Copies of this document can be obtained from:


http://transfusionontario.org/

**Note:** This document is for information purposes only and is not intended to provide either legal or medical advice. If you have a legal question, you should consult a lawyer. If you have a medical question, you should consult a qualified medical professional.
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The Ministry of Health and Long-Term Care acknowledges the contributions of the Ontario Contingency Planning Working Group (a subgroup of the Ontario Blood Advisory Committee) and the Ontario Regional Blood Coordinating Network for their participation in the development, maintenance and dissemination of the Ontario Contingency Plan for the Management of Blood Shortages.
Executive Summary

The Ministry of Health and Long-Term Care (MOHLTC) is committed to ensuring that Ontarians have access to a safe and adequate supply of blood and blood products across the province. Canadian Blood Services (CBS) as the national blood supplier to all provinces and territories in Canada excluding Quebec ensures the best practice for inventory management and equitable distribution of blood and blood products across Canada as well as in Ontario.

Despite all the efforts of CBS, MOHLTC, and many other champions in the blood system in Ontario to ensure undisturbed supply of blood, there still exists a risk of blood shortage due to labour disruptions, information system and transportation chain failures, communicable disease outbreaks, major weather disruptions, shortage of donors or a mass trauma event.

To help Ontario respond to such a blood supply shortage quickly and effectively, the Ontario Contingency Planning Working Group (CPWG) updated the Ontario Contingency Plan for the Management of Blood Shortages (“Ontario Plan Version 3”) which outlines roles and required actions for key stakeholders - National Emergency Blood Management Committee (NEBMC), CBS, MOHLTC, Ontario Emergency Blood Management Committee (OEBMC) and hospitals during a shortage. The Ontario Plan Version 3 incorporated the changes in the National Plan for Management of Shortages of Labile Blood Components dated October 7, 2015 (“National Plan”) from the previous version of the National Plan and feedback to the February 2014 Ontario Blood Shortage Exercise from the stakeholders.

The purpose of this document is to provide a framework to Ontario hospitals and other key stakeholders to prepare themselves for a consistent and coordinated response to primarily four different levels of blood inventory - Green, Amber, Red and Recovery, to minimize impact on patient care and ensure equitable distribution of health care and resources to Ontarians.

- **Green Phase**: normal blood component inventory levels where supply generally meets demand. This phase includes a broad range of inventory levels ranging from an ideal inventory to shortages that occur periodically and can be managed with existing CBS and hospital actions. Depending on where the national or regional inventory sits within the Green Phase inventory range, some hospital actions may be required.
  - Green Phase Advisory notification may be issued to hospitals when CBS inventory levels are low with respect to a particular blood component(s). All hospitals need to report their inventories and be aware of the possibility of crossing into Amber or Red Phase.
- **Amber Phase**: insufficient national inventory to ensure routine transfusion practices. Hospitals will be required to implement specific measures, as outlined in this document and as guided by NEBMC and OEBMC, in order to reduce blood usage.
- **Red Phase**: insufficient national inventory levels to ensure that patients with non-elective indications for transfusion will receive the required transfusion(s).
- **Recovery Phase**: national inventories have begun to increase and are expected to be maintained at a level which would enable the return from Red to Amber and subsequently to Green Phase.
Hospitals are encouraged to review this Plan and develop their own hospital emergency blood management plan (HEBMP) with specific requirements and settings for their hospital in advance to the actual event of a blood shortage or near-shortage. This can be tasked to the hospital emergency blood management committee (HEBMC) or equivalent.

When there is a risk of a blood shortage, CBS will notify hospital transfusion services (HTS) of the risk and inform their blood shortage mitigation strategies including possible order cuts and collection of hospital inventory data to better measure the national inventory level. Hospitals will be asked to enter their blood component inventories daily to the CBS Blood Component and Product Disposition System. This will help ensure distribution of the affected blood component is fair, equitable and transparent.

CBS will provide Provinces/Territories (P/Ts) with information on hospital inventory status. Based on hospital inventory index numbers and advice from the NEBMC, CBS will determine the severity of the shortage. This will be communicated to hospitals and P/Ts. NEBMC recommendations for clinical management of the shortage will be communicated to hospitals.

Blood components may also be redistributed between hospital sites to provide for urgent or critical patient needs in a given region and to reduce outdate of near expiring components.

CBS will ensure that regular and ongoing communication occurs to keep stakeholders informed of inventory status throughout the blood shortage. CBS is also responsible for all public service announcements and communications regarding recruitment of donors to correct the blood shortage.

MOHLTC is responsible for communications to hospital senior management via Local Health Integrated Networks (LHINs) regarding impacts to patient care in the province and hospital actions to reduce blood use as recommended by the NEBMC and OEBMC. MOHLTC also may send communications to the public as necessary.

HTS will notify relevant hospital personnel. The HEBMC will initiate their HEBMP. HEBMCs are responsible for developing a plan that reduces inventory needs at their hospital in response to a blood shortage notification from CBS.
**Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>ADRD</td>
<td>Average Daily Red Cell Demand</td>
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<tr>
<td>BLC</td>
<td>Blood Liaison Committee</td>
</tr>
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<td>CBS</td>
<td>Canadian Blood Services</td>
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<tr>
<td>CSCO</td>
<td>Chief Supply Chain Officer</td>
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<tr>
<td>CPWG</td>
<td>Contingency Planning Working Group (Ontario)</td>
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<td>DOH</td>
<td>Days on Hand</td>
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<tr>
<td>EMB</td>
<td>Emergency Management Branch</td>
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<td>EMCT</td>
<td>Emergency Management Communication Tool</td>
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<td>HEBMC</td>
<td>Hospital Emergency Blood Management Committee</td>
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<td>HEBMP</td>
<td>Hospital Emergency Blood Management Plan</td>
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<td>HII</td>
<td>Hospital Inventory Index</td>
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<td>HTS</td>
<td>Hospital Transfusion Service</td>
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<td>LHIN</td>
<td>Local Health Integration Network</td>
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<td>MEOC</td>
<td>Ministry Emergency Operations Centre</td>
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<td>MERP</td>
<td>Ministry Emergency Response Plan</td>
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<tr>
<td>MOHLTC</td>
<td>Ministry of Health and Long-Term Care (Ontario)</td>
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<tr>
<td>NAC</td>
<td>National Advisory Committee on Blood and Blood Products</td>
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<td>NAC-BSWG</td>
<td>NAC Blood Shortage Working Group</td>
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<tr>
<td>NEBMC</td>
<td>National Emergency Blood Management Committee</td>
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<td>OBAC</td>
<td>Ontario Blood Advisory Committee</td>
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<td>OEBMC</td>
<td>Ontario Emergency Blood Management Committee</td>
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<td>PATB</td>
<td>Provincial Agencies Trillium Gift of Life Network, Blood and Specialized Programs (formerly “Blood Programs Coordinating Office, BPCO)</td>
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<tr>
<td>PEBMC</td>
<td>Provincial Emergency Blood Management Committee</td>
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<tr>
<td>P/T</td>
<td>Provincial/Territorial or Province/Territory</td>
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Definitions

Average Daily Red Cell Demand (ADRD)
ADRD is a calculation determined from the CBS web based hospital disposition reporting system, the Blood Component and Product Disposition System, as follows:¹

\[
\text{ADRD} = \frac{\text{annual red cell demand}}{365 \text{ days}}
\]

(Red cell demand = transfused + outdated + wasted)

Blood Component
Whole blood, donated at CBS, is processed into different components including red blood cells (RBC), platelets, plasma and cryoprecipitate.

Blood Product
Blood products are manufactured from plasma (i.e., albumin, factor concentrates, immune globulins), also known as plasma protein products.

Elective/Urgent/Emergency surgical procedures
Elective surgical procedures are those that are not emergency or urgent procedures. Emergency procedures need to be performed within 24 hours in order to prevent the patient’s death (or major morbidity such as paralysis).¹ Urgent procedures are those for which a patient is likely to have major morbidity if surgery is not performed within the next one to 28 days.¹

Emergency Framework
Emergency Framework refers to the Emergency Framework for Rationing of Blood for Massively Bleeding Patients during a Red Phase of a Blood Shortage, which was developed by NAC as a supplement to the National Plan. It is an ethical decision-making framework to provide guidance to hospital triage officers so that decisions made on blood allocation during a critical blood shortage are as consistent and equitable as possible for patients across Canada.

Emergency Management Communication Tool (EMCT)
This tool was rolled out to all hospitals in Ontario in August 2016. It allows hospitals or CBS to inform the MOHLTC if there are concerns with inventory, and vice versa. It can be used to provide updates to hospitals but can also be used as a communication tool between hospitals. EMCT can be used for a wide number of emergency situations within the province.

Hospital Emergency Blood Management Plan (HEBMP)
Hospitals are required to develop a plan to respond to blood shortages by reducing their demand for the affected blood component or product. The HEBMP outlines actions to be taken at the hospital including guidance on internal communication and triage.

Hospital Inventory Index (HII)
Approximately half of RBC inventory is held at CBS and half in hospital inventory. The use of a common index to define inventory levels in relation to anticipated daily need is referred to as the
inventory index. HII is the ratio of the ADRD and the inventory at the time it is reported to CBS in the web based disposition reporting system. The HII can be used by CBS in times of shortage to aid in decisions for allocating inventory. The HII can also be rolled up into regional, provincial and national indices to provide information to decision makers during blood shortages. Although no ideal HII has been defined, according to calculations based on 2014-15 hospital data, HII for Green phase was reported as 8.57 to 11.9.

National Plan
National Plan refers to the National Plan for the Management of Shortages of Labile Blood Components which was developed by NAC and CBS. The National Plan provides guidance to provincial and hospital decision makers on how to manage and allocate resources during a blood shortage. The National Plan is based on established ethical principles (outlined in Appendix D of the National Plan).

Ontario Plan
Ontario Plan refers to the Ontario Contingency Plan for the Management of Blood Shortages, which was developed by the MOHLTC in collaboration with the CPWG (a subgroup of the Ontario Blood Advisory Committee) to outline the provincial response to a blood shortage.

Toolkit
The Toolkit refers to the Ontario Hospital Toolkit on Emergency Blood Management, a resource to support Hospital Emergency Blood Management Committees (HEBMC) in the development of an HEBMP to respond to a blood shortage. The Toolkit includes:

- preparedness checklists
- sample HEBMC Terms of Reference and template for a HEBMP
- checklist and supporting resources to train staff on the HEBMP
- memo templates to support internal communication during a blood shortage
- triage log sheets to document cancelled/deferred surgeries and other procedures
- One-pager educational and training documents for roles and responsibilities of health care professionals during a blood shortage

Triage
Triage is an action taken to reduce the impact of or avoid the possibility of a blood shortage. These actions can include:

- redistribution of blood between CBS production/distribution sites to equalize inventory levels across Canada and lessen the impact on any one region.
- distribution of blood to hospitals by CBS production/distribution sites to conserve supply and to balance inventory levels across a region. This may include CBS reducing the fill rate of hospital requests based on the HII and/or requesting hospitals to redistribute to another hospital.
- actions taken and decisions made by triage officers/teams within a hospital to prioritize and allocate blood components affected by the shortage to patients with the most urgent need.
1 Introduction

The MOHLTC ensures adequate and sustainable supply and appropriate use of blood as part of the provincial blood utilization strategy. Based on stakeholder feedback and advice from the OBAC, planning for a blood shortage was identified as a key priority for the Provincial Agencies Trillium Gift of Life Network, Blood and Specialized Programs (PATB).

As a result, the CPWG (see Appendix A for Terms of Reference) was formed in February 2007 to develop a contingency plan for the management of blood during a blood shortage. The first version of the Ontario Contingency Plan for Management of Blood Product Shortages (“Ontario Plan”) was released in January 2008.

Version 1 of the Ontario Plan borrowed from the draft plan developed in Nova Scotia and plans published in the United Kingdom, which are based on a colour-coded system for alerting stakeholders to blood shortages and actions to be taken. Other P/Ts have since released contingency plans based on the same colour-coded system. This allows CBS to respond to a blood shortage in a uniform manner, independent of P/T borders.

The NAC, in collaboration with CBS, released the National Plan for the Management of Shortages of Labile Blood Components (“National Plan”) in February 2010. Updated versions have been released in January 2012 and October 2015. The objective of the National Plan is to maximize the effectiveness of a national response to any crisis that impacts the adequacy of the blood supply in Canada.¹

The National Plan also uses the same colour-coded system and recommends actions to be taken during the various phases relating to activation of provincial blood shortage plans and patient triage. It also establishes a process to facilitate communication at the national, provincial and hospital levels in order to achieve a coordinated and consistent response throughout the country. This is imperative because blood inventory in Canada is managed (outside of Quebec) at the national level, by one supplier, CBS, irrespective of P/T health systems.

As recommended in the National Plan, the OEBMC was formed in 2009 (see Appendix B for OEBMC Terms of Reference). In 2010, the OEBMC held a provincial exercise to test the Ontario Plan.³ A second exercise was held in February 2014, simulating a severe (Red Phase) platelet shortage.⁴

In addition to the exercise held in 2014, low inventory at CBS in September/October of that year, led to identification of the importance of hospital inventory information to aid in decisions around methods of recovery (i.e. if a public media appeal for donors is necessary) and to a better understanding of the term Green Phase Advisory.

