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Provincial Frozen Plasma (FP)/Prothrombin Complex Concentrate (PCC) Audit

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Worldwide, the largest avoidable risk to patients from transfusion is probably due to the transfusion of fresh frozen plasma (FFP) for totally inappropriate or unproven clinical indications.[1]

In 2013, ORBCoN conducted a Provincial FP/PCC utilization audit in order to assess appropriateness and the uptake of previously distributed FP clinical practice recommendations and their effect on FP utilization. A previous FP audit (2008) showed considerable utilization outside of published guidelines, with 29% of the FP orders being inappropriate. The 2013 FP/PCC audit had 51 participating sites, representing 60% of the FP utilization for the province. Participating sites reported their FP/PCC utilization for 5 days (not necessarily consecutive) in an electronic audit tool. During the audit period, 329 orders for FP and 113 orders for PCC were collected. In duplicate and independently, two Hematologists adjudicated each FP/PCC order as appropriate, inappropriate and indeterminate based on pre-determined criteria. The results showed that 52% of the FP orders were inappropriate, 42% appropriate and 6% indeterminate. Only 19.7% of FP transfusions met the criteria for both appropriateness and adequate dose. Almost half of the FP orders (49%) were for 2 units, representing an inadequate dose for an average sized adult. A considerable amount of FP orders (19.8%) collected during the audit period were for the urgent reversal of warfarin/Coumadin, an indication better managed by PCC.

Orders for PCC were considerably better, with 70% appropriate, 28% inappropriate and 2% indeterminate. Interestingly, guidelines for PCC utilization were a requirement for their use when they were first introduced in Canada in 2008, a requirement that is not present for FP utilization.

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The transfusion of blood products, including FP does not come without consequences, in fact there are a number of adverse events that can occur including transfusion-related acute lung injury (TRALI) and transfusion associated circulatory overload (TACO). The reduction of inappropriate FP utilization would improve patient safety and most likely result in decreased costs, those associated with the transfusion process and the costs associated with managing adverse reactions. The availability of unused plasma for fractionation products may also reduce the acquisition costs for fractionation products in Canada. Recommendations from the most recent audit include the inclusion of FP into a Provincial Quality Improvement Plan, a plan currently being introduced to Ontario hospitals for red blood cell utilization.

1.McClelland, DBL. Effective use of blood components. In: Practical Transfusion Medicine, 1st Ed. Ed. Murphy M and Pamphilon D. Blackwell, Oxford, 2001, 65-76.

Implementation of Triaging Blood and Blood Product Orders by Transfusion Services

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A great deal of planning has taken place to begin the implementation of triaging blood and blood product orders in our Transfusion Services department here at Sault Area Hospital. We began the process in fall of 2014 after the suggestion was made by our Director Dr. Jeannie Callum at Sunnybrook that we begin looking at screening physician orders for appropriateness before transfusing. I began developing the procedures for screening orders for blood, plasma, platelets and cryoprecipitate with the help of Dr. Callum and the Blood Bank Supervisors at University Health Network.

My biggest concern was how my blood bank staff would react when told about the screening processes. I have encountered mixed emotions. Mostly people felt uneasy with questioning our physicians' orders and worried about the extra time it may take to query the benefits of the transfusion. We have had a departmental meeting and reviewed case studies in hopes of helping staff become more familiar with the process. A job-aid was also developed and is kept on the bench. This is to provide the MLTs quick access to the procedures.

Screening guidelines do not include any bleeding patient, or patients in our Cancer Clinic, operating room, recovery room, or Medical Daycare unit. Screening is restricted to non-bleeding emergency room patients or inpatients. They also allow for investigation of patients with a potential iron deficiency anemia, dependant on the patient's hemoglobin, MCV and ferritin level.

Upon developing these procedures I began to understand the importance these processes have in impacting patient care and safety. Our transfusion rates have already decreased remarkably due to a presentation from Dr. Callum regarding appropriate use of blood products and the importance of ordering and transfusing one unit at a time.

