**Title**: Characterizing data quality through a multi-center analysis of the Veterinary Committee on Trauma (VetCOT) trauma registry

**Justification, Significance, and Literature Review** (Please include relevancy to the field of veterinary trauma, pet owners and veterinarians. Literature review should summarize current research in the area, including the investigator's contributions).

Trauma accounts for approximately 10-15% of cases presenting to veterinary hospitals and is the second leading cause of death in canine patients (Kolata 1974, Hayes 2010, Fleming 2011). Trauma injury patterns and associated epidemiology have been reported in several retrospective single-center studies (Friedenberg 2012, Simpson 2009, Steinmetz 2013, Streeter 2009) as well as one prospective multi-center study (Hall 2014, JAVMA). Data is even more limited when considering prospective randomized placebo-controlled intervention studies in veterinary trauma patients (Anderson, 2008). The utilization of naturally-occurring canine trauma as a translational model to improve both veterinary and human patient care has been proposed by multiple authors (Hall 2014, Shock; Simpson 2009). Given the high incidence of naturally-occurring trauma within the veterinary population, the limited interventional literature available, and the possibility for veterinary data to be utilized as a translational model, development of infrastructure to guide further study of trauma in veterinary patients is prudent.

The Veterinary Committee on Trauma (VetCOT) was established through the American College of Veterinary Emergency and Critical Care (ACVECC) with a vision to “create a network of lead hospitals that…will work collaboratively to define high standards of care and disseminate information that improves trauma patient management efficiency and outcome.” One priority identified to achieve this goal was the establishment of a trauma registry. In 2013, the VetCOT-Registry Subcommittee (VetCOT-RS) was formed and recommended the use of REDCap (Harris 2009) to house the multi-center veterinary trauma registry. With over 30,000 trauma cases entered to date, the VetCOT trauma registry is the largest trauma specific medical database in veterinary medicine. Access to this data serves multiple purposes and constituents; it contributes to individual hospital and system quality improvement, identifies and reports trauma patterns, provides data for clinical research design and guides priorities for the creation of educational resources (Lecky 2014, Hlaing 2006, ACS-COT 2015, Zehabchi 2011, Arts 2002).

The value of the registry largely depends on the quality of the data therein. Assurance of data validation, quantification of errors and an understanding of the influence of quality control measures on trauma registry data is of fundamental importance for meaningful interpretation of the data provided. The purpose of the proposed project is to document the quality of data within the VetCOT REDCap database through evaluation of (1) data capture, (2) data completeness, (3) data accuracy and (4) data consistency. Using the medical record as the gold-standard, REDCap errors will be documented and subsequently corrected; the “quality-controlled” dataset can then be evaluated in context of the original dataset to better understand the magnitude of error present. Identification of which REDCap entries are most prone to error may support future VetCOT-RS changes to database entry, which would subsequently improve data quality for future studies.

**Specific, Testable Hypothesis and Objectives** (Please be precise and enumerate).

Hypothesis: Performing quality control measures on the VetCOT trauma registry database will identify data errors, allow for the measurement of data point discrepancies, and increase the quality of data generated by the registry.

Objectives:

1. To review medical records from dogs and cats entered into a veterinary trauma database, document errors in data entry, and revise such errors based on quality control measures
2. To describe the differences between the original data and quality-controlled data and characterize the relative quality of data produced by the trauma registry
3. To identify which REDCap data points are more susceptible to error and provide recommendations regarding quality improvement for future data entry

**Preliminary Data** (Published or unpublished data that supports the stated hypothesis and objectives. Please be specific regarding available data and include references, if available).

The existing REDCap-based registry contains information on approximately 30,000 small animal trauma cases prospectively enrolled across 31 identified Veterinary Trauma Centers (VTCs). To determine preliminary error rate, the authors reviewed medical records from 836 trauma cases presenting to Colorado State University’s Veterinary Teaching Hospital (CSU-VTH) within the time period of 14 January 2015 and 02 March 2017 (approximately 26 months). Several variables (e.g., species, breed, sex, age and weight) could be easily extracted from the electronic medical record for all cases, and subsequently compared to the REDCap value for determination of error rate (*Table 1*).