In early 2015, the potential for a labour disruption at CBS in Ontario led to heightened awareness of the need for preparedness for a blood shortage and the development of guidelines for the use of platelets. Recommendations from the 2014 exercise as well as others identified following debrief of the possible CBS labour disruption have been incorporated into Version 3 of the Ontario Plan.
1.1 Purpose and Scope

The purpose of the Ontario Plan is to:

- ensure a standard and equitable approach to managing low blood inventory throughout the province, consistent with the National Plan
- outline the provincial response to a blood shortage
- describe communication processes, including how national recommendations are communicated and monitored during a blood shortage
- assist HEBMCs to develop HEBMPs
- educate hospitals to assist them in meeting certain standards of practice and regulatory requirements (e.g., CSA Z902-15 Standard on Blood and Blood Components, Canadian Society for Transfusion Medicine Standards for Hospital Transfusion Services v3 2011, Public Hospitals Act)

Although the Ontario Plan was developed with labile blood components in mind (RBCs, platelets, plasma), a similar approach can be taken to address shortages of manufactured blood products (e.g., intravenous immune globulin, albumin).

1.2 Assumptions

The Ontario Plan is based on the following assumptions:

- The blood shortage may be regional, provincial or national in scope.
- CBS makes every effort to address the blood shortage and put actions into place to correct the blood shortage as soon as possible, including strategies in the green phase to reduce the risk of a blood shortage.
- The Ontario Plan is revised as needed and reviewed following each simulation exercise or actual event.
- Hospitals comply with recommendations and guidance provided by the NEBMC/MOHLTC.
- A blood shortage may be caused by a variety of events, such as labour disruptions, information system and transportation chain failures, communicable disease outbreaks, major weather disruptions, shortage of donors or a mass trauma event.
- A blood shortage may be short-term, or it could be a prolonged event.
- Several small rural hospitals maintain minimum stock to support ‘just in case’ transfusion needs. During a blood shortage, for Ontario, this inventory would remain on site however, if urgent need arises elsewhere, this inventory may need to be redistributed.
- During a blood shortage heightened efforts would be made to redistribute any components to avoid discards due to outdating.
- An ideal Hospital Inventory Index has not yet been defined.
1.3 Key Stakeholders

1.3.1 Canadian Blood Services (CBS)

CBS is a not-for-profit, charitable organization whose mission is to manage the supply of blood and blood products for Canadians (excluding Quebec, which is served by Héma-Québec). Core functions include donor recruitment and management; whole blood, platelet and plasma collection, testing, processing, storage/distribution and inventory management. CBS has a key role in notifying and communicating with hospital transfusion services (HTS) in the event of a blood shortage regarding change in inventory phase and ongoing inventory status.

1.3.2 CBS production/distribution site

A CBS production/distribution site prepares blood components from whole blood donations and distributes both blood components and blood products to hospitals. In Ontario, there are two CBS production/distribution sites: Brampton and Ottawa. The Brampton site provides service to 94 hospital sites in Central and Southwest Ontario. The Ottawa site provides service to 48 hospital sites in Northeast Ontario and one hospital in Nunavut. Twelve hospitals in Northwest Ontario receive blood components from CBS Winnipeg due to distances for shipping.

1.3.3 Hospital Emergency Blood Management Committee (HEBMC)

Hospitals establish HEBMCs to develop HEBMPs and to ensure adherence to the HEBMP in times of blood shortages. All key stakeholders tasked with the development and implementation of the HEBMP should be represented on the committee. This ensures joint input and decision making on the determined strategies required to reduce blood use at the hospital and a collaborative response should it be necessary to implement them (see the Toolkit for a sample HEBMC Terms of Reference). The HEBMC should delineate the lines of responsibility to ensure effective communication within their facility during a blood shortage. The National Plan strongly recommends that hospitals define their target inventory levels by blood shortage phases (Green, Amber and Red) within their HEBMP.¹

1.3.3.1 Hospital Emergency Blood Management Plan (HEBMP)

In accordance with the Public Hospitals Act, Regulation 965,³ it is a hospital’s legal requirement to plan for emergency situations that could place a greater than normal demand on the services provided by the hospital or disrupt the hospital routine.

This plan should be developed during the normal Green Phase so that it is available to guide the hospital’s response during a blood shortage. Usually, transfusion service personnel and the medical director respond to minor shortages in the supply of one or more blood groups or blood components by triaging blood order requests as they are received to verify compliance with hospital transfusion guidelines (or published guidelines where no hospital guidelines exist). Often, there is no requirement for action to be taken outside of the transfusion service. Should a larger scale or prolonged blood shortage occur, this response would fail to reduce blood usage to the degree
needed to ensure blood components are available to support patients who require life saving measures.

Severe blood shortages (current or imminent) must be communicated to professional staff outside of the transfusion service to ensure that the required multidisciplinary and coordinated reduction of blood use is achieved.

The plan should define the notification of personnel required for various phases of blood shortages. Amber Phase may initially include the transfusion service medical director, Chiefs of Hematology/Oncology, Intensive Care and Emergency, but may expand to Chief Executive Officer, Chiefs of Medicine, Surgery Nursing and senior management personnel should the need arise to defer or cancel elective procedures that might require blood transfusion. Red Phase needs to include notification of all of those mentioned above, in addition to all senior medical and nursing staff.

The HEBMP should:

- define inventory levels at the hospital by Phase (Green, Amber, Red) and how they are monitored and communicated (see the Toolkit for guidance on determining inventory levels by blood shortage phase)
- ensure inventory levels are reported to CBS, as directed, via the CBS Blood Component and Product Disposition System
- include a list and contact information for personnel within the hospital who must be notified of a blood shortage and also a defined personnel communication fan out plan
- have defined notifications and actions for Amber, Red and Recovery Phases
- define how blood conservation and transfusion alternatives may be safely and appropriately implemented to avoid anemia and reduce demand for blood
- define how triage of blood order requests will be performed (pre-defined guidelines, use of patient categories, direct medical approval, use of a triage officer/team) and monitored in Amber and Red Phases, including:
  - strict adherence to widely accepted transfusion triggers
  - reduction in number of components given per treatment (e.g. splitting of platelet units)
  - deferral or cancellation of non-urgent elective surgeries that historically involve transfusion of blood components (greater than 10% probability of blood use)
  - categorization of patients for prioritizing transfusion needs (emergency, urgent, elective)
- establish how decisions regarding triage (cancellation or deferral of blood transfusions) are documented and how these records will be archived
- define prioritization of the recall of patients for deferred or cancelled procedures following the Recovery Phase after CBS notification that hospital operations can return to normal levels to ensure inventory recovery can be sustained
- include a communication strategy to notify patients and their families who may be affected by the blood shortage
- be incorporated into the overall facility emergency or disaster plan
- define responsibilities and actions required by key individuals
• include a training plan to ensure staff are familiar with the plan, roles and responsibilities
• include a plan for debriefing and assessment following resolution of a blood shortage

More information on the components of a HEBMP can be found in the Toolkit.

1.3.3.2 Triage

To assist with triage, most likely to occur during a Red Phase, the NAC has developed the Emergency Framework, which is included as a supplement to the National Plan. The Emergency Framework is intended to:

• guide healthcare professionals in triaging patients in need of a massive transfusion during a Red Phase, where demand for blood greatly exceeds supply, and where all other measures to increase the supply of blood have been exhausted; and
• assist with standardizing care across all jurisdictions to allow for fair and equitable distribution of blood during a Red Phase

The Emergency Framework is based on the ethical framework Accountability for Reasonableness and includes input from transfusion experts from across Canada. It is recommended that, if directed to by the NEBMC:

• hospitals use the Emergency Framework to ensure fair and equitable access to blood across the country
• hospitals assign triage officers/teams to execute the protocol
• hospitals ensure transparency and documentation of all triage decisions

The triage officer/team:

• should be appointed by the HEBMC
• should be/include physician(s) experienced in triaging critically ill patients
• should be supported by a multi-disciplinary team which is available to provide consultation as required (if one individual is assigned the duty)
• should not be responsible for direct patient care (of those patients being triaged)
• should include a sufficient number of physicians to provide 24 hour coverage and to account for the volume of transfusions in the hospital
• should include support personnel for completing documentation of triage assessments, decisions and outcomes (registered nurse, medical laboratory technologist)
• should include personnel with background in patient and family support (palliative care, social worker, spiritual care)
• should have access to a medical ethicist
• should have access to psychological support
• should have training and education on the Emergency Framework and documentation requirements

It is critical that the triage officer/team has the endorsement of all those involved in patient care and hospital senior management. This allows for decisions to be made with confidence within the Emergency Framework.
Documentation and reporting:

Patient tracking forms are copied and distributed as follows:
- copy kept on patient chart
- copy to HEMBC daily
- copy to triage officer/team for next shift (if applicable)

After a blood shortage, the HEBMC is required to report on the use of the Emergency Framework during the blood shortage to the OEBMC, who then is required to provide a summary report to the NEBMC. The NEBMC provides a report to the NAC with recommendations on any required adjustments or revisions to the Emergency Framework and allocation algorithm or documentation/tracking tools. Review of the triage protocol application from all hospitals in each P/T helps to validate its use and identify any gaps/need for revisions.

Refer to Appendix C for the Synopsis for Triage Team guidance on implementing the Emergency Framework.

1.3.4 Ministry of Health and Long-Term Care (MOHLTC)

P/T ministries of health are responsible for funding CBS. P/T Ministers of Health are also corporate members of CBS and are responsible for approval of CBS's annual budget, oversight of the expenditure of public funds by CBS in delivering the blood program, selection of the CBS Board of Directors, ensuring the effectiveness of the blood system and providing recommendations to the Minister of Health (Canada) on proposed regulatory changes.

MOHLTC is responsible for activating the Ministry Emergency Operations Centre (MEOC), which is dedicated space within the Emergency Management Branch (EMB) that serves as the central command centre from which emergency situations facing the health care system and requiring MOHLTC support are coordinated. The MOHLTC may activate the MEOC to coordinate the ministry’s response (e.g. through activities of the PATB, LHIN Liaison Branch, Communications and Marketing Division, EMB and any other affected ministry areas) depending on the severity of the blood shortage. This coordination is particularly important if the blood shortage is related to a concomitant emergency. The Ministry Emergency Response Plan (MERP) outlines processes and procedures for MEOC activation.

The MOHLTC is responsible for communications to Ontario stakeholders (e.g., hospital senior management, the public) outside of those carried out by CBS to recruit donors and provide inventory status updates.

1.3.5 National Advisory Committee on Blood and Blood Products (NAC)

The NAC provides medical and technical advice on the utilization management of blood and blood products to the P/T ministries of health and CBS. Each P/T is represented by up to two members from their respective jurisdictions.
1.3.6 National Emergency Blood Management Committee (NEBMC)

The NEBMC develops recommendations and provides advice to CBS and provincial emergency blood management committees (PEBMCs) to support a consistent and coordinated response to critical blood shortages in Canada. The NEBMC is made up of all NAC members and all P/T BLC members to address the need for all regions to share information and have input into decision-making. Membership also includes CBS officials, ex-officio members from Quebec’s Ministry of Health, Héma-Québec, Health Canada and two blood recipients. The Chair of the NEBMC is the current chair of the NAC. NEBMC is responsible for activation of the National Plan. A working group of NAC, the NAC Blood Shortage Working Group (NAC-BSWG) is responsible for revisions and maintenance of the National Plan which is approved by the NEBMC.

1.3.7 Ontario Emergency Blood Management Committee (OEBMC)

The National Plan recommends that each P/T establish a PEBMC to plan for and respond to blood shortages. In Ontario, this committee is known as the OEBMC. Ontario’s P/T Blood Representative (PATB, MOHLTC) chairs the OEBMC and communicates national common messages, which may include information/advice regarding inventory status, mitigation strategies and impact to clinical practice and transfusion protocols (triage), from the NEBMC to the OEBMC. The OEBMC provides medical and technical advice to the MOHLTC. Ontario’s two NAC representatives are members of both the NEBMC and the OEBMC. If a regional or provincial inventory shortage occurs, the OEBMC may meet even though it may not be necessary for the NEBMC to be convened. The Chair of the OEBMC will notify the Chair of the NEBMC if the decision to convene is made. It is a responsibility of the OEBMC to strongly encourage hospitals to develop a blood shortage plan and to report inventory to CBS as requested. OEBMC is also responsible for monitoring hospital preparedness and compliance through regular provincial blood shortage exercises.

1.3.8 Provincial/Territorial Blood Liaison Committee (P/T BLC)

The P/T BLC facilitates the work among the participating governments and CBS to support CBS in the provision of a safe, secure and affordable national blood system and other programs. Each P/T has one representative on the BLC. Ontario’s P/T Blood Representative is the Manager or a delegate of the PATB, MOHLTC, who also acts as the Chair for the OEBMC.

1.3.9 Triage Officer/Team

A triage officer/team is the person or group of persons within a hospital tasked with the responsibility of performing triage of blood requests/needs. The triage officer/team follows guidelines approved by their HEBMC. To ensure consistency with other jurisdictions, these guidelines should adhere with the direction provided in the Ontario Plan and the National Plan. All decisions made must be documented to ensure transparency. Refer to the Synopsis for triage teams within this plan as well as the Emergency Framework available on the NAC website.
1.4 Communications

As indicated in the National Plan, a blood shortage is most likely to be first identified by CBS. In the event that critical inventory levels exist or are imminent, CBS contacts the Chair of the NAC to convene a meeting of the NEBMC. This meeting typically occurs within 24 hours depending on the severity of the situation. The NEBMC is consulted to declare a blood shortage. The final determination of the phase (Green Phase Advisory, Amber, Red) is made by the CBS Chief Supply Chain Officer (CSCO), based on input from the NEBMC. The NEBMC also develops key messages and advice (i.e., mitigation strategies, impact on clinical practice) to support a consistent and coordinated response to critical blood shortages across the country.

