

# MASSIVE TRANSFUSION PROTOCOL: STANDARDIZING CARE TO IMPROVE PATIENT OUTCOMES

## Author:

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## ABSTRACT:

Providing rapid response is a primary goal when caring for surgical patients with injuries involving massive blood loss. Massive transfusion protocols have been developed in some tertiary care health care facilities to ensure a rapid and efficient response in the provision of care to patients with a massive and uncontrolled hemorrhage. The purpose of this article is to discuss a massive transfusion protocol and to describe the process used to implement a massive transfusion protocol at Winnipeg's Health Sciences Centre (the site) as well as to describe its impact in the operating room department.

## INTRODUCTION:

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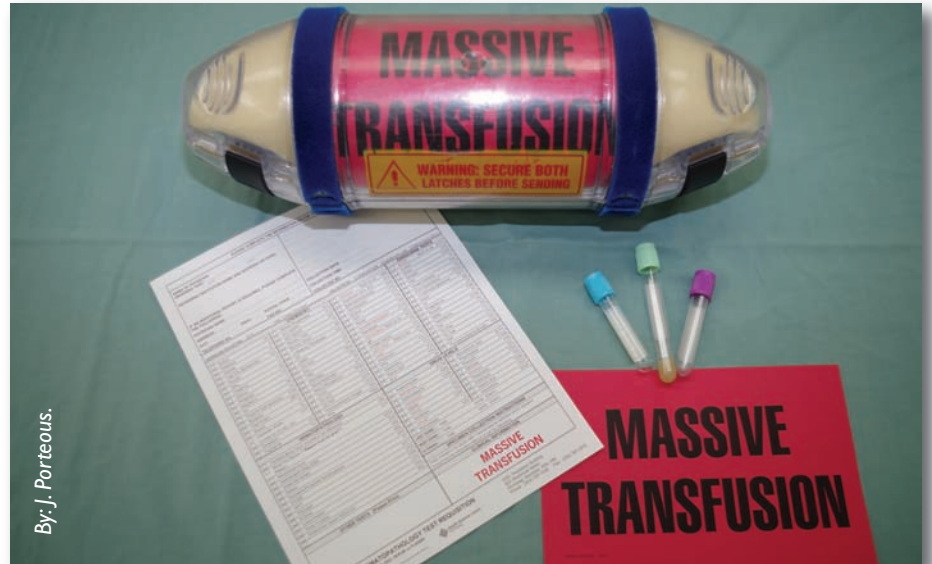
### What is a Massive Transfusion?

There are various definitions of the term massive transfusion. It has, historically, been defined as the replacement, by transfusion, of 10 units of red blood cells (RBC) in 24 hours. Another definition is the replacement of a patient's total blood volume in less than 24 hours or as the acute administration of more than half the patient's estimated blood volume per hour.<sup>2</sup> At Winnipeg Health Sciences Centre we defined a massive transfusion as an emergency situation where there is an expected transfusion of four or more

units of RBC within one hour and where on-going substantial need is expected. This paper defines a massive transfusion protocol as a standardized response plan that allows health care teams from a variety of departments to organize activities quickly and efficiently in order to provide the patient experiencing a massive hemorrhage with essential resources and services in the most time-efficient manner possible.

The aim of treatment is to restore an adequate blood volume to the patient and to maintain blood composition within safe limits of oxygen-carrying capacity, haemostasis, blood pressure, and biochemistry.<sup>2</sup> Specific protocols, which provide a rapid response to massive and uncontrolled hemorrhage, have been demonstrated to improve patient outcomes.<sup>3,4,5</sup> The use of a protocol facilitates a rapid delivery of services and resources.

The protocol at this site includes the timely provision of an on-going supply of blood and blood products, standardized physician treatment orders, rapid communication and specimen management strategies, immediate access



Preparation of blood samples for transport to the laboratory.

to blood lab test results, support for personnel, and the provision of a hematopathologist for immediate consult. The protocol, essentially, allows impacted departments to work collaboratively and cohesively as an efficient emergency response team.

