
<td>0.003</td>
</tr>
<tr>
<td>Malaise/fatigue/weak</td>
<td>53 (60%)</td>
<td>32 (71%)</td>
<td>21 (49%)</td>
<td>0.033</td>
</tr>
<tr>
<td>Headache</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Dizziness</td>
<td>53 (16%)</td>
<td>11 (24%)</td>
<td>3 (7%)</td>
<td>0.025</td>
</tr>
<tr>
<td>Pallor</td>
<td>14 (16%)</td>
<td>11 (24%)</td>
<td>3 (7%)</td>
<td>0.032</td>
</tr>
</tbody>
</table>

* Statistical test could not be applied to this symptom, as it did not occur frequently enough for adequate measure.
References