In the event that the blood shortage is restricted to a provincial scope, CBS will notify hospitals of the low inventory status via their standard communication channels. The CBS supply chain representative for Ontario will inform the Chair of the OEBMC of the potential inventory shortage. Depending on the severity of the situation, the Chair of OEBMC will inform OEBMC members of the situation via email. The Chair of the OEBMC will also notify the Chair of the NEBMC to inform them of the provincial inventory shortage for information only as a shortage in the province of Ontario has the potential of becoming a national shortage due to the percentage of blood used in the province (approximately 50% of CBS issues are to Ontario hospitals). The Chair of the NEBMC will determine whether to convene a meeting of the NEBMC or to inform the members of NEBMC in the event of an inventory shortage within Ontario.

The potential for a regional or provincial CBS supply shortage of RBC is low as RBC inventory is assessed daily across the country and leveled nationally. However, occasional short term shortages of RBC may occur that require CBS to adjust or negotiate hospital requests for stock. In the event of a short term platelet shortage, CBS will endeavor to inform hospitals as early in the day as feasible prior to induction of anesthesia or initiation of cardiopulmonary bypass to avoid scheduled surgeries proceeding in the absence of available platelets. Whenever possible, CBS will attempt to proactively adjust platelet production and/or negotiate platelet orders with hospital staff in order to mitigate the risk of such shortages.

At the MOHLTC, the PATB Manager, who is the OEBMC Chair and the Ontario’s P/T blood representative, will inform the EMB of Green Advisory or Amber Phase inventory shortage and its implications through OEBMC communication and when the situation is worsened (e.g. Red Phase), PATB will notify EMB via 24/7 Healthcare Provider Hotline. The EMB will then share the information with appropriate contacts within the MOHLTC.

If the NEBMC is convened or at the call of the OEBMC Chair, the OEBMC will be convened to discuss details of the shortage and NEBMC key messages including their recommendations for hospitals. The OEBMC provides medical and technical advice to the MOHLTC which may include recommendations for hospital orders (based on hospital inventory data from CBS); need for triage measures; handling of blood components such as splitting units and the need to communicate with hospitals/the public, including identifying any key messages specific to Ontario.

The MOHLTC may use the MEOC and EMCT to facilitate coordination of the provincial response. This will likely only be required in the event of a Red phase blood shortage or broader health care system emergency. Any communications from the MOHLTC should be consistent with recommendations and messaging from the NEBMC and OEBMC.
MOHLTC communications to hospital senior management via LHINs are to reinforce their obligation to ensure that physicians within their hospital are aware of the need to reduce their blood orders and blood use (triage). Hospital senior management is responsible for communicating MOHLTC recommendations to ordering physicians and transfusion services within their hospital and ensuring those recommendations are followed. This may be done through the HEBMC.

MOHLTC communications to the public by the Communications and Marketing Division will provide guidance on the potential impacts to patient care as required.

CBS has developed a communication plan (included in the National Plan) in which CBS (on behalf of NEBMC) notifies HTS of any change to inventory phases (i.e., when inventory levels reach Green Phase Advisory, Amber or Red Phase, when they begin to recover, and when levels return to Green Phase). It also describes how CBS manages communications to the public regarding recruitment of donors.

Ontario HTS are notified of the blood shortage directly by their regional CBS production/distribution site via fax and/or phone depending on the severity of the shortage (see Appendix D for a sample fax notification to hospitals). CBS production/distribution sites coordinate teleconferences, as required, with the hospitals in each region to communicate the status of the shortage; any hospital actions to be taken (e.g., request to reduce hospital target inventory, request to report inventory to CBS, request to redistribute to another hospital as required) and to obtain hospital status regarding the situation. Representatives from the OEBMC will participate on these teleconferences.

CBS may provide data on hospital inventory, average daily red cell demand and ordering to the MOHLTC via the Ontario’s P/T Blood Representative if requested, to inform the MOHLTC on Ontario hospitals’ compliance to recommended actions to correct the shortage. Decisions to fill orders may be determined in consideration of hospital inventory index to help ensure equitable distribution of the affected component.

Effective and consistent communication of key messages among stakeholders at all levels is essential to the effective implementation of this Plan. Figure 1 provides an overview of the two-way flow of information from the national and provincial levels to the hospital during a blood shortage.
Figure 1 Communication Flow

- **NAC Chair**
- **CBS CSCO**
- **NEBMC**
  - **NEBMC Key Message**
    - CBS: Inventory status and mitigation strategy update
    - NAC: Impact on clinical practice and transfusion protocol
  - When shortage is called
  - Prosocial Inventory Shortage Identified
  - Advice
  - Information sharing/coordination
- **MOHLTC**
  - **NEBMC Key Message with Ontario specific details**
  - Via LHINs
  - When shortage is not called,
    - Inventory memo for inventory challenges may be issued by CBS distribution site.
- **CBS**
  - Inventory status: initial notification & change in phase
  - Donor recruitment
- **OEBMC**
  - Advice
- **Hospital Senior Management**
  - **HEBMC**
- **Hospital Transfusion Service (HTS)**
  - Public (donors)
- **Clinicians**
  - Public (patients)
## Plan Structure

### 2.1 Inventory Levels/Phases

#### 2.1.1 Green Phase

Definition: Green Phase implies that normal blood component inventory levels exist and supply generally meets demand. This phase includes a broad range of inventory levels ranging from an ideal inventory to temporary shortages that occur periodically and can be managed within the scope of existing CBS and hospital actions.

A Green Phase is defined by CBS when national inventory is:

<table>
<thead>
<tr>
<th>Normal Green Phase</th>
<th>CBS national inventory level</th>
<th>Days on hand (DOH)</th>
<th>Green Phase Advisory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>RBC</td>
<td>Platelets</td>
<td>Plasma (non AB groups)</td>
</tr>
<tr>
<td>CBS national inventory level</td>
<td></td>
<td>&gt;4 DOH for O Rh positive and A Rh positive AND &gt;3 DOH for all Rh negative blood groups</td>
<td>&gt;90% daily national requirement (recovery must occur within 12-24 hours)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Green Phase Advisory</th>
<th>CBS national inventory level</th>
<th>DOH</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>RBC</td>
<td>Platelets</td>
<td>Plasma (non AB groups)</td>
</tr>
<tr>
<td>CBS national inventory level</td>
<td></td>
<td>More than 3 successive days of 3-3.5 DOH for either O Rh positive or A Rh positive OR More than 3 successive days of 2-3 DOH for either O Rh negative or other multiple Rh negative groups</td>
<td>80-90% of the national daily requirement May include a lower unit/fill rate for some sites but recovery must occur within 12-24 hours</td>
</tr>
</tbody>
</table>
While the overall CBS inventory is in Green Phase, if a particular blood type of component is in limited supply and temporary inventory adjustments are required by CBS, a **Green Phase Advisory** may be called. This state requires review of all hospital inventories to determine the possibility of the national inventory crossing into Amber or Red phase. Hospitals will be asked to submit their inventory to CBS by blood group and component within a specific timeframe to ensure that the NEBMC can make an assessment of what the appropriate inventory phase would be. Hospitals may be asked to reduce their target inventory for the affected component by a percentage in order to aid in recovery of supply.

Hospital Inventory Index (HII) can be used to determine optimal levels of inventory. Through the CBS hospital disposition reporting, hospital average daily red cell demand (ADRD) can be determined. HII is calculated by dividing the inventory level by the ADRD. HII can be calculated by blood group (ABO/Rh) if disposition reporting is done by ABO/Rh.

### 2.1.2 Amber Phase

Amber Phase implies that blood inventory levels are insufficient to continue with routine transfusion practice and is declared by the CBS CSCO with counsel from NEBMC when there is a short-term blood shortage and may apply to a single blood group or blood component. An Amber Phase is defined when national inventory is:  

<table>
<thead>
<tr>
<th>Component</th>
<th>RBC</th>
<th>Platelets</th>
<th>Plasma</th>
<th>Cryoprecipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOH</td>
<td>2-3 DOH</td>
<td>25-79% daily national requirement (NO recovery expected within 12-24 hours)</td>
<td>3-7 DOH non AB (6-14 DOH AB plasma)</td>
<td>6-14 DOH</td>
</tr>
</tbody>
</table>

Note: CBS will attempt to level hospital inventory based on HII within a region. (e.g. hospitals with a higher HII may receive a lower per cent of requested order compared to hospitals with a lower HII).

### 2.1.3 Red Phase

Red Phase implies that blood inventory levels are insufficient to ensure that patients with even non-elective indications for transfusion will receive the required transfusion(s). If inventory levels cannot recover in the short term, CBS may notify NEBMC to request that a move from the Amber Phase to the Red Phase be declared. If an imminent threat to or precipitous drop in the blood supply is identified, a move directly to the Red Phase from Green may be called.

Inventory levels for a Red Phase are defined as:  

<table>
<thead>
<tr>
<th>Component</th>
<th>RBC</th>
<th>Platelets</th>
<th>Plasma</th>
<th>Cryoprecipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOH</td>
<td>&lt;48 hours</td>
<td>&lt;25% of daily national requirement with NO recovery expected within 12-24 hours</td>
<td>&lt;3 DOH non AB, &lt;6 DOH AB plasma</td>
<td>&lt;6 DOH</td>
</tr>
</tbody>
</table>

Note: See the National Plan for specific details of inventory by group.
Note: Hospitals may be advised by the NEBMC to use the Emergency Framework for Rationing of Blood for Massively Bleeding Patients during a Red Phase of a Blood Shortage (Emergency Framework), which includes an algorithm and guidance document to triage blood for massively bleeding patients in a Red Phase blood shortage when faced with an extreme Red Phase shortage.2

CBS will attempt to level hospital inventory based on HII within a region. (e.g. hospitals with a higher HII may receive a lower per cent of requested order compared to hospitals with a lower HII).

2.1.4 Recovery Phase

Recovery Phase implies that blood inventory levels have begun to increase and are expected to be maintained at a level that would facilitate gradual resumption of normal transfusion activities. Recovery Phase will be communicated to hospitals by CBS based on national inventory in consultation with NEBMC.1 During the Recovery Phase, hospital activities with respect to blood use should continue to be monitored closely (as in Amber Phase) for 24-48 hours or as recommended by NEBMC or until CBS provides notice that normal activity levels can be supported (i.e. return to Green Phase).

2.2 Roles and Responsibilities of Key Stakeholders

2.2.1 Green Phase

In the Green Phase, key stakeholders should develop plans to prepare to respond should a blood shortage be declared.

<table>
<thead>
<tr>
<th>NEBMC/NAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop, maintain and distribute the National Plan.</td>
</tr>
<tr>
<td>Plan and hold exercises for the National Plan and incorporate lessons learned into the National Plan.</td>
</tr>
<tr>
<td>Develop recommendations to aid clinicians in planning for allocation of blood resources during a blood shortage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CBS &amp; CBS production/distribution sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm support for the Ontario Plan at CBS and ensure its compatibility with the CBS’ internal business continuity plan.</td>
</tr>
<tr>
<td>Provide ongoing linkage between CBS and the OEBMC/CPWG by participating on the OEBMC/CPWG.</td>
</tr>
<tr>
<td>Collaborate with NEBMC to review and revise the National Plan as needed.</td>
</tr>
<tr>
<td>Manage the inventory nationally and fill hospital orders as requested except for the times when CBS experiences unusual low inventory, e.g. Green Phase Advisory.</td>
</tr>
<tr>
<td>Notify hospitals of Green Phase Advisory phase if determined that the situation cannot be</td>
</tr>
</tbody>
</table>
improved internally.

- Notify MOHLTC should inventory reach Green Phase Advisory level or a level that may require MOHLTC’s attention (i.e. approaching Green Phase Advisory).

### MOHLTC

- Distribute the Ontario Plan to all Ontario hospitals and encourage them to prepare for a blood shortage with the guidance of the National Plan and the Ontario Plan.
- Provide secretariat support for the OEBMC and ensure OEBMC meets as per Terms of Reference (Appendix B).
- Provide the conduit for communications between NEBMC/OEBMC and hospitals/the public.
- Ensure all relevant areas of the provincial government are aware of the Ontario Plan and its implications for their areas of responsibility.
- Ensure linkage between the Ontario Plan with the National Plan and the Ministry Emergency Response Plan (MERP).
- Keep OEBMC informed of any potential shortage situations, e.g. Green Phase Advisory. The Emergency Management Branch (EMB) will communicate any information from the OEBMC to appropriate areas within the MOHLTC as necessary.
- May convene OEBMC depending on likelihood of the regional or short-term inventory concerns crossing into Green Phase Advisory, Amber or Red Phase.
- Encourage hospitals to report inventory regularly to CBS.
- Encourage leveling of HII through sharing of best practices in inventory management.

### OEBMC

- Develop and maintain the Ontario Plan.
- Plan and hold exercises to test the Ontario Plan and incorporate lessons learned into the Ontario Plan.
- No actions required unless otherwise advised by NEBMC.
- May develop medical/technical recommendations to the MOHLTC and CBS when required, e.g. when OEBMC is convened.