Following identification of the initial 836 trauma cases, the CSU-VTH authors further defined a “complete record” as any case with entry of all mandatory information (n=19 variables; species, age, breed, sex, body weight, type of trauma, cause of trauma, date/time of trauma, date/time of hospital presentation, prior DVM care, prior non-DVM care, hospitalization in ICU, evidence of head injury, evidence of spinal injury, surgical procedures performed, blood product administered, and outcome) as well as select optional information [n=6 variables; blood lactate, base excess, ionized calcium (iCa), packed cell volume (PCV), total solids concentration (TS) and blood glucose]. These additional parameters were selected based upon a high frequency of collection at the CSU-VTH, thereby facilitating capture of the most commonly entered data points. MGCS and ATT variables (n=9) were not previously required to be recorded within the CSU-VTH medical record; therefore, a comparison between records could not be made for these variables. A total of 120/836 (14.3%) of cases were classified as “complete” using the previously mentioned criteria.

A smaller population of complete records selected to undergo more detailed evaluation was determined by calculating a 90% confidence interval (with 10% margin of error) on the 120 complete records. This resulted in a total of 44/120 (36.6%) medical records receiving full evaluation. The complete medical records to receive thorough evaluation (n=44) were randomly selected, and comparison between REDCap data and the original medical record data was performed. Using the following descriptions (according to Wang and Strong’s conceptual model for measuring data quality), quality control was further explored through the following error types:

1. **Accuracy**. Defined as the confirmation of data with a trustworthy source. Synonyms for trustworthy used within the medical literature include verifiable, complementary, reliable, or credible. Accuracy was evaluated by measuring REDCap congruity with the medical record of each animal. A REDCap data point was considered erroneous if it did not match the value entered into the medical record; exceptions to this rule was age and body weight, where error was defined as > + 0.2 years (or kg) difference when compared to their respective values. Percent error (number of inaccurate values/total number of reported values\*100) was then reported for all variables.

*Preliminary data*: A total of 25 variables were evaluated and error was identified in 24/25 (96%) of the variables. Overall percent error for a given variable ranged from 0% to 33.7% of records, with 15/25 (48%) of variables demonstrating an error rate of <5% for all records. Descriptive results evaluating the selected trauma variables, along with associated rate of error, are reported in *Table 1*.

Following identification and correction of erroneous data points, a “quality-controlled dataset” was created and compared to the original dataset. For continuous quantitative variables (n=8), the discrepancy between each erroneous value and its actual value was measured, and the respective percent discrepancy was calculated (% discrepancy = erroneous value-actual value/actual value\*100).

*Preliminary data*: The median percent discrepancy for continuous variables ranged from 2.4% to 90%; values are reported in *Table 2*. The distribution of percent discrepancy is also depicted graphically for continuous variables (*Figures 1-8, Appendix)*.

1. **Consistency**. Defined as the compatibility of data between multiple variables, and evaluated through the comparison of these variables within each VetCOT entry. Examples of inconsistency include: (1) Date of presentation before date of trauma, (2) large dog breeds >3 months of age and <15kg, (3) small dog breeds >12kg, (4) cats >12kg, and (5) all dogs >40kg along with a consideration with their breed.

*Preliminary data*: Of these five parameters, 4/5 had identifiable contradictions between variables (*Table 3)*. Inconsistencies ranged from 0% to 5.7% of VetCOT records.

1. **Capture.** Defined asthe documentation of all records of interest, which is evaluated by screening the electronic medical record system for trauma cases unrecorded in the trauma registry. A measurement of capture rate (number of reported trauma cases/total recorded and unrecorded trauma cases\*100) will be reported.

*Preliminary data*: For the purposes of preliminary data, the CSU-VTH electronic medical record was screened by filtering out canine patients whose diagnosis included one of two search terms (“lacerations” or “hit by car”). This identified 410 trauma cases between the previously described outcome dates. Of these 410 cases, 232 of them were recorded into REDCap (capture rate of 56.6%). In other words, the percent missing cases based on these search criteria was 43.4%.

1. **Completeness**.Defined as the extent to which data is acquired in REDCap. Completeness of the trauma registry will be determined through a percent completeness measurement (number of recorded data points/total number of data points\*100).