#### Advantages of Developing a Massive Transfusion Protocol:

A standardized plan to manage this critical event provides many benefits, including the following:

- Health care teams are prepared to move quickly and cohesively in response to a simple trigger;
- Rapid communication is facilitated;
- Treatment plans are standardized and easily resourced;
- Delays in receiving blood products are minimized;
- Blood test results become available rapidly;
- Support becomes quickly available to the patient care team; and
- The provision of a safe replacement ratio of RBC to plasma to the patient is also facilitated which minimizes the risk of complications including coagulopathies.<sup>6</sup>

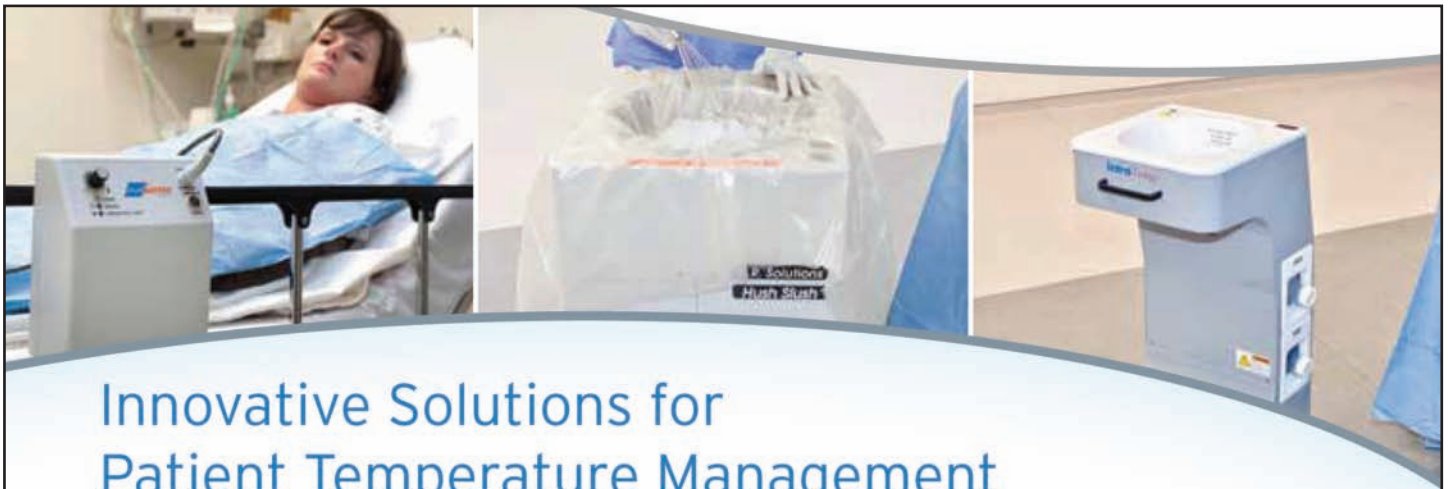
#### Developing a Massive Transfusion Protocol:

In order to develop the protocol at this

site a project manager met with the different departments and professionals involved and coordinated the development of a manageable protocol while ensuring ongoing feedback from all stakeholders. Opportunities to practice the protocol were also provided. The following processes were considered:

- Identifying the patient populations and departments involved;
- Activating the massive transfusion protocol;
- Communicating quickly and effectively to other departments involved;
- Ensuring the rapid receipt of blood lab test results;
- Ensuring blood and blood products are provided in a timely manner;
- Providing an appropriate ratio of RBC:plasma:platelets;
- Managing a patient being transferred to the OR in the midst of a massive transfusion protocol;
- Terminating the protocol;
- Educating physicians, nurses, and support staff; and
- Evaluating the protocol.

The protocol at this site affects patients 16 years of age and older in the emergency, operating rooms, post-anesthesia care units, and intensive care departments.



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## MASSIVE TRANSFUSION (cont.)

### Educating Participants:

The massive transfusion protocol was presented to physicians at their weekly rounds, in September 2014, and the protocol “went live” shortly after that. Centre-wide educational packages and PowerPoint presentations were developed and posted on-line as a resource for all departments. The OR department also utilized weekly education times to educate nurses and support staff on the protocol.

Mock massive transfusion simulations were planned, with the participation of all disciplines and departments, for each individual patient care area involved and personnel from all departments were able to attend. This included participation by communication systems (paging), patient transport, etc. Debriefing sessions were organized following each simulation. This allowed all participants to learn from the experiences of others. Revisions

to the protocol were made, as appropriate, and the protocol became more and more practical and effective. Clarification of communication comprised most of the revisions.

### Applying the Protocol in the OR:

In the operating room the anaesthetist and the surgeon assess both the blood loss prior to the patient’s arrival and the anticipated blood loss during surgery. The anaesthetist gives the order to activate the massive transfusion protocol when appropriate. The nurse responds at this site by initiating a code “Transfusion 25” via the emergency operator paging system. The nurse also immediately ensures the blood bank receives the patient demographics which includes the patient’s name, provincial health insurance number (PHIN), and location. It is only with the receipt of this information that the blood bank personnel are able to prepare for the



Uncrossmatched emergency red blood cells.

subsequent continuous delivery of blood and blood products to the patient.