### Hospitals (Hospital Transfusion Service (HTS), HEBMC)

- Report inventory levels to CBS daily (for smaller hospitals minimum monthly) using the CBS Blood Component and Product Disposition System. Include ALL units available in inventory not yet transfused or issued to a patient i.e. for RBC include phenotyped and crossmatched (allocated) units.8
- Establish good blood utilization and inventory management practices to minimize wastage of blood components:
  - Regularly review inventory stocking to assess appropriate levels. Inventory levels should be determined based on hospital needs for Green, Amber and Red Phases (see the Toolkit for more information on determining inventory levels by Phase).
  - Develop and implement transfusion guidelines, patient blood management strategies,
blood alternatives and regular auditing of blood ordering practices. Refer to Appendix E and F for suggested RBC and platelet guidelines as taken from the National Plan. ¹

- Determine current blood usage according to surgical procedure. Identify procedures that have a greater than 10% probability of blood use.
- Adopt a massive blood transfusion policy/algorithm.
- Consider using the ORBCoN Platelet Web application (user guide can be found on http://transfusionontario.org/en/documents/?cat=platelets)
- Establish redistribution linkages.
  - Develop agreements among hospitals located in proximity to one another to support the redistribution of blood components if/when necessary.
  - Outline the policies and procedures for the redistribution of blood components including the requirement for appropriate storage conditions and appropriate documentation.
- Establish a HEBMC or make use of an existing committee, such as a transfusion committee.
  - Develop HEBMP to respond to a MOHLTC request to reduce blood use during a shortage.
  - Communicate the HEBMP to hospital staff. They should be aware of and familiar with their roles and responsibilities. Staff should be trained on actions required during a shortage according to the HEBMP.
  - Identify triage officer/team and provide training on their role and responsibilities in a blood shortage.

2.2.2 Amber Phase

In the Amber Phase key stakeholders should take action as indicated in the table below:

<table>
<thead>
<tr>
<th>NEBMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Assess the “total” national inventory and provide advice to the CBS CSCO for the final decision on declaration of Amber Phase.</td>
</tr>
<tr>
<td>- Develop national key messages and response strategies (e.g., triage of blood order requests) to ensure a standardized approach across Canada and disseminate the key message to hospital transfusion services (HTS) via CBS communication channels.</td>
</tr>
<tr>
<td>- Notify P/T ministries of health through the respective P/T Blood Representatives.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CBS &amp; CBS production/distribution sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Notify HTS of Amber Phase on behalf of NEBMC.</td>
</tr>
<tr>
<td>- Distribute components between distribution sites to ensure fair, equitable and transparent distribution to hospitals across the country.</td>
</tr>
<tr>
<td>- Communicate regularly with HTS and the MOHLTC (via Ontario’s P/T Blood Representative) to provide status reports of inventory levels and the anticipated recovery time.</td>
</tr>
<tr>
<td>- Provide linkage between NEBMC and OEBMC through a common CBS representative on both committees.</td>
</tr>
<tr>
<td>- Report information to MOHLTC (Ontario P/T Representative) on Ontario HII, by individual</td>
</tr>
</tbody>
</table>
hospital and provincially, to aid in monitoring of the affected component(s). If inventory levels at CBS cannot support hospital requests, or hospitals are not complying with requests to reduce inventory demand, the HII will be used to level distribution to hospitals (e.g. hospitals with a higher HII may receive a lower per cent of requested order compared to hospitals with a lower HII).

- Coordinate and oversee media announcements on the blood inventory status and any call for donors.

**MOH LTC**

- Ontario P/T Blood Representative (PATB) will inform EMB of the Amber Phase national blood shortage via OEBMC communication.
- EMB will communicate information from the NEBMC/OEBMC to appropriate contacts within the Ministry.
- The P/T Blood Representative will convene the OEBMC upon CBS’ declaration of blood shortage.
- Activate the MEOC as required - determined by the Director of EMB.
- If activated, MEOC will coordinate steps that need to be taken within the MOH LTC and any other relevant areas in the government of Ontario. This coordination is particularly important if the blood shortage is related to a concomitant emergency.
- Monitor hospital compliance with inventory stocking/ordering through information received from CBS via the P/T Blood Representative.
- Disseminate key messages from NEBMC/OEBMC to hospital senior management via LHINs. Emergency Management Communication Tool (EMCT) may be used.
- The Communication and Marketing Division will communicate the shortage and its impact to patient care to the public as required.

**OEBMC**

- Review and discuss recommendations, key messages and strategies from the NEBMC.
- Review regular updates from CBS on inventory status (both CBS and hospitals) and from hospital representatives the status of hospital responses in Ontario.
- Provide medical and technical advice to MOH LTC specific to Ontario.
- Collaborate with the MOH LTC to develop Ontario specific recommendations and guidance for health system partners in addition to the NEBMC key messages as necessary.

**Hospitals (HTS, HEBMC)**

- Upon notification of the blood shortage, initiate HEBMP and launch internal communication plan.
- Report ALL blood component inventory on the CBS Blood Component and Product Disposition System daily or as requested.
- Participate in CBS production/distribution site coordinated teleconferences as scheduled.
- Convene HEBMC to support decisions required to reduce demand for affected blood
component(s). Follow NEBMC/OEBMC recommendations and guidance.

- Reduce inventory target levels of affected blood component(s) for Amber Phase as defined in the HEBMP.
- Activate triage officer/team as per HEBMP. Triage blood order requests to prioritize and allocate blood components (refer to Table 1 and 2 in Appendix E and F). Document all decisions for deferral/cancellation of surgical/medical procedures.
  - Consider deferral/cancellation of elective surgical/medical procedures identified with a greater than 10% probability of requiring the affected blood component if shortage is prolonged.
  - Consider deferral/cancellation of non-urgent transfusions requiring the affected blood components.

- Increase use of blood conservation strategies and blood alternatives to decrease demand for blood.
- Heighten vigilance to avoid any wastage of components due to outdating.
- Utilize the ORBCoN Platelet Web Application to post or request near to expiring platelets to avoid discarding platelets due to expiry.
  
  [Link](http://transfusionontario.org/en/download/orbcon-platelet-inventory-exchange-web-application/)
  (user guide can be found on [http://transfusionontario.org/en/documents/?cat=platelets](http://transfusionontario.org/en/documents/?cat=platelets))
- Ensure patients and their families are notified if treatment is to be deferred, and the reason for the deferral is provided.

### 2.2.3 Red Phase

The roles and responsibilities required by key stakeholders in a Red Phase blood shortage mimic those required in the Amber Phase although frequency of meetings and communication may be escalated. The major difference is to the response required at hospitals.

#### NEMBC

- Assess the “total” national inventory and provide advice to the CBS CSCO for the final decision on declaration of Red Phase.
- Develop national key messages and response strategies (e.g., triage of blood order requests) to ensure a standardized approach across Canada and disseminate the key message to HTS via CBS communication channels.
- Notify P/T ministries of health through the respective P/T Blood Representatives.

#### CBS & CBS production/distribution sites

- Notify HTS of Red Phase on behalf of NEBMC.
- Distribute components between distribution sites to ensure fair, equitable and transparent distribution to hospitals across the country.
- Communicate regularly with HTS and the MOHLTC (via Ontario’s P/T Blood Representative) to provide status reports of inventory levels and the anticipated recovery time.
• Provide linkage between NEBMC and OEBMC through a common CBS representative on both committees.

• Report information to MOHLTC (Ontario P/T Representative) on Ontario HII, by individual hospital and provincially, to aid in monitoring of the affected component(s). If inventory levels at CBS cannot support hospital requests, or hospitals are not complying with requests to reduce inventory demand, the HII will be used to level distribution to hospitals (e.g. hospitals with a higher HII may receive a lower per cent of requested order compared to hospitals with a lower HII).

• Coordinate and oversee media announcements on the blood inventory status and any call for donors.

**MOHLTC**

• Ontario P/T Blood Representative (PATB) will update EMB of the Red phase national blood shortage via 24/7 Healthcare Provider Hotline (Toll free): 1-866-212-2272 or via EMCT. The EMB will also be notified via OEBMC communication.

• EMB will communicate information from the NEBMC/OEBMC to appropriate contacts within the Ministry.

• The P/T Blood Representative will convene the OEBMC upon CBS’ declaration of Red Phase blood shortage.

• Activate the MEOC as required, if not activated yet - determined by the Director of EMB.

• If activated, MEOC will coordinate steps that need to be taken within the MOHLTC and any other relevant areas in the government of Ontario. This coordination is particularly important if the blood shortage is related to a concomitant emergency.

• Monitor hospital compliance with inventory stocking/ordering through information received from CBS via the P/T Blood Representative.

• Disseminate key messages from NEBMC/OEBMC to hospital senior management via LHINs. EMCT may be used.

• The Communication and Marketing Division will communicate the shortage and its impact to patient care to the public as required.

**OEBMC**

• Review and discuss recommendations, key messages and strategies from the NEBMC.

• Review regular updates from CBS on inventory status (both CBS and hospitals) and from hospital representatives the status of hospital responses in Ontario.

• Provide medical and technical advice to MOHLTC specific to Ontario.

• Collaborate with the MOHLTC to develop Ontario specific recommendations and guidance for health system partners in addition to the NEBMC key messages.

**Hospitals (HTS, HEBMC)**

• Launch internal communication plan to notify move to Red Phase.

• Continue to report ALL blood component inventory using the web based CBS Blood Component and Product Disposition System as requested by CBS.
• Participate in CBS production/distribution sites’ coordinated teleconferences as scheduled.
• Convene HEBMC to support decision-making required to further reduce demand for the affected blood component(s). Follow NEBMC/OEBMC recommendations and guidance.
• Activate HEBMP for Red Phase. This may include the following additional actions:
  (a) Reduce target inventory levels of affected blood group(s) or blood component(s) according to Red Phase inventory needs as defined in HEBMP.
  (b) Continue to defer/cancel elective procedures with historical use of blood and any non-urgent transfusions.
  (c) Activate triage officer/team and triage all blood order requests.
     • Determine which patients are to be allocated to receive the blood components(s) and which are not (refer to Tables 1 and 2 in Appendix E and F). Decisions must be transparent and documented.
     • Document all decisions carefully using a log sheet and individual patient tracking form (may be completed by support staff) (See Toolkit for example).
     • Report all decisions to the HEBMC.
     • Communicate decisions to defer transfusion to the patient, the patient’s family and the patient care team.
  (d) Consider that other strategies may be needed such as deferral of chemotherapy and hematopoietic stem cell transplants or splitting of available components where the technology is available to do this safely (e.g. sterile connecting device).
  (e) Increase focus on use of blood conservation strategies and blood alternatives to reduce blood use as much as possible.
  (f) Utilize ORBCoN platelet web application to post platelets near to expiry and to request platelets if needed in order to minimize wastage.
  (g) Heighten vigilance to avoid any wastage of components due to outdated.
• In consultation with local CBS personnel and hospital clinicians determine if transfer of blood components between facilities is required to best serve the needs of patients in a region.

Activate the Emergency Framework for massively bleeding patients if directed to do so by the NEBMC and notify front line medical staff.

• Consideration may need to be given to stopping transfusion in those who have very low probability of survival. Note that the emergency framework provides guidance for patients who are massively bleeding and not those who require smaller volumes of blood.
• Reassess those patients who were denied blood daily (minimum) or sooner if their clinical situation changes (deteriorates or improves). If a patient is not to receive blood, it is important that they continue to receive supportive care which may include application of blood conservation techniques, supportive care for pain and management of clinical symptoms, and/or palliative care support.
### 2.2.4 Recovery Phase

Recovery of hospital blood inventory and return to normal activities (transfusions) should be gradual to ensure the overall blood inventory level does not return to shortage levels.

<table>
<thead>
<tr>
<th>NEBMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Convene to advise CBS when return to Recovery Phase is feasible and develop key messages and response strategies to ensure a standardized approach across Canada.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CBS &amp; CBS production/distribution sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Notify HTS of move to Recovery Phase.</td>
</tr>
<tr>
<td>- Coordinate and oversee media announcements regarding the recovery of the blood supply, manage donor response and return to normal operations as they deem appropriate.</td>
</tr>
<tr>
<td>- Communicate regularly with HTS and MOHLTC to provide status reports of inventory levels.</td>
</tr>
<tr>
<td>- Once the Green Phase has been announced, within 4-6 weeks, convene relevant personnel to debrief and identify recommendations to improve the response.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOHLTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If required, notify hospital senior management (via LHINs using email and/or EMCT) and the public of move to Recovery Phase.</td>
</tr>
<tr>
<td>- Once CBS has declared a Green Phase, convene OEBMC to (within 4-6 weeks) debrief to recommend improvements to the Ontario Plan and ensure continual improvement of the response to a blood shortage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OEBMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Collaborate with the MOHLTC to develop Ontario specific recommendations and guidance for health system partners in addition to the NEBMC key messages if necessary.</td>
</tr>
<tr>
<td>- Provide feedback on the shortage management for NEBMC debrief.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hospitals (HTS, HEBMC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- When the hospital receives notification that Recovery Phase has been declared, implement communication fan-out to notify internal hospital personnel.</td>
</tr>
<tr>
<td>- Continue to report blood component inventory to CBS on the Blood Component and Product Disposition System.</td>
</tr>
<tr>
<td>- Convene HEBMC to support decisions required to maintain close surveillance of blood use (24-48 hours) until notified by CBS of a return to a stable Green Phase inventory. At this point hospitals may return slowly to normal operations.</td>
</tr>
<tr>
<td>- Initiate Recovery Phase of HEBMP. This may include the following actions:</td>
</tr>
<tr>
<td>(a) Gradually return to Green Phase inventory levels of affected blood component(s) or group(s) according to HEBMP once CBS has notified hospitals of a return to a stable Green Phase inventory.</td>
</tr>
<tr>
<td>(b) Redistribution of blood components between hospitals may still be required for a short</td>
</tr>
</tbody>
</table>
period to ensure the equitable distribution of product within a region.
(c) Careful management of recalling and rescheduling patients for elective surgeries and non-
urgent transfusions to ensure there is no surge of blood demand that could result in a
return to a shortage.
(d) Encourage continued use of blood conservation strategies and blood alternatives to support
good blood management.