*Preliminary data*: Every required variable had a corresponding data point for each case (100% completeness rate, *Table 4*). The optional variables without a 100% completion rate include text entries (describe prior treatment personnel and prior treatment methods, describe blunt trauma, and describe penetrating trauma), time/date entries (trauma date/time, presentation time, and outcome time), blood gas and PCV/TP, performance of AFAST/TFAST along with corresponding variables (AFAST fluid score, TFAST presence of glide sign or pleural fluid), and the use of specific blood products (plasma, whole blood, platelets, pRBCs, albumin, or other).

*Preliminary data conclusions*: Most mandatory variables entered into REDCap, as well as many blood gas variables and PCV/TS, demonstrate some rate of error when compared to the medical record. For a majority of these variables (20/25, 80%), error was present in <10% of the records evaluated. An error rate of <5%, which has been defined as “low relative error” based on the existing literature, was identified in 15/25 (60%) of the variables. All variables demonstrating relatively high error rate (defined as >10% of records) were continuous and quantitative in nature and included PCV, TS, iCa, and age. When further evaluating percent discrepancy for these variables, median percent discrepancy was 12.5% for PCV, 13.8% for TS, 2.4% for iCa, 13.5% for age and 9.4% for body weight. Examples are provided below to highlight the significance of the documented error:

1. Errors in age were identified in 11.6% of cases, with a median percent discrepancy of 13.5%. For a dog listed in the medical record as 10 years of age, an erroneously recorded REDCap age could be between 8.65 to 11.35 years (using a median discrepancy of 13.5%).
2. Errors in PCV were identified in 21.7% of cases, with median percent discrepancy of 12.5%. For a recorded PCV of 20% within the medical record, the discrepant REDCap value may be between 17.5% and 22.5%.
3. Errors in iCa were identified in 33.7% of cases. An actual ionized calcium of 1.0 mmol/L could be recorded in REDCap between 0.98 mmol/L and 1.02 mmol/L (using median discrepancy percent 2.4%). The extreme range of this recording in the trauma registry could be 0.75mmol/L to 1.25mmol/L (using a maximum discrepancy of 21.5%).

The above findings suggest that initial data generated by the trauma registry may benefit from a broader quality control initiative. This seems most beneficial in the areas of continuous variables, although there are other categorical variables [i.e. blunt trauma (yes/no), surgery performed (yes/no), blood products administered (yes/no)] whose error rate approached 10%; these areas may also require modification. It is unknown if the areas of more common error, and associated degrees of error, found within the CSU-VTH are consistent with other VTCs. Therefore, the below project will evaluate data from The Ohio State University, University of Pennsylvania, University of Minnesota, MedVet Chicago, and Auburn University to determine data quality using similar methods. Authors at the CSU-VTH will work with authors at other VTCs to perform quality control on the larger database using a medical records system approach. This project will be performed by a DVM/MS student [Troy Cabral (TC)] who has specific training in data analysis, and has received NIH scholar funding to investigate the data quality and accuracy of trauma cases entered into REDCap.

**Experimental Methods and Design** (Clearly address specific objectives by providing a detailed description of the experimental design, including data to be obtained from the VetCOT Trauma Database and the expected outcome parameters to be assessed. A power analysis should also be provided, in order to verify that the number of cases needed are currently available through the Database. Anticipated statistical methods for data analysis should also be included).

**Objective 1: To review medical records from dogs and cats entered into a veterinary trauma database, document errors in data entry, and revise such errors based on quality control measures**

Cases from the VetCOT trauma registry will be extracted from the six participating veterinary trauma centers (CSU, UMN, UPenn, OSU, Chicago MedVet, and Auburn). Algorithms will be used to generate a sample size following calculation of a 95% CI and 5% MOE for a proportion. These randomly selected cases will receive manual review of their medical record. Pertinent data to be reviewed includes all variables previously defined as part of a “complete record,” as well as optional variables collected by the VetCOT registry [e.g., if prior care by a non-DVM (e.g., owner, EMT, MD, police, firefighter, military, or other personnel occurred), what non-DVM treatments were provided (e.g., bandage/flush/compressions/oxygen or other), use of AFAST and AFAST fluid score, use of TFAST and presence of pleural fluid or loss of glide sign, where surgery was performed (e.g., ER, OR, or other), and type of blood product used (e.g, plasma, whole blood, platelets, pRBCs, albumin, or other)].