Implementation of the massive transfusion protocol in the OR at this site consists, essentially, of the following activities:

- Initiation of the protocol by telephoning the hospital's emergency operator;
- The emergency operator will page the code via the overhead paging system and immediately fan out calls to the following individuals:
  - o The transfusion medicine physician on call who becomes a resource for the surgical team;
  - o The nursing supervisor; and
  - o Respiratory services.
- Blood bank personnel, upon receipt of the patient information from the OR, immediately prepare 5 units of red blood cells (RBC) and begin to thaw 1000 mL of plasma for transport as soon as possible. At this site 15 minutes is required for RBC and 40 minutes to thaw and prepare plasma. These same blood products and an adult dose of platelets will be prepared and packed in temperature-validated coolers by blood bank personnel for hourly pick-up until the protocol is terminated by the OR;
- If more blood products are required, in between the hourly arrivals, the

OR requests them from the blood bank as per standard practice;

- Standard physicians' order sets were developed and approved by physicians for:
  - o The massive transfusion protocol;
  - o A blood component order sheet; and
  - o Guidelines for the reversal of anticoagulation in massive transfusion.
- Lab tests are requested on forms flagged with a red massive transfusion stamp or sticker;
- Blood samples are transported to the lab via pneumatic tubes with internal large red flags to attract the attention of lab personnel who will then give them immediate priority and telephone and fax test results back as soon as they are available;
- A massive transfusion document package (envelope) containing flagged lab requisitions, physician order sets, protocol guidelines/ checklists, etc. is utilized by theatre personnel as a time-saving strategy;
- A pre-assembled, clearly labelled, package of medications that may not be routinely stored on the anaesthetic machine is available for immediate transport into the theatre. These medications include tranexamic acid, vitamin K, desmopressin acetate, protamine

This allows for quality monitoring and an opportunity for feedback and suggestions.

- sulfate, calcium chloride and calcium gluconate;
- If a patient is being transferred to the OR in the midst of a massive transfusion protocol it is critical to have clear concise communication between departments that includes:
  - o Notification of the time of an imminent delivery of blood products (i.e. at this site delivery is scheduled to be within the next 15 minutes, the sending department will arrange for delivery to the OR);
  - o Notification of the patient's new location to the blood bank to avoid delays in future blood product delivery; and
  - o Notification to the blood laboratory to fax pending blood test results to the patient's new location in the OR.
- The anaesthetist will request that the protocol be terminated when the patient has stabilized;
- Unused blood and blood products are returned immediately to the blood bank;
- At the end of the procedure the surgical team is asked to complete the evaluation form that is enclosed

in the document package. This allows for quality monitoring and an opportunity for feedback and suggestions; and

- A massive transfusion protocol evaluation team plans to meet on a regular basis to review the forms and revise the protocol as needed.

Please see Appendix 1 describing how the circulating nurse may organize the activities associated with the protocol during an intraoperative massive transfusion event.

#### Considerations for Developing a Massive Transfusion Protocol:

It should now be evident to the reader that adequate human resources were an essential component in the implementation of the complex Massive Transfusion Protocol described above. The presence of a clerk working at the OR control centre 24/7 is essential for effectively carrying out the activities that must occur with this protocol. Charge nurses on night and evening shifts are often in the theatre assisting with direct patient care for patients who have a massive and uncontrolled hemorrhage. Also, a limited number of sites have resources such as a transfusion medicine physician on call 24/7. Universal principles of a massive transfusion response would be in accordance with each individual site's practices and resources. Even portable companion telephones for charge nurses would be helpful so that calls to an empty OR desk can be transferred to a companion phone.

#### Our Experience:

The massive transfusion protocol in effect at this site is relatively new but the author's experience is that it is working quite well from the perioperative perspective. At the time of writing the protocol had been enacted approximately 10 times. Participants



By: J. Porteous.

Blood and blood product transport coolers.