- Once CBS has declared a return to Green Phase, within 4-6 weeks, convene HEBMC to
debrief and recommend changes to the HEBMP and the Ontario Plan for continual
improvement of the response to a blood shortage.

3 Helpful Resources

3.1 Ontario Hospital Toolkit for Emergency Blood Management

This toolkit provides templates of communication documents, a generic hospital emergency
blood management plan, tracking sheets to support documentation of decisions regarding
deferral of transfusion, training documents and job aids.

3.2 Ontario Transfusion Quality Improvement Plan (OTQIP) and Toolkit

The OTQIP and toolkit provide Ontario practice recommendations for blood components,
screening algorithms and training support resources.

3.3 ORBCoN Inventory Management Toolkit

This toolkit provides resources to support best practices in inventory management and
includes a top 10 best practices list, discussion of how to determine your inventory, inventory
calculators for red cells and platelets, guide and examples to developing a maximum surgical
blood order schedule.
4 Contingency Planning Working Group

The following members of the Contingency Planning Working Group (CPWG) were involved in the review and revision of the Ontario Plan for the version 3. The CPWG is a subcommittee of the OEBMC and was originally formed under the direction of the OBAC to develop a provincial contingency plan in the event of a blood shortage.

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Allison Collins, Chair</td>
<td>Northumberland Hills Hospital</td>
</tr>
<tr>
<td>Ms. Wendy Owens, Vice Chair</td>
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<td>Ms. Lisa Ruston</td>
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<tr>
<td>Dr. Robert Skeate</td>
<td>Canadian Blood Services (CBS)</td>
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<td>Mr. Troy Thompson</td>
<td>ORBCoN - Central Ontario</td>
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<tr>
<td>Ms. Susan White</td>
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<td>Ms. Sophie Yang</td>
<td>Ministry of Health and Long-Term Care (MOHLTC)</td>
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<tr>
<td>Dr. Michelle Zeller</td>
<td>McMaster University</td>
</tr>
</tbody>
</table>
5 References


5. CAN/CSA-Z902-15 Blood and Blood Components; December 2015 Canadian Standards Association; Mississauga, Ontario.

6. CSTM Standards for Hospital Transfusion Services v.3; February 2011 Canadian Society for Transfusion Medicine; Ottawa, Ontario.


Appendix A – CPWG Terms of Reference

1. MANDATE

1.1 To develop and maintain the provincial blood contingency plan and toolkit for hospitals that addresses shortages of blood in the province of Ontario due to any type of disruption.

1.2 To review feedback following each blood shortage simulation exercise or blood shortage event to assess if revisions to the Ontario blood contingency plan are required.

1.3 To act as a multidisciplinary working group of the Ontario Blood Advisory Committee (OBAC)* for the implementation and ongoing monitoring of the provincial blood contingency plan and strategies.

*OBAC is an external advisory group to the Provincial Agencies Trillium Gift of Life Network, Blood and Specialized Programs (PATB), the Ministry of Health and Long-Term Care (MOHLTC) on blood system issues in Ontario.

1.4 To plan and implement provincial blood shortage exercises to test the provincial and hospital plans and preparedness at regular intervals (every two years minimum).

2. MEMBERSHIP

2.1 Members will be appointed by the PATB. The PATB may solicit the advice of the existing Chair, Vice Chair and members.

2.2 The Chair and Vice Chair will be selected by the PATB.

2.3 The Chair will be selected from the OBAC membership and will report to the OBAC.

2.4 The term for the Chair and Vice Chair will be two years with opportunity for renewal.

2.5 Members of CPWG will be, by default, members of the Ontario Emergency Blood Management Committee (OEBMC)

2.6 Multidisciplinary representation will include the following:

- Ministry of Health and Long-Term Care
  - Provincial Agencies Trillium Gift of Life Network, Blood and Specialized Programs
    - Manager/OEBMC Chair
    - Project Coordinator

- Canadian Blood Services (CBS)
  - Regional Medical Officer representative
  - Regional Hospital Liaison Specialist (HLS) representative

- Hospital/Hospital Emergency Blood Management Committee (HEBMC)
  - Clinical Consultant - Transfusion Medicine, Anesthesiology, Critical Care, Surgery (ad hoc)
  - Transfusion Medicine Laboratory - Teaching and Community
  - Transfusion Safety Officer
  - Risk Management representative

- National Advisory Committee on Blood and Blood Products (NAC)
- Ontario Blood Advisory Committee (OBAC)
- Ontario Regional Blood Coordinating Network (ORBCoN)
2.7 Additional experts may be invited to meeting on an ad hoc basis to provide expertise on the subject matter being discussed.

2.8 Each region within Ontario (Central, Northern/Eastern, Southwest) is represented by at least two members.

3. MEETINGS

3.1 Meetings will be scheduled as necessary, typically 6-8 meetings per year, or at the call of the Chair. Meetings will take place by teleconference.

3.2 Attendance at meetings is required to address all aspects of the mandate stated in Section 1. Members must attend at least 50 percent of meetings; non-compliance over any 12-month period may result in replacement of the member.

3.3 If one is unable to attend, a delegate may be sent with a notice to the Chair in advance. The delegate is fully responsible for meeting participation and debrief to the member.

3.4 Decisions will be made by consensus (80 percent of the members present).

4. REMUNERATION

4.1 Members will not receive remuneration for participation on this working group.

4.2 In the event that travel is required to attend in person, relating to business, members will be reimbursed for travel expenses (i.e., transportation, accommodation and meals) incurred due to their participation in this group. An expenses claim form (available from MOHLTC) and original receipts must be submitted to the PATB. Expenses will be subject to the Government of Ontario’s Travel, Meal and Hospitality Expenses Directive.

5. SECRETARIAT

5.1 The PATB will serve as the Secretariat for the CPWG and will:

- Schedule meetings
- Develop the agenda in conjunction with the Chair and Vice Chair
- Circulate the agenda, minutes and any other relevant information to members
- Follow up on action items resulting from the meetings
- Maintain an up-to-date contact list of members and relevant stakeholders

6. REPORTING

6.1 The CPWG will report to the Chair of the OEBMC

6.2 The CPWG will report progress to OBAC through updates at scheduled meetings.
Appendix B – Ontario Emergency Blood Management Committee Terms of Reference

1. MANDATE

1.1 Develop a response plan (i.e. communication plan within the Ontario Plan for the Management of Blood Shortages) with national and provincial stakeholders to minimize the impact of blood shortages.

1.2 Work in accordance with the guidelines outlined in the National Plan for Management of Shortages of Labile Blood Components (the National Plan), especially during a blood shortage.

1.3 Ensure that the recommendations of the National Emergency Blood Management Committee (NEBMC) and resulting national decisions are appropriately communicated within Ontario.

1.4 Solicit feedback and ongoing collaboration on implementation of the National Plan from key stakeholders (i.e. transfusion medicine specialists, organ transplant, sickle cell and other specialty groups) and hospital emergency blood management committees (HEBMCs).

1.5 Provide the conduit for communications/feedback between the NEBMC, hospitals/HEBMCs.

1.6 Provide recommendations to CBS on distribution of blood components to Ontario hospitals during an Amber, Red or Recovery Phase blood shortage.

1.7 Establish a process to monitor adherence to the National and Ontario Plans in times of blood shortages and recommendations to manage non-adherence to the Plans in times of blood shortage.

1.8 Provide feedback to the NEBMC, CBS, NAC, and the Ontario Contingency Planning Working Group on the results of the blood emergency simulation exercise and/or live activation of the National and Ontario Plans for emergencies related to blood.

1.9 Task the Ontario Contingency Planning Working Group with review and revision of the Ontario Plan following simulation exercises or live activation. Ensure ongoing improvements to the Ontario Plan are completed and communicated to stakeholders.

2. MEMBERSHIP

2.1 The Chair of the OEBMC will be the current Provincial Blood Representative, which is the Manager of the PATB, MOHLTC.

2.2 The Vice Chair will be the Ontario’s NAC representation who sits on both the Contingency Planning Working Group and the OEBMC and will act as Chair in the absence of the OEBMC Chair.

2.3 Members will be selected by consensus of the committee with the consent of the Chair.

2.4 The membership of the OEBMC will include the following:

- All Ontario Contingency Planning Working Group members
- Ministry of Health and Long-Term Care (MOHLTC)
  - Provincial Agencies Trillium Gift of Life Network, Blood and Specialized Programs (PATB) Manager/PT representative
  - Emergency Management Branch (EMB)/Ministry Emergency Operations Centre (MEOC) Representatives
• National Advisory Committee on Blood and Blood Products (NAC) members for Ontario
• Canadian Blood Services (CBS)
  o All Regional Medical Officers
  o All Regional Supply Chain Operations Directors
  o All Regional Hospital Liaison Specialists
• Ontario Regional Blood Coordinating Network
  o Project Clinical Coordinator - TM Physician
  o All Regional Managers
• Hospital
  o Senior Management
  o Communication Specialist
  o Tertiary Care Centre Blood Transfusion Services Representatives (including Transfusion Medicine Medical Directors from the regions within Ontario with Medical Schools – London, Hamilton, Toronto, Ottawa, Kingston, Sudbury/Thunder Bay)
  o Rural or Remote Sites Representatives
• Ontario Nurse Transfusion Coordinators (ONTraC) Program
• Ontario Hospital Association (OHA)
• Patient Group/Consumer (ad hoc)
• Nunavut Blood Office/Ministry of Health

2.5 Additional experts may be invited to meeting on an ad hoc basis to provide expertise on the subject matter being discussed.

3. MEETINGS

3.1 The OEBMC will meet at least once per year.

3.2 Meetings will be scheduled as necessary or at the call of the Chair, e.g. blood emergency simulation, potential shortages or shortages. Meetings will take place by teleconference.

3.3 Every member of the OEBMC is responsible for naming a designate in the event that he/she is unavailable, with a notice to the Chair in advance. The designate is fully responsible for meeting participation and debrief to the member.

3.4 Decisions will be made by consensus (80 percent of the members present).

4. SECRETARIAT

4.1 The PATB will serve as the Secretariat for the OEBMC and will:
  • Schedule meetings
  • Develop the agenda in conjunction with the Chair.
  • Circulate the agenda, meeting materials and any other relevant information
  • Follow up on action items resulting from the meetings
  • Maintain an up-to-date contact list of members and relevant stakeholders

Purpose and Scope
The National Advisory Committee on Blood and Blood Products (NAC—an advisory committee, composed of hospital-based transfusion medicine experts chosen by their respective Provincial Ministries of Health and Canadian Blood Services representatives that report to a joint Canadian Blood Services/Provincial and Territorial Ministries of Health committee) developed the National Plan for the Management of Shortages of Labile Blood Components (The National Shortages Plan). The National Shortages Plan required further expansion for dealing with patients who require massive blood transfusion during a red phase blood shortage. This document has been developed as an adjunct to the National Shortages Plan (available at www.nacblood.ca) to address these massively hemorrhaging patients as they can consume up to 25% of the national blood supply and urgent decisions are needed to ration blood to these patients during a red phase blood shortage.

The document for the rationing of blood for massive hemorrhage (defined as expected blood loss of one blood volume over less than a 24 hour period; 0.5 blood volume in 3 hours; or four or more units of red blood cells in one hour) is a guide for the management of patients in need of massive transfusion (trauma patients, patients undergoing liver/lung/heart transplantation, patients requiring ventricular assist devices or extracorporeal membrane oxygenation, patients with ruptured aortic aneurysms or gastrointestinal bleeding and obstetrical patients) during a red phase blood shortage. A red phase blood shortage is defined as the availability of less than 48 hours of red blood cell units in Canada where it is not foreseeable that a shortage will be averted by increasing the collection of blood or by reducing elective surgical procedures. In other words, the blood inventory levels are insufficient to ensure that patients with non-elective indications for transfusion will receive the required transfusion.

This document has been developed to ensure that blood transfusions are provided to Canadians during a red phase blood shortage in an ethical, fair, and transparent way to ensure that the greatest numbers of lives are saved and to minimize the suffering and maximize the use of alternatives for those who may not survive due to insufficient availability of blood.

Target Audience
This emergency framework is intended to be used by key blood system participants who are defined to be Canadian Blood Services, hospitals and regional health authorities, the Provincial and Territorial Ministries of Health and the National Emergency Blood Management Committee (NEBMC) as per the National Shortages Plan.
Summary of the Development Process

In 2009, a working group of experts was convened to develop an emergency framework. The working group members were from large tertiary care centres in Canada and had expertise in transfusion medicine, trauma, anesthesiology, gastroenterology, heart/lung/liver transplantation, obstetrics, cardiovascular surgery, allied health, medical ethics, law and methodology. The working group also included members of the National Advisory Committee on Blood and Blood Products. The working group did not include patient representatives, although widespread lay consultation was sought during the development process.