Data will be exported into R and Microsoft Excel. The data analyst (TC) will use R code to review the distribution of data. Queries will be used to allocate specific electronic health record information corresponding to data within the trauma registry. Quality of data will be determined primarily through comparison of the trauma database information with the electronic medical record, using previously described measures (e.g. accuracy, consistency, capture and completeness). Further details regarding the methods of evaluation are as follows:

1. **Accuracy** (defined as the confirmation of data with a trustworthy source). The accuracy of the VetCOT trauma registry will be evaluated by measuring its congruity with the medical record of each animal. The data analyst (TC) will produce a new (quality-controlled) dataset consisting of the trauma data manipulated to match the medical record. Errors will be identified based on mismatches between the original trauma dataset and quality-controlled dataset, and percent error (number of inaccurate values/total number of reported values\*100) will be reported for each variable. Discrepancy values will be reported as indicators of accuracy; quantification of these errors will be measured by taking the absolute value of difference between each original and quality-controlled value (% discrepancy = erroneous value-actual value/actual value\*100). Positive and negative discrepancies will also be calculated to evaluate if trends are present.

b) **Consistency** (defined as the compatibility of data between multiple variables). The consistency of the VetCOT trauma registry will be evaluated through the comparison of multiple variables within each record. The data analyst (TC) will use code to filter data using paired parameters. Date of trauma and date of presentation will be compared, and inconsistencies will be defined as “dates of presentation before trauma dates.” Breed, age and weight will also be compared. Inconsistent results will include the following: “large dog breeds >3 months of age that are <15kg,” “small dog breeds and cats that are >12kg,” and “all dogs that are >40kg” along with a consideration with their breed.

**c) Capture** (defined as the documentation of all records of interest). The capture of cases for entry into the VetCOT trauma registry will be evaluated by screening each VTC’s medical records system for trauma cases unrecorded in the trauma registry. The search terms “Hit by Car”, “Laceration”, “Wound”, “Injury”, “Trauma”, and “Attacked by Animal” will be used to identify canine and feline trauma cases that were presented to their respective VTC within the defined time period. Unique identifiers (e.g., case numbers) will be used to identify relevant cases that have not been uploaded into the trauma registry. A measurement of percent missed cases (number of unreported trauma cases/total recorded and unrecorded trauma cases\*100) will be reported. Additionally, the data analyst (TC) will use code to identify potential cases uploaded multiple times for a single presentation (defined as error of commission).

d) **Completeness** (defined as the extent to which all necessary data is acquired). Case completeness for those records entered into the VetCOT trauma registry will be determined by measuring how many data points were recorded out of total possibilities. The original trauma dataset will be screened to ensure that all the required fields for each case have been filled out. Missing data will be documented and recognized as incomplete data points. The completeness of variables within the trauma registry will be reported through a percent completeness measurement (number of recorded values/total number of data points\*100).

**Objective 2: To describe the differences that exist between the original data and quality-controlled data, and characterize the relative data quality of initially generated data within the trauma registry**

The differences between the original trauma registry data and quality-controlled data will be reported based on results of the four previously defined quality control dimensions: 1) accuracy, 2) completeness, 3) capture, and 4) consistency. Using the data collected, inferences will be made regarding the quality of data initially generated by the trauma registry. “Quality data” is poorly defined and ambiguous within existing literature (O’Reilly 2016); human studies have reported varying error ranges: 0.4% to 5.2% (Dente 2016), 0.2% to 19.0% (Porgo 2016), 2.3% to 26.9% (Goldberg 2008), and >3% to 22.2% (Hlaing 2006). For most variables, error rates were within 5%. Based on these findings, the authors will identify which variables correspond to low relative error (<5% or within the lower range of error within the registry), as well as which registry variables correspond to high relative error (>5% or within the high end of range in context of the registry).

**Objective 3: To identify which REDCap data points are more susceptible to error and provide recommendations regarding quality improvement for future trauma cases**

Following identification of variables with a higher susceptibility to error, investigation of such inaccuracies will be conducted through the following methods: Acquiring feedback from data entry personnel, ensuring that entered data points are correct and consistent between veterinary trauma centers, and examining how survey questions may be improved to reduce ambiguity. The data analyst (TC) will contact the personnel in charge of data collection and upload into the trauma registry. The source of data, methods of upload, and history of changes in process will be documented. After documentation, the data analyst will identify if inconsistencies or misrepresentations of data are present. A report of this information and the implementation of quality assurance based on such results will be passed for approval. Personnel involved throughout the data collection process will also be contacted for feedback on all survey parameters. The data analyst will survey such personnel for issues that may arise during data collection. This will be used to screen for terms where ambiguity may exist within the current case report forms. The results from such methods will act as guidance towards implementing survey changes for improved data entries in the future.