## Appendix I:

# MASSIVE TRANSFUSION PROTOCOL (MTP) SAMPLE GUIDELINES FOR THE OR NURSE

*(based on the protocol utilized at the author's healthcare facility)*

1. MTP is announced by the anaesthetist when the need for a massive transfusion is identified:
  - a. OR staff will activate the MTP by dialling "55" and stating "Transfusion 25 Adult OR"
  - b. Notify the OR desk
  - c. The charge nurse will immediately bring in a MT printed package from the OR desk into the theatre
  - d. Send an addressographed blood bank Request for Release of Blood Products with a red Massive Transfusion sticker from the printed package to the OR desk immediately. You only need to do this once.
  - e. The transfusion medicine physician on call will telephone into the theatre and ask to speak to the anaesthetist
  - f. The patient may arrive in the OR with a MTP previously activated. If so, there is no need to send a blood bank requisition as above. Call blood bank to let them know the patient is now in the OR.
2. If the desk personnel have not already removed the large red signs/flags from the MT printed package, send the signs to the desk. They will be used to flag samples sent in the pneumatic tubes.
3. Blood bank personnel will begin to prepare blood and blood product cooler packs as soon as they receive the Request for Release... faxed form with the patient's addressograph.
  - a. The first red cooler shall be ready for pick up in 15 minutes from the implementation time and shall contain 5 units of cross-matched RBC
    - i. If patient has had no previous cross-match, O positive RBC will be sent until a cross-match is completed
  - b. The first blue cooler shall be ready in 40 minutes and shall contain one litre of thawed plasma and a separate bag of platelets attached to the outside
  - c. Subsequent cooler packs consisting of a red cooler, a blue cooler and a separate bag of platelets, will be ready together for pick up one hour from the initiation of the MTP and hourly after that until the MTP is terminated by the anaesthetist
  - d. Each cooler will have a seal of shrink wrap and have a packing slip on the top listing the contents as well as a manilla tag on which to document the time the cooler was opened in the theatre
4. If more blood is required before the second cooler pack would be ready, request cross-matched blood from blood bank as per standard processes or use emergency blood from OR satellite blood bank fridge if the patient is uncross-matched
5. Send someone to pick up the zip-loc bag of MT meds taped to the wall in the medication room for the anaesthetist.

## Appendix I: (cont)

6. Blood samples for cross-match, and for chemistry and hematology labs will be sent at least hourly:
  - a. Ensure red MT stickers (found in the printed package) are placed on all blood requisitions sent to blood bank or labs for testing
  - b. Ensure you document the patient's location i.e. "Adult OR" on the Hematology/Chemistry blood requisition, so the lab can fax the test results to the OR immediately after testing is completed
  
7. Only open coolers when needed. When the cooler is opened document the time on the manilla tag on the outside of the cooler. The time the cooler is opened should be documented on the reverse side of Record of Transfusion (ROT) forms attached to each unit in that cooler.
  
8. Complete 2-person confirmation of information on ROT, tag and unit label as per standard blood verification processes and document on Cumulative Blood Record as per standard processes.
  
9. If a patient arrives in the OR with the MTP previously activated (i.e. in Emergency Department), the OR shall call the blood bank to inform them of the patient's arrival in the OR. The sending unit (i.e. Emergency Department) staff shall inform the OR of the next blood pack anticipated ready for pick up time.
  
10. Cooler packs consisting of one red cooler containing 5 units of RBC, a blue cooler containing thawed plasma, and a separate bag of platelets shall continue to arrive hourly until MTP is discontinued by the anaesthetist.
  
11. Empty coolers shall be disinfected by the perioperative aide before being returned to the blood bank
  
12. The adult OR shall inform the OR desk and the blood bank when the MTP has been terminated by the anaesthetist.
  - a. Unopened coolers shall be immediately returned to the blood bank
  - b. Opened coolers with remaining unused products shall be immediately returned to the blood bank with the time the cooler was opened documented on the manilla tag on the top of the cooler
  
13. Completed ROT forms shall be placed in the addressed envelope contained in the MT printed package and sent to the blood bank. Keep them all together.
  
14. The surgical team shall collaborate to complete the evaluation forms contained in the MT printed package, place the evaluations into the addressed envelope provided in the printed document package and send via hospital mail.

have regular audit meetings to follow-up and discuss our experiences with these events. Revisions to the protocol will be on-going as recommended practices and resources change.

### CONCLUSION:

The massive transfusion protocol provides a strong example of how health care workers and departments can become a larger, more cohesive, team and quickly respond to a massive hemorrhage crisis by working efficiently together toward a common goal. At this site we continue to educate, monitor and evaluate the protocol to ensure it remains an effective strategy for providing timely access to resources when caring for patients experiencing a massive hemorrhage.

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ORNAC Standards pertaining to this article can be found in the Operating Room Nurses Association of Canada (ORNAC) (May 2013) *Standards, Guidelines, and Position Statements for Perioperative Registered Nursing Practice* (11th edition). Section 5, pg(s) 250-252, Standard 5.1.



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