A systematic search was conducted of the literature to identify predictors of massive blood loss and mortality to guide the working group members in determining which patients would be the most likely to benefit from blood transfusion.

An extensive literature search was also conducted for ethical frameworks and allocation protocols dealing with the allocation of scarce resources as the allocation of any scarce resource is one of the most challenging ethical issues faced in health care. This emergency framework was developed to ensure a fair, transparent and just distribution of blood when the demand for transfusion will exceed the available resources. This framework may transcend the needs of a single patient, health care professional or institution but represents a focus on the ‘greater good’.

The working group through an iterative process developed recommendations that were assigned a level of evidence and grade of recommendation according to the Canadian Task Force (www.canadiantaskforce.ca). In addition to the recommendations, the working group also adapted a previously published Canadian critical care triage protocol developed for pandemic influenza planning. Recommendations for the patients who are massively hemorrhaging do not address comorbidities that may impact on the survival of patients.

National experts including professional societies, the blood provider and lay groups reviewed the final recommendations to provide input on the recommendations. Their agreement to all recommendations and the overall document review was elicited and all comments were subsequently addressed in the final document.

The Triage Team

It is recommended that triage teams be established in advance of a shortage. The role of the triage team is to provide a structure that formally oversees the triage process be it provincial/regional or at the hospital level during a crisis. The triage team should receive comprehensive information on the triage framework in advance of a blood shortage being declared. The triage team must be a multidisciplinary team with adequate background knowledge in terms of patient triage and managing patients under a ‘crisis standard of care’.

Membership

The triage team should be comprised of any of the following and be appointed by the regional/hospital transfusion committee or regional/hospital emergency blood management committee (the number of team members should be proportional to the transfusion volume of the institution or region):
1. **Triage Team Leader.** The triage team leader should be an experienced physician with familiarity in triaging critically ill patients, broad based knowledge of resources and capabilities of healthcare organizations. Will have final responsibility and authority over clinical decisions.

2. **A Management Representative.** A management representative is required to provide guidance on the capability of the organization regarding resources, personnel, external support, and internal and external communications.

3. **An ethicist.**

4. **A nursing supervisor to provide direction on alternate care**

5. **Representative from the emergency room, trauma, transplantation, cardiovascular surgery, gastroenterology, and obstetrics to provide updates on demand, impact and assist in decision making.**

6. **Palliative care nurse or physician for patients not triaged to receive blood.**

7. **Social worker**

8. **Chaplain**

9. **Medical laboratory technologist**

In addition, the triage team leader should have another triage physician available to them for assistance with decision making for difficult cases. The regional/hospital transfusion committee or Regional/Hospital Emergency Blood Management Committee should appoint members of the triage teams with the number of individuals proportional to the transfusion volume of the institution or region. It will be the responsibility of the triage teams to report back to the transfusion committee or emergency blood management committee all triage decisions made.

The triage teams must be educated on the background information and how to apply the triage tool in advance of a blood shortage. The responsibility for education of physicians and triage teams rests with the Regional Emergency Blood Management Committee in collaboration with the Hospital/Regional/District Health Authority. Specific training at dedicated intervals is difficult to achieve as there is varying frequency with which simulation exercises occur, the level of involvement of various medical services during a simulation and a large turnover of physicians throughout the system. However, through simulation exercises, continuous education, and dissemination of the National Blood Shortages Plan and this emergency framework, physicians would be more inclined to align with the National Blood Shortages Plan to ensure all patients receive quality levels of care during a shortage. Post simulation reporting may provide the best training opportunities in that lessons learned can be addressed at the Medical Advisory Committee level. Training and development modules should occur in collaboration with Canadian Blood Services as they will be instrumental in invoking the National Blood Shortages Plan. A core part of this pre-shortage education should clearly focus the triage team on their role in ensuring the best care for the community of patients that they serve, rather than the needs of individual patients.

**Responsibilities**

*The responsibilities of the triage team are to ensure*

- documentation of the state of emergency (i.e., that an emergency has been activated, that all existing resources are exhausted, the rationale for withholding transfusion, and that all supportive care and blood conservation strategies will be instituted);
• documentation of inclusion/exclusion criteria;
• adherence to decisions and alternate levels of care;
• efficient and regular re-evaluation of patients;
• reevaluation of triaged patients daily and every 10th red blood cell transfusion;
• physicians receive the required assistance; and
• the public receive information about the status of the emergency and where to obtain further information.

**Implications**
The triage team should not be directly involved in the care of the patient. The triage team assigned to allocate blood components needs to be clearly cognizant that their duty is to the population, not just to the individual patient. The triage teams should be blinded to identifying patient information when presented with clinical information in determining if a patient is eligible to receive transfusion as per the triage criteria. It is suggested that the triage team convene in an area not within the immediate vicinity of the patient bedside. Typically given the acute and emergent nature of the presenting cases, it is anticipated that there will be no ability to manage an appeals process in the middle of the mass casualty situation or other disaster. In addition, decisions during a massive hemorrhage must be made within minutes and therefore a formal appeals process is not clinically feasible as such the triage decisions must be final with no appeal process. The triage teams should be offered adequate administrative and psychological support.

There must be sufficient coverage of the triage team to allow for 24 hour coverage. The triage team decisions need to be reported daily to the Regional/Hospital Emergency Blood Management Committee to ensure ‘over triage’ and ‘under triage’ errors are minimized. Consideration needs to be given by the hospital of having a joint intensive care and transfusion triage teams, where possible, to maximize the use of resources. The triage decisions need to be transparently communicated to the patient, the patient’s family, the clinical team caring for the patient and recorded clearly in the patient’s chart. Patients should be reassessed at a minimum of daily, every 10th unit of red blood cells, or sooner if their clinical status improves or deteriorates substantially prior to 24 hours.

In the setting of a scarcity of multiple hospital resources, the blood triage tool should be utilized sequentially with the other rationing tools. It is possible that a blood shortage may occur as an isolated event or in the setting of multiple resource scarcity (e.g., ventilators or critical care beds). In the setting of an isolated blood shortage, all other available therapies, including blood conservation strategies, should be offered to all patients. In addition, ensuring pain and symptom management should be a core part of the triage team’s oversight responsibility so that patients and their families do not feel abandoned.

**Documentation**
Clear and complete documentation will be essential for a complete patient record and for evaluation after the red phase. In the patient chart, the triage team shall document the following: phase of blood shortage, triage decision, reason for exclusion if applicable, date/time of next planned re-evaluation, a copy of the triage documentation tool, and the number to page if the clinical status of the patient substantially improves or deteriorates before the next planned re-assessment. Extensive clinical notes will not be possible, or appropriate, as the triage team will be required to triage multiple patients. Documentation can be delegated to any member of the triage team and need not be done by the triage physician. Documentation on the triage documents should include a triage tracking log of all cases and a triage sheet for each patient. Efforts should
be made to be as complete as possible to allow for the best possible review of triage decisions after the resolution of the red phase. At the end of each shift, a copy of the documents should be given to the chair of the Regional/Hospital Emergency Blood Management Committee, or their designate, and the original documents given to the next triage team with appropriate verbal handover. At the completion of the red phase, copies of all triage tools should be forwarded to the Provincial Emergency Blood Management Committee for review and analysis.

**The Framework**

**Patient Population:** This framework applies only to patients experiencing massive hemorrhage (defined as expected blood loss of one blood volume over less than 24 hours; 0.5 blood volume in three hours; or four or more units of red blood cells in 1 hour) during a red phase blood shortage.

In general all patients should receive access to all available blood conservation strategies including but not limited to: erythropoiesis-stimulating agents, intravenous iron, oral iron, antifibrinolytics, intraoperative cell salvage, interventional radiologic procedures, rapid access to endoscopy, and non-invasive surgeries.
Figure 1 – Algorithm for the Triage Team (page 1)

General Exclusion Criteria:

A. Severe burns of patient with any 2 of the following:
   i. Age >60 yrs
   ii. >60% of total body surface area affected
   iii. Inhalation injury requiring mechanical ventilation

B. Cardiac arrest

C. Advanced, progressive baseline cognitive impairment

D. Advanced, progressive untreatable neuromuscular disease

E. Metastatic malignant disease with expected survival less than 6 months

F. Advanced and irreversible immunocompromise

G. Severe and irreversible acute neurologic event or condition

H. End-stage organ failure meeting the following criteria:
   i. Heart – NYHA class III or IV heart failure
   ii. Lungs – COPD with FEV1 < 25% predicted, baseline PaO2 < 55mmHg, or secondary pulmonary hypertension; Cystic fibrosis with post-bronchodilator FEV1 < 30% or baseline PaO2 < 55mmHg; Pulmonary fibrosis with VC or TLC < 60% predicted, baseline PaO2 < 55mmHg, or secondary pulmonary hypertension; Primary pulmonary hypertension with NYHA class III or IV heart failure, right atrial pressure > 10mmHg, or mean pulmonary arterial pressure > 50mmHg

Does patient meet one of the above general exclusions?  

YES  Do not transfuse. Re-assess as per page 11.

NO  Specific Exclusion Criteria based on clinical factors specific to patient populations (see page 8):

- Trauma
- Ruptured Abdominal Aortic Aneurysm
- ECMO/VAD
- Heart/Lung Liver Transplantation
- Gastroenterology (GI Bleed)
- Obstetrical Bleed
- Other

Go to page 2 of algorithm
Figure 1 – page 2

Does patient meet one of the above specific exclusions?

YES → Do not transfuse. Re-assess as per page 11

NO →

Is there sufficient inventory to meet current demand at hospital level?

NO →

Is inventory concern related to competing patients eligible for transfusion?

NO → Do not transfuse. Re-assess as per page 11

YES →

Supplemental Inclusion Criteria (in order presented)
1. Youngest first
2. Highest likelihood of hemostasis control
3. First-come, first-served

Proceed with transfusion

YES →

Reevaluate at specified intervals for eligibility for ongoing transfusion:
1. Every 24 hours
2. Every 10 units of RBC (to be adjusted by the NEBMC as determined by blood availability)
3. Re-assess according to the reassessment criteria for triaged patients (page 11)

NO →

Is a patient meeting these inclusions?

NO →

Do not transfuse. Re-assess as per page 11
Specific Exclusion Criteria for Massively Bleeding Patients:

Trauma

1. During a red phase, do not administer transfusions to children or adults with non survivable brain injury.
   Level of evidence: III
   Grade of recommendation: A
   Clinical Consideration: CT scanning should be done as soon as possible to confirm the diagnosis of a non survivable brain injury.

2. During a red phase, do not administer transfusion to children or adults with a Glasgow Coma Scale =3 who have hypotension not attributable to reversible factors and who have fixed and dilated pupils.
   Level of evidence: III
   Grade of recommendation: A

3. During a red phase, do not transfuse patients after the declaration of brain death for the purpose of deceased organ donation.
   Level of evidence: III
   Grade of recommendation: A

4. During a red phase, do not administer transfusions to adults or children with penetrating cranial trauma and a Glasgow coma scale =3 that is not attributable to reversible factors.
   Level of evidence: III
   Grade of recommendation: B

5. During a red phase, do not administer transfusions to adults or children with penetrating cranial trauma, a Glasgow coma scale <8 that is not attributable to reversible factors, hypotension and severe thoracoabdominal trauma.
   Level of evidence: III
   Grade of recommendation: B

6. During a red phase, do not administer transfusions to adults or children with blunt trauma, and a Glasgow Coma Scale =3 that is not attributable to reversible factors.
   Level of evidence: III
   Grade of recommendation: B

7. During a red phase, do not administer transfusions to adults or children with blunt trauma who have lost vital signs pre-hospitalization.
   Level of evidence: III
   Grade of recommendation: A

8. During a red phase, do not administer transfusions to patients with transcranial gunshot injuries.
   Level of evidence: III
   Grade of recommendation: A
9. During a red phase, do not administer transfusions to patients >65 years with severe brain injury and profound shock and severe thoracic or abdominal trauma.  
   Level of evidence: III  
   Grade of recommendation: B

10. During a red phase, do not administer transfusions to patients >75 years with moderate brain injury, a Glasgow Coma scale of <12, who are in profound shock and who have thoracoabdominal injury.  
    Level of evidence: III  
    Grade of recommendation: B

Ruptured Abdominal Aortic Aneurysm

1. During a critical blood shortage, do not transfuse patients who have a cardiac arrest preoperatively.  
   Level of evidence: III  
   Grade of recommendation: B

2. During a critical blood shortage, do not transfuse patients with a systolic blood pressure less than 70mmHg who are unresponsive to fluid resuscitation and have lost consciousness.  
   Level of evidence: III  
   Grade of recommendation: B

3. During a critical blood shortage, do not transfuse patients with RAAA that do not meet criteria for emergent vascular repair.  
   Level of evidence: III  
   Grade of recommendation: I

ECMO/VAD

1. During a red phase, do not transfuse patients who require ECMO/VAD and who have multi-organ (> 1 organ) failure.  
   Level of evidence: III  
   Grade of recommendation: B

2. During a red phase, inform patients/families that patients receiving ECMO/VAD support who have multi-organ failure may not receive transfusion support if massively bleeding.  
   Level of evidence: III  
   Grade of recommendation: B

Heart, Lung, Liver Transplantation

1. Deceased Donor Organ Recovery - During a red phase, deceased donor organ recovery for transplantation should proceed, with the understanding that the deceased donor will not be transfused in the process of deceased donor stabilization.  
   Level of evidence: III  
   Grade of recommendation: B
2. **Deceased Donor Transplantation** - During a red phase, deceased donor solid organ transplants may proceed with informed consent regarding increased risk from restriction of blood transfusion, and with the understanding (among patient and all involved physicians) that blood may not be available for transfusion.