**Power analysis**

It is estimated that the dataset including the six veterinary trauma centers (CSU, UMN, UPenn, OSU, Chicago MedVet, and Auburn) will consist of ~8,000 cases. This is the total number of cases entered by the six veterinary trauma centers between September 2013 and June 2018 and was calculated using the following information:

Table A: Trauma Caseload at Partnering VTCs

|  |  |  |  |
| --- | --- | --- | --- |
| VTC Name | Number of Cases from Sept 2013 to March 2017 | Number of Cases from April 2017 to June 2018 | Total Cases |
| CSU-VTH | 836 | 475 | 1311 |
| UMN | 1064 | 324 | 1388 |
| UPenn | 823 | 422 | 1245 |
| Auburn | 342 | 242 | 584 |
| OSU | 1267 | 673 | 1940 |
| MedVet Chicago | 261 | 1285 | 1546 |
| Total Cases | 4593 | 3421 | 8014 |

For variables that can be easily extracted from the electronic medical record and compared to the REDCap value, error will be determined for all cases (n=8,000). For more complex variables, comparison will require manual review of the medical record. Of the anticipated 8,000 cases, a randomly selected subset of ~367 cases will be reviewed as a requirement to represent this total (using a 95% CI and 5% MOE).

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**Table 1:** Calculated error rate (%) for those variables used to define a “complete” record, when comparing data extracted from REDCap to the CSU-VTH medical record.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trauma Variable | Sample Size | Missing Values from CSU medical record | Percent Missing Values (%) | Mismatches between records | Percent Error (%) |
| Species | 836 | 0/836 | 0 | 0/836 | 0 |
| Dog Breed | 486 | 0/486 | 0 | 14/486 | 2.9 |
| Cat Breed | 106 | 0/106 | 0 | 5/106 | 4.7 |
| Sex | 836 | 6/836 | 0.7 | 23/830 | 2.8 |
| Age (yr) | 836 | 2/836 | 2.4 | 97/834 | 11.6 |
| Weight (kg) | 835 | 119/835 | 14.3 | 52/716 | 7.3 |
| Prior DVM Care | 44 | 0/44 | 0 | 2/44 | 4.5 |
| Prior Non DVM Care | 44 | 0/44 | 0 | 2/44 | 4.5 |
| Trauma Type | 44 | 0/44 | 0 | 1/44 | 2.2 |
| Blunt Category | 44 | 0/44 | 0 | 4/44 | 9.1 |
| Penetrating Category | 44 | 1/44 | 2.3 | 2/43 | 4.7 |
| Trauma Date Present | 44 | 0/44 | 0 | 2/44 | 4.5 |
| Trauma Time Present | 44 | 0/44 | 0 | 11/44 | 25 |
| Intensive Care Needed | 44 | 0/44 | 0 | 1/44 | 2.2 |
| Head Injury | 44 | 0/44 | 0 | 2/44 | 4.5 |
| Spinal Injury | 44 | 0/44 | 0 | 1/44 | 2.2 |
| Surgery performed | 44 | 0/44 | 0 | 4/44 | 9.1 |
| Blood Glucose (g/mL) | 328 | 21/328 | 6.4 | 8/307 | 2.6 |
| Blood Lactate (mmol/L) | 185 | 3/185 | 1.6 | 6/182 | 3.3 |
| Base Excess (mmol/L) | 174 | 3/174 | 1.7 | 4/171 | 2.3 |
| PCV (%) | 259 | 6/259 | 2.3 | 55/253 | 21.7 |
| TS (g/dL) | 285 | 7/285 | 2.5 | 87/278 | 31.3 |
| Ionized Calcium (mmol/L) | 182 | 4/182 | 2.2 | 60/178 | 33.7 |
| Blood Products Used | 44 | 0/44 | 0 | 4/44 | 9.1 |
| Outcome | 44 | 0/44 | 0 | 2/44 | 4.5 |