Our concerns for the future are the ease at which we can get the physicians to order that all important hemoglobin level post transfusion, and anxiety for the times that they just don't want to wait or be bothered with the transfusion medicine laboratory questioning them. We are lucky to have our Medical Directors at University Health Network and Sunnybrook as support. In these instances our physicians will be referred to our Medical Director on call.

We hope to go live with screening in early June. I'm sure we will hit some bumps in the road, but my hopes are that once we get started hospital and blood bank staff will find the screening process to be beneficial.

Case Report: Warfarin Reversal before Surgery

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Setting: A 53 year old woman presented to the Emergency Department on the evening of January 15 with abdominal pain.

Background information: The patient was taking warfarin because of a past history of two deep venous thromboses, and her INR was 2.8 on presentation. She had no other major medical conditions, and did not have liver disease. Appendicitis was diagnosed, and she was placed on the operating room list for an appendectomy on January 17. On the evening of January 15 she was transfused with 4 units of frozen plasma (FP). The next evening (January 16) her INR was 1.8 and she was given 20 mg of Vitamin K intravenously, followed within an hour by 3000 IU prothrombin complex concentrate (PCC). The INR was measured 90 minutes after the PCC infusion and was 1.3. On the morning of January 17 the INR was again 1.3 and she was taken to the operating room.

Description of event: The procedure was uneventful, and the patient recovered without any bleeding or thrombotic complications.

Conclusion: A patient requiring non-urgent pre-procedure reversal of warfarin was treated with frozen plasma, intravenous Vitamin K, and prothrombin complex concentrate.

Questions to Ponder: What would be the best method of warfarin reversal in this patient? Did she require blood products for warfarin reversal? Please refer to our website www.transfusionontario.org for a posting of a discussion paper on this case study. Compare your answers to the questions posed.

Keywords: warfarin, plasma, prothrombin complex concentrate, Vitamin K

Case Report: 2 Wrongs Don't Make a Right

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Setting:
Two in-patients were both admitted onto the same medical inpatient unit at a trauma centre.

- Patient A is diagnosed with chronic anemia, has been transfused in the last 24 hours and requires another unit of RBC
- Patient B is actively bleeding and a transfusion has been ordered as his hemoglobin has dropped below 70 g/L

Description of event: On the evening of these cases, it was very busy on the unit. Three staff Registered Nurses (RN) were at the unit front desk. One RN was providing a report to the other two nurses regarding patients A and B and notified them that both patients required a RBC transfusion. The units for each patient were placed at the front desk for the RNs to transfuse. One of the RNs took both units and administered them to the patients assuming that the other two RNs at the front desk had already performed the checks regarding the patient identification and RBC units. Both patients received a few millilitres of each unit until the RN noticed that Patient A was actually receiving a unit labeled for Patient B. The RN stopped the transfusion on patient A immediately and called for another RN to immediately stop the transfusion on patient B. The RN then notified the patients' physicians and the transfusion medicine laboratory. The units were sent back to the transfusion medicine laboratory (blood bank) along with blood

samples obtained from both patients. The patients' vital signs were taken and found to be within their baseline. The patient records were checked and showed that the patients had the same ABO and Rh blood type (both were group O Rh positive) and their antibody screens were negative.
The RNs involved, completed an incident report and an investigation was initiated to determine the root cause and identify any corrective action required. How would you investigate these occurrences? What would you want to review? Who would you want to talk to? What corrective actions and preventative measures would you consider? How would you know they are effective? After you reflect on this, we invite you to visit our website to review further discussion on these points.