   Level of evidence: III  
   Grade of recommendation: B  

3. **Living Donor Transplantation** – During a red phase, living donor transplantation should be deferred.

   Level of evidence: III  
   Grade of recommendation: B  

Gastroenterology (refer to Section 8 of the expanded emergency framework for further information)

1. During a red phase do not administer transfusions to patients with gastrointestinal bleeding and a Rockall score >8.

   Level of evidence: III  
   Grade of recommendation: B  

2. During a red phase do not administer transfusion to patients with liver cirrhosis and gastrointestinal (i.e. variceal) bleeding who have a Child Pugh score more than 10 (MELD score of more than 18) and who are not on the list for transplantation.

   Level of evidence: III  
   Grade of recommendation: B  

3. During a red phase, triage patients with gastrointestinal bleeding to centers with endoscopy to minimize the use of blood products.

   Level of evidence: III  
   Grade of recommendation: B  

Obstetrics

1. In a red phase, red cell transfusion should not be withheld from the bleeding obstetrical patient.

   Level of evidence: II-2-III  
   Grade of recommendation: B  

Other massively bleeding situations not listed above

1. In a red phase, for patients massively bleeding for reasons not listed above, do not transfuse patients for whom the triage team believes the mortality rate exceeds 80%  

*Reassessment for Triage Patients*

1. Patients triaged to no blood components:  

   Patients triaged to no transfusion care will be re-assessed at a minimum of every 24 hours. The triage team will review requests from the most responsible physician if an improvement in a patient’s status would now qualify them to be triaged to active transfusion management. In addition, the triage team will
assure that the patient and their family are given adequate access to psychological support and that adequate symptom management is given to minimize pain and distress.

2. **Patients triaged to blood components:**

For patients triaged to active transfusion care, they will be re-assessed at a minimum of every 10 units of red blood cells (including pediatrics) or every 24 hours for patients receiving less than 10 units of blood or until cessation of hemorrhage (or more frequently – e.g. every 5 units - if deemed necessary by the NEBMC). At each assessment, the triage team will utilize the following variables to guide their decisions regarding the value of continued transfusions: SOFA score, total blood products used, need for ongoing transfusion support and ability to control bleeding with either surgery or other procedure (e.g. interventional radiology, endoscopy). Patients with a SOFA score >11, continued need for large amounts of blood components, and with no foreseeable ability to control blood loss will be triaged to palliative care.

**Documentation for Transfusion Decisions**

Transfusion decisions should be documented on a patient tracking tool. An example of a patient tracking tool is available in the appendix of this document.

**Competing Patients Triaged to Active Transfusion Care**

In the event of two or more patients requiring blood components at the same hospital for whom both qualify for active transfusion management by the triage team, the following principles (in order) are suggested to prioritize transfusion resources:

1. Administer blood to the youngest patients first i.e. pediatric patients first
2. Administer blood to patients who have the highest likelihood of hemostasis control
3. Administer blood according to the first-come, first-served principle.

In the event that two or more patients are competing for blood components at different hospitals and the blood still resides at the local blood centre, the same aforementioned principles will be applied jointly by the blood centre physician and the triage team leader from the hospitals involved.
Appendix A – Documentation Tools and Clinical Scoring

Triage Tracking Log – Emergency Disposition of Blood during Red Phase Blood Shortage

<table>
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<tr>
<th>Tracking Number</th>
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<td>37</td>
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<tr>
<td>38</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### Patient Triage Record – Emergency Disposition of Blood during Red Phase Blood Shortage

<table>
<thead>
<tr>
<th>Patient Tracking Number</th>
<th>Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason for Massive hemorrhage</td>
<td>Date of Triage</td>
</tr>
<tr>
<td>Predicted to need &gt;10 units in the next 24 hours □ Yes □ No (if no refer to standard tracking tool)</td>
<td>Age</td>
</tr>
<tr>
<td>Has patient received product in the previous 24 h? □ Yes □ No</td>
<td>Hemoglobin</td>
</tr>
<tr>
<td>If yes, list products:</td>
<td>Platelet</td>
</tr>
<tr>
<td></td>
<td>INR</td>
</tr>
<tr>
<td></td>
<td>PTT</td>
</tr>
<tr>
<td></td>
<td>Fibrinogen</td>
</tr>
<tr>
<td>Meets any exclusion criteria □ Yes □ No</td>
<td>Product Required</td>
</tr>
<tr>
<td>If yes, which one(s)?</td>
<td></td>
</tr>
<tr>
<td>Meets any specific exclusion criteria □ Yes □ No</td>
<td>Date/Time of assessment</td>
</tr>
<tr>
<td>If yes, which one(s)?</td>
<td></td>
</tr>
<tr>
<td>Decision made to administer blood? □ Yes □ No</td>
<td>Date/Time</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient outcome at 24 hours</td>
<td>Date/Time</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments by Triage Team</td>
<td>Comments regarding patient and family concerns</td>
</tr>
<tr>
<td>Triage Documentation completed by</td>
<td>Signature</td>
</tr>
<tr>
<td>Triage Officer Name</td>
<td>Signature</td>
</tr>
<tr>
<td>Follow-up</td>
<td></td>
</tr>
<tr>
<td>Patient Outcome at Discharge</td>
<td>Patient Outcome at 6 months</td>
</tr>
</tbody>
</table>
Glasgow Coma Scale

The chart from the above reference has been modified to reflect a more recent version of the scale:

<table>
<thead>
<tr>
<th>Eye opening</th>
<th>Spontaneous</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To speech</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>To pain</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Best verbal response</th>
<th>Orientated</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Confused</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Inappropriate</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Incomprehensible</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Best motor response</th>
<th>Obeying</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Localising</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Withdraws</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Flexing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Extending</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

Rockall Score

<table>
<thead>
<tr>
<th>Rockall Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt; 60 years</td>
<td>60 – 79 years</td>
<td>&gt; = 80 years</td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>'No shock', systolic BP &gt; = 100, pulse &lt; 100</td>
<td>'Tachycardia', systolic BP &gt; = 100, pulse &gt; = 100</td>
<td>'Hypotension', Systolic BP &lt; 100</td>
<td></td>
</tr>
<tr>
<td>Comorbidity</td>
<td>No major comorbidity</td>
<td>Cardiac failure, ischaemic heart disease, any major comorbidity</td>
<td>Renal failure, liver failure, disseminated malignancy</td>
<td></td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Mallory-Weiss tear, no lesion identified and no SRH</td>
<td>All other diagnoses</td>
<td>Malignancy of upper GI tract</td>
<td></td>
</tr>
<tr>
<td>Major SRH</td>
<td>None of dark spot only</td>
<td>Blood in upper GI tract, adherent clot</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Child Pugh Score

<table>
<thead>
<tr>
<th>Clinical and Biochemical Measurements</th>
<th>Points Scored for Increasing Abnormality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Encephalopathy (grade)</td>
<td>none</td>
</tr>
<tr>
<td>Ascites</td>
<td>Absent</td>
</tr>
<tr>
<td>Bilirubin (mg per 100 ml)</td>
<td>1 - 2</td>
</tr>
<tr>
<td>Albumin (g per 100 ml)</td>
<td>3.5</td>
</tr>
<tr>
<td>Prothrombin time (sec. prolonged)</td>
<td>1 - 4</td>
</tr>
<tr>
<td>For primary biliary cirrhosis –</td>
<td>1 - 4</td>
</tr>
<tr>
<td>Bilirubin (mg per 100 ml)</td>
<td></td>
</tr>
</tbody>
</table>

MELD Score

Formula : \[3.8 \times \log_{e}(\text{bilirubin[mg/dL]}) + 11.2 \times \log_{e} (\text{INR}) + 9.6 \times \log_{e}(\text{creatinine [mg/dL]}) + 6.4^{(\text{etiology: 0 if cholestatic or alcoholic, 1 otherwise})}.\]

An online calculator is available: [http://www.mayoclinic.org/meld/mayomodel6.html](http://www.mayoclinic.org/meld/mayomodel6.html)

SOFA Score

<table>
<thead>
<tr>
<th>SOFA Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PaO2/FIO2 Ratio</td>
<td>&gt;400</td>
<td>&lt;400</td>
<td>&lt;300</td>
<td>&lt;200 and mechanically vented</td>
<td>&lt;100 and mechanically vented</td>
</tr>
<tr>
<td>Platelet Count</td>
<td>&gt;150</td>
<td>&lt;150</td>
<td>&lt;100</td>
<td>&lt;50</td>
<td>&lt;20</td>
</tr>
<tr>
<td>Bilirubin umol/L</td>
<td>&lt;20</td>
<td>20-32</td>
<td>33-101</td>
<td>102-204</td>
<td>&gt;204</td>
</tr>
<tr>
<td>Hypotension (ug/kg/min)</td>
<td>None</td>
<td>MAP&lt;70</td>
<td>Dopamine &lt;5 or dobutamine (any dose)</td>
<td>Dopamine &gt;5 or epinephrine &lt;0.1 or norepinephrine &lt;0.1</td>
<td>Dopamine &gt;15 or epinephrine &gt;0.1 or norepinephrine &gt;0.1</td>
</tr>
<tr>
<td>Glasgow Coma Scale</td>
<td>15</td>
<td>13-14</td>
<td>10-12</td>
<td>6-9</td>
<td>&lt;6</td>
</tr>
<tr>
<td>Creatinine (umol/L)</td>
<td>&lt;110</td>
<td>110-170</td>
<td>171-299</td>
<td>300-440 or &lt;500 mL/day</td>
<td>&gt;440 or &lt;200 mL/day</td>
</tr>
</tbody>
</table>
Appendix D – Example of Hospital Notification from Canadian Blood Services

**URGENT: Immediate Action Required**

To: ALL HOSPITAL SITES  
From: National Emergency Blood Management Committee*  
Subject: National Inventory Advisory

**FAX NOTIFICATION: National Inventory**

<table>
<thead>
<tr>
<th>Date of Issue</th>
<th>&lt;Date&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inventory Availability Phase</strong></td>
<td>Amber</td>
</tr>
<tr>
<td><strong>Product(s)</strong></td>
<td>Platelets (all groups)</td>
</tr>
</tbody>
</table>

**Description**

Following a massive recall of platelet collection bags from Company X, the availability of platelets has been seriously compromised.

The National Emergency Blood Management Committee has called an Amber Phase of the Blood Shortages plan. Both Hema-Quebec and Canadian Blood Services are attempting to secure bags from another vendor, but it may be a few weeks until supplies can be replenished.

**Impact on hospitals**

Follow directives in the “Amber Phase” section of The Plan/ Provincial/RHA or Hospital blood shortage plan.

**Contact Information**

<table>
<thead>
<tr>
<th>&lt;Insert Name&gt;</th>
<th>&lt;Insert Name&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Manager, Production, &lt;Insert Site&gt;</td>
<td>Hospital Liaison Specialist</td>
</tr>
<tr>
<td>E. &lt;insert e-mail address&gt;</td>
<td>E. &lt;insert e-mail address&gt;</td>
</tr>
<tr>
<td>T. &lt;insert telephone #&gt;</td>
<td>T. &lt;insert telephone #&gt;</td>
</tr>
</tbody>
</table>

*The National Emergency Blood Management Committee (NEBMC) is comprised of the National Advisory Committee on Blood and Blood Products, Provincial Territorial Blood Liaison representatives and key Canadian Blood Services personnel. This group will develop recommendations and provide advice to the P/T Ministries of Health, hospitals and regional health authorities, and Canadian Blood Services to support a consistent and coordinated response to critical blood shortages in Canada.