**Table 2**: Measurement of percent discrepancy between each erroneous value and the actual value for continuous quantitative variables

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Number of Erroneous Values | Discrepancy Value Range | Percent Discrepancy Range (%) | Percent Discrepancy Median (%) |
| Age (yr) | 97/834 (11.6%) | 0.2 - 14 | 1.4 - 1000 | 13.5 |
| Weight (kg) | 52/716 (7.26%) | 0.2 – 31.1 | 0.34 - 136.6 | 9.4 |
| Blood Glucose (g/mL) | 8/307 (2.61%) | 3.0 – 168 | 3.0 – 131.0 | 16.9 |
| Blood Lactate (mmol/L) | 6/185 (3.24%) | 0.1 - 9.3 | 2.9 – 254.5 | 40.8 |
| Base Excess (mmol/L) | 4/171 (2.34%) | 0.45 – 20.1 | 71 - 773 | 90 |
| Ionized Calcium (mmol/L) | 60/178 (33.7%) | 0.01 – 0.29 | 0.74 – 21.5 | 2.4 |
| PCV (%) | 55/253 (21.7%) | 1.0 – 46.4 | 2.0 – 93.5 | 12.5 |
| TS (g/dL) | 87/278 (31.3%) | 0.1 – 72.9 | 1.6 – 1026.8 | 13.8 |

**Table 3:** Consistency based on multiple predefined variables

|  |  |  |  |
| --- | --- | --- | --- |
| Type of Inconsistency | Instance | Number of instances | Percent inconsistency (%) |
| Small Breed Canine > 12kg | Dachshund 35.5kg | 1/98 | 1.02 |
| Feline > 12kg | None | 0/106 | 0 |
| Large Breed > 3mo and < 15kg | 2 Mastiffs (7.5kg and 9.5kg) | 2/35 | 5.7 |
| Breed vs. > 40kg | 43.2kg English Coonhound | 1/49 | 2.04 |
| Trauma Date After Presentation Date | 1 to 319 days afterwards | 8/836 | 0.96 |

**Table 4**: Completeness of Optional Variables in CSU Trauma Registry

|  |  |  |
| --- | --- | --- |
| Trauma Database Variable | Total Number of Recordings (out of 836) | Percent Completeness (%) |
| Prior Care by Owner | 836 | 100 |
| Prior Care by EMT | 836 | 100 |
| Prior Care by MD | 836 | 100 |
| Prior Care by Police | 836 | 100 |
| Prior Care by Firefighter | 836 | 100 |
| Prior Care by Military | 836 | 100 |
| Prior Care by Other | 836 | 100 |
| Describe Other Caregiver | 3 | 0.36 |
| Prior Treat Bandage | 836 | 100 |
| Prior Treat Flush | 836 | 100 |
| Prior Treat Compressions | 836 | 100 |
| Prior Treat Oxygen | 836 | 100 |
| Prior Treat Other | 836 | 100 |
| Describe Other Treatment | 25 | 2.99 |
| Description of Other Penetrating Trauma | 94 | 11.24 |
| Description of Other Blunt Trauma | 139 | 16.63 |
| Trauma Date | 774 | 92.58 |
| Trauma Time | 421 | 50.36 |
| Presentation Time | 812 | 97.13 |
| AFAST | 827 | 98.92 |
| AFAST Fluid Score | 127 | 15.19 |
| TFAST | 824 | 98.56 |
| TFAST Pleural Fluid | 82 | 9.81 |
| TFAST Loss of Glide | 82 | 9.81 |
| Blood Glucose (g/mL) | 328 | 39.23 |
| Blood Lactate (mmol/L) | 185 | 22.13 |
| Base Excess (mmol/L) | 174 | 20.81 |
| Ionized Calcium (mmol/L) | 182 | 21.77 |
| PCV (%) | 259 | 30.98 |
| TS (g/dL) | 285 | 34.09 |
| Surgery in ER | 836 | 100 |
| Surgery in OR | 836 | 100 |
| Surgery in Other Area | 836 | 100 |
| Plasma | 9 | 1.01 |
| Whole Blood | 11 | 1.32 |
| Platelets | 5 | 0.6 |
| PRBCs | 11 | 1.32 |
| Albumin | 5 | 0.6 |
| Other Blood Products | 5 | 0.6 |
| Describe Other Blood Products Used | 0 | 0 |