Lessons Learned: In this case, the RN administering the transfusion should NOT HAVE ASSUMED that the units had been checked by someone else and should have confirmed correct identification of the patient and blood component AT THE BEDSIDE prior to initiating the transfusion.
Health Care Professionals must be diligent in the administration process of all blood products, as well as in the collection of blood samples during the pre-transfusion process. Patient identification at the time of transfusion and collection and labeling of blood samples should be done at the bedside. If possible include the patient or patient care giver in the identification process. Labeling blood samples must occur at the bedside. If samples are taken away from the bedside for labeling there is a much greater risk of mislabeling. According to Bloody Easy 3, half of all ABO incompatibility errors are related to administering a properly labeled blood unit to the wrong patient. It is the most common cause of morbidity from RBC transfusion.
Incorrect identification of a patient or patient blood sample may lead to the possibility of the patient having an acute hemolytic transfusion reaction (AHTR): a reaction that may occur when the wrong blood type is transfused to the patient.
AHTR (1 in 40 000) is most often associated with ABO incompatibility. But also, as stated in Bloody Easy 3, there are 29 blood group systems that may cause non ABO incompatibility.
If a patient has had a prior pregnancy or transfusion, the patient can be immunized and this results in formation of RBC alloantibodies.
It was concluded that the patients involved in these cases were both group O Rh positive however, as patient A had received transfusions previously he could have become immunized from past transfusions. Receiving the wrong blood could potentially cause this patient to experience a hemolytic transfusion reaction from existing RBC alloantibodies.
Clinical signs and symptoms of AHTR are most often fever, chills, and hemoglobinuria. In some cases though, fever may be the only presenting sign.

References: Callum, J. et al. Bloody Easy 3: Blood Transfusions, Blood Alternatives and Transfusion Reactions. Third Edition. ORBCoN 2011
Maskens, C. et al. Hospital-based transfusion error tracking from 2005 to 2010: identifying the key errors threatening patient transfusion safety. Transfusion. Jan 2014

Points to Consider in the Investigation of These Incidents
Fortunately with these two incidents no patient harm occurred. If at least one of the patients had previous red blood cell (RBC) alloantibodies or if one of the transfusions was ABO incompatible, the outcomes could have been much worse.
The nurse involved in the incident reacted quickly and immediately reported the incident once s/he was assured both patients were safe and had suffered no ill effects. All of the appropriate parties were notified as quickly as possible.

As a supervisor or manager investigating these incidents, how would you proceed? A good place to start is a root cause analysis. Why did these events occur? There are numerous tools available to assist the investigator in determining root causes. These examples include The 5 Whys, The Fishbone (Ishikawa) Diagram, Pareto and Scatter Graphs.

Why did the nurse assume the patient identification has already taken place, especially since the RBC units were not at the bedside? You will want to review various documents and speak with different staff members to get a complete picture of the possible breakdowns in the process. Some questions to get you started:

1. Is there a policy accurately directing staff on how to completely identify a patient before transfusion? If the answer is no, why isn't there a policy? Get a team together to create a policy Once the policy is developed, there will be related SOPs (standard operating procedures) and accompanying training documents to develop.
2. If the policy exists, why (your next why question) aren't staff following it? Is it easily accessible? Do new staff receive orientation and training? Are incidents reviewed at staff meetings? Are staff asked for input into the resolution of the problems?
3. Are there training records? Are staffed regularly assessed for competency? Just providing procedures and policies is not a sufficient expectation of staff competency. They must be given the information in an engaging manner and be assessed on their skills and retention of the knowledge.
4. Is this a localized or systemic problem? What about other processes involving patient identification like surgery, DI, medication administration? Do these processes need improving too?
5. Is there a quality culture in the organization? In this scenario, the nurse was quick to report her/his own error, which is a positive indicator of this type of culture. Are staff encouraged to report and be involved in quality improvement initiatives? Should patient identification become part of the organization's Quality Improvement Plan (QIP) under patient safety?

These questions will guide the investigators in determining the probable causes of this incident and the most appropriate courses of action. While developing the resources to mitigate the reoccurrence of this error, consideration should be given to corrective action and preventative measures.

Audit the process to ensure the changes have the desired effect. If they do not, analyze the reasons. Speak to and engage front line staff. Tweak your plan and re-audit until you realize the desired progress. Remember that quality improvement is a journey.