For information about the National Blood Shortages Plan, please see [http://www.nacblood.ca/resources/shortages-plan/index.html](http://www.nacblood.ca/resources/shortages-plan/index.html)

If you require this report in an accessible format, please contact your local Hospital Liaison Specialist.
## Appendix E – Guideline for the Use of RBC Transfusions in Children and Adults in Shortage Situations

<table>
<thead>
<tr>
<th><strong>Green Phase</strong></th>
<th><strong>Amber Phase</strong></th>
<th><strong>Red Phase</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Hemorrhage</td>
<td>Major Hemorrhage</td>
<td>Major Hemorrhage</td>
</tr>
<tr>
<td>Follow your hospital guidelines.</td>
<td>Follow your hospital guidelines.</td>
<td>Follow your hospital guidelines. Follow triage/rationing allocation framework if instructed by NEBMC.</td>
</tr>
<tr>
<td><strong>Surgery/Obstetrics</strong></td>
<td><strong>Surgery/Obstetrics</strong></td>
<td><strong>Surgery/Obstetrics</strong></td>
</tr>
<tr>
<td>Follow your hospital guidelines.</td>
<td>Urgent(^2) and emergency(^3) surgery in consultation with HEBMC. Peri/post partum hemorrhage For all situations, the minimal number of units to stabilize patient should be used.</td>
<td>Emergency situations in consultation with HEBMC. Follow triage/rationing allocation framework if instructed by NEBMC.</td>
</tr>
<tr>
<td><strong>Non-Surgical Anemias(^4)</strong></td>
<td><strong>Non-Surgical Anemias</strong></td>
<td><strong>Non-Surgical Anemias</strong></td>
</tr>
<tr>
<td>Follow your hospital guidelines.</td>
<td>All requests for RBC transfusion in patients with a Hb level &gt; 70 g/L must be reviewed by designated medical personnel. For patients with hypoproliferative anemias, single unit transfusion should be provided if significant symptoms associated with anemia but reassessment of severity of symptoms after each unit is required.</td>
<td>All requests for RBC transfusion in patients with a Hb level &gt; 60 g/L must be reviewed by designated medical personnel. For patients with hypoproliferative anemias, single unit transfusion should be provided if significant symptoms associated with anemia but reassessment of severity of symptoms after each unit is required.</td>
</tr>
</tbody>
</table>

**Notes**
- Given the relatively small volumes/numbers of units required, transfusions for neonates (i.e. patients less that 4 months of age) and intrauterine transfusions would be given according to usual guidelines (i.e. would not be restricted even in times of shortage). However measures to share units among neonates or between neonates and larger patients should be used to the extent possible.
- In Red or Amber Phases, the hospital/RHA blood bank director, in consultation with the patient’s physician, may consider

\(^1\) These guidelines are available on [http://www.nacblood.ca/resources/shortages-plan/index.html](http://www.nacblood.ca/resources/shortages-plan/index.html)
\(^2\) Urgent surgery - patient likely to have major morbidity if surgery not performed within the next one to 28 days
\(^3\) Emergency Surgery - patient likely to dies (have major morbidity) with 24 hours without surgery
\(^4\) Includes anemia following trauma, surgery and delivery
the use of a blood component which has passed its Health Canada approved storage period. In such cases the justification for the use of an outdated product must be documented by the responsible physician in the patient’s chart, and every effort must be made to obtain, specific patient consent.
## Appendix F – Guideline for the Use of Platelet Transfusions in Children and Adults in Shortage Situations

<table>
<thead>
<tr>
<th>Green Phase</th>
<th>Amber Phase</th>
<th>Red Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major Hemorrhage</strong></td>
<td><strong>Major Hemorrhage</strong></td>
<td><strong>Major Hemorrhage</strong></td>
</tr>
<tr>
<td>Immune thrombocytopenia and life- or limb-threatening bleeding maintain PC &gt;10 × 10⁹/L.</td>
<td>For head trauma or CNS bleeding maintain a PC &gt; 80 x 10⁹/L.</td>
<td>Same as Amber phase.</td>
</tr>
<tr>
<td>For head trauma or CNS bleeding maintain a PC &gt;100 x 10⁹/L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other significant bleeding, or acute promyelocytic leukemia at acute presentation, maintain a PC &gt;50 x 10⁹/L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Invasive Procedures/ Surgery</strong></td>
<td><strong>Invasive Procedures/ Surgery</strong></td>
<td><strong>Invasive Procedures/ Surgery</strong></td>
</tr>
<tr>
<td>For non-surgical invasive procedures maintain a PC &gt; 20 x 10⁹/L (central venous catheter insertion, paracentesis, thoracentesis).</td>
<td>Urgent² and emergency³ surgery in consultation with HEBMC.</td>
<td>Emergency surgery in consultation with HEBMC.</td>
</tr>
<tr>
<td>For lumbar maintain a PC &gt; 50 x 10⁹/L.</td>
<td>In presence of active bleeding or surgical procedure maintain a PC &gt; 50 x 10⁹/L or if CNS trauma/surgery a PC &gt; 80 x 10⁹/L.</td>
<td>All requests for platelet transfusion must be reviewed by designated medical personnel.</td>
</tr>
<tr>
<td>For CNS surgery maintain a PC &gt; 100 x 10⁹/L.</td>
<td>For non-surgical invasive procedures (other than bone marrow aspiration or biopsy) maintain a PC&gt; 10 x 10⁹/L with image guidance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For lumbar puncture, maintain a PC &gt;20 x 10⁹/L.</td>
<td></td>
</tr>
</tbody>
</table>

---

¹ These guidelines are available on [http://www.nachold.ca/resources/shortages-plan/index.html](http://www.nachold.ca/resources/shortages-plan/index.html)
² Urgent surgery - patient likely to have major morbidity if surgery not performed within the next one to 28 days
³ Emergency surgery - patient likely to die (have major morbidity) with 24 hours without surgery
<table>
<thead>
<tr>
<th><strong>Green Phase</strong></th>
<th><strong>Amber Phase</strong></th>
<th><strong>Red Phase</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bone Marrow Failure/ Hematopoietic Stem Cell Transplantation/ Chemotherapy</strong></td>
<td><strong>Bone Marrow Failure/ Hematopoietic Stem Cell Transplantation/ Chemotherapy</strong></td>
<td><strong>Bone Marrow Failure/ Hematopoietic Stem Cell Transplantation/ Chemotherapy</strong></td>
</tr>
<tr>
<td>Adhere to a maximum threshold PC of 10 x 10^9/L for prophylactic platelet transfusions.</td>
<td>Adhere to a maximum threshold PC of 10 X10^9/L for prophylactic platelet transfusions; consider lowering this threshold for routine prophylactic transfusions to 5 x 10^9/L. Transfuse patients undergoing autologous stem cell transplant only if symptoms of bleeding. All requests for a platelet transfusion in non-bleeding patients with a PC &gt;10 x10^9/L must be reviewed by designated medical personnel.</td>
<td>Eliminate all prophylactic transfusions. All requests for platelet transfusions in non-bleeding patients must be reviewed by designated medical personnel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PC = Platelet Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Given the relatively small volumes/numbers of units required, transfusions for neonates (i.e. patients less than 4 months of age) and intrauterine transfusions would be given according to usual guidelines (i.e. would not be restricted even in times of shortage). However measures to share units among neonates or between neonates and larger patients should be used to the extent possible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Follow the same guidelines for cancelling/performing surgery as described in Appendix G.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Split doses of platelets (apheresis or buffy coat) should be considered if available. Health Canada advises that splitting doses of platelets is considered aliquotting and is not a processing activity which requires registration. CBS has validated the process of aliquotting smaller volumes of platelets for pediatric platelet transfusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Lower PC thresholds for platelet transfusions for surgical bleeding or special procedures (such as ECMO) should be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In Red or Amber phases, the hospital blood bank director, in consultation with the patient’s physician, may consider the use of a blood component which has passed its Health Canada approved storage period. In such cases the justification for the use of an outdated product must be documented by the responsible physician in the patient’s chart, and every effort must be made to obtain, specific patient consent.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix G – Revision Table

Changes made in Version 3 (October 31, 2016)

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| Global changes           | Editing for improved clarification and flow  
                          | Replaced executive summary  
                          | Revised structure of plan  
                          | Removed use of ‘primary’, ‘secondary’ and ‘tertiary’ triage  
                          | Updated references       |
| Abbreviations            | Added Average Daily Red Cell Demand (ADRD), Hospital Inventory Index (HII), Days on Hand (DOH), Emergency Management Communication Tool (EMCT), Hospital Transfusion Service (HTS) and Local Health Integration Network (LHIN) |
|                          | Changed Chief Operating Officer (COO) to Chief Supply Chain Officer (CSCO)                                                                                                                             |
| Definitions              | Added Emergency Framework, Emergency Management Communication Tool (EMCT), Hospital Emergency Blood Management Plan (HEBMP), Hospital Inventory Index (HII) |
|                          | Added to list of tools in toolkit for training                                                                                                                                                           |
| Background               | Changed ‘background’ to ‘introduction’  
                          | Added reference to 2014 platelet shortage exercise, Fall 2014 Green Phase Advisory and 2015 possible CBS labour disruption in Ontario                                                                       |
| Purpose and Scope        | Updated list of standards and regulatory requirements                                                                                                                                                   |
| Assumptions              | Added:  
                          | The blood shortage may be regional, provincial or national in scope  
                          | Several small rural hospitals maintain minimum stock to support ‘just in case’ transfusion needs. During a blood shortage this inventory would remain on site however, if urgent need arises elsewhere, this inventory would need to be redistributed.  
                          | During a blood shortage heightened efforts would be made to redistribute any components to avoid discards due to outdated.  
<pre><code>                      | An ideal Hospital Inventory Index has not yet been defined                                                                                                                                            |
</code></pre>
<p>| Key Stakeholders         | NEBMC added: A working group of NAC, the NAC Blood Shortage Working Group (NAC-BSWG) is responsible for revisions and maintenance of the National Plan which is approved by the NEBMC.                                  |
|                          | OEBMC added: Ontario’s two NAC representatives are members of the OEBMC. If a regional or provincial inventory shortage occurs, the OEBMC may meet even though it may not be necessary for the NEBMC to be convened. The Chair of the OEBMC will notify Chair of the NEBMC if the decision to convene is made. It is a responsibility of the OEBMC to encourage hospitals to develop a blood shortage plan and to report inventory to CBS as requested. OEBMC is also responsible for monitoring hospital preparedness and compliance through regular provincial blood |</p>
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<td>shortage exercises.</td>
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<td>HEBMC added: The HEBMC should delineate the lines of responsibility to ensure effective communication within their facility during a blood shortage. The National Plan strongly recommends that hospitals define their target inventory levels by blood shortage phases (Green, Amber and Red) within their HEBMP.¹</td>
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<td>HEBMP reworded statement: Often there is no requirement for action to be taken outside of the transfusion service.</td>
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<td>Added ‘assessment’ to bullet on debriefing.</td>
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<td>Clarified triage team should not be directly responsible for patient care for those patients who are being triaged.</td>
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<td>Clarified documentation of triage should include assessments and any decisions and outcomes.</td>
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<td>Added ‘and family’ and spiritual care to those to be considered for inclusion on triage team</td>
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**Communications**

Added: In the event that the blood shortage is restricted to a provincial scope, CBS will notify hospitals of the low inventory status via their business-as-usual channels. The CBS supply chain representative for Ontario will inform the Chair of the OEBMC of the potential national inventory shortage or short term regional shortage. Depending on the severity of the situation, the Chair of OEBMC will inform OEBMC members of the situation via email. The Chair of the OEBMC will also notify the Chair of the NEBMC to inform them of the inventory shortage for information only as a shortage in the province of Ontario has the potential of becoming a national shortage due to the percentage of blood used in the province (approximately 50% of CBS issues are to Ontario hospitals). The Chair of the NEBMC will determine whether to convene a meeting of the NEBMC or to inform the members of NEBMC in the event of an inventory shortage within Ontario.

Added: The potential for a regional or provincial CBS supply shortage of RBC is low as RBC inventory is assessed daily across the country and leveled nationally. However, occasional short term shortages of RBC may occur that require CBS to adjust or negotiate hospital requests for stock. In the event of a short term platelet shortage, CBS will endeavor to inform hospitals as early in the day as feasible prior to induction of anesthesia or initiation of cardiopulmonary bypass to avoid scheduled surgeries proceeding in the absence of available platelets. Whenever possible, CBS will attempt to proactively adjust platelet production and/or negotiate platelet orders with hospital staff in order to mitigate the risk of such shortages.

Added: The MOHLTC may use the MEOC and EMCT to facilitate coordination of the provincial response. This will likely only be required in the event of a Red phase blood shortage or broader health care system emergency. Any communications from the MOHLTC should be consistent with recommendations and messaging from the NEBMC and OEBMC.
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<td>Added: Decisions to fill orders will be determined in consideration of hospital inventory index to help ensure equitable distribution of the affected component. Updated flow chart to include provincial shortage scenario.</td>
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<td><strong>Inventory Levels/Phases</strong></td>
<td>Added this section to define phases by inventory following National Plan. Under Green Phase, added: Hospitals may be asked to reduce their target inventory for the affected component by a percentage in order to aid in recovery of supply. Under Red Phase added: Hospitals may be advised by NEBMC to use the Emergency Framework for Rationing of Blood for Massively Bleeding Patients during a Red Phase of a Blood Shortage.</td>
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<td><strong>Roles and Responsibilities during phases</strong></td>
<td>Green Phase added: Hospital Inventory Index (HII) can be used to determine optimal levels of inventory. Through the CBS hospital disposition reporting, hospital average daily red cell demand (ADRD) can be determined. HII is calculated by dividing the inventory level by the ADRD. HII can be calculated by ABO/Rh if disposition reporting is done by ABO/Rh. Added definition of what inventory is to be included in reporting to CBS. Added note to define Green Phase Advisory. Amber Phase added: HII will be used to level distribution to hospitals (e.g. hospitals with a higher HII may receive a lower per cent of requested order compared to hospitals with a lower HII). Added use of EMCT by MOHLTC. Added reference and link to ORBCoN Platelet Web App. Red Phase added: Utilize ORBCoN Platelet web application to post platelets near to expiry and to request platelets if needed in order to minimize wastage. Added use of EMCT by MOHLTC. Removed consider extension of shelf life and bacterial testing. Added reference and link to ORBCoN Platelet Web App. Recovery Phase added: recommendation that for all stakeholders, debrief should occur 4-6 weeks following shortage event.</td>
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<td><strong>Appendices added</strong></td>
<td>Terms of reference for the Contingency Planning Working Group added. Terms of reference for the National Emergency Blood Management Committee removed. Added Emergency Framework – Synopsis for Triage Team as an Appendix. Added Table 1 and Table 2 Guidelines for use of RBC and platelets during a blood shortage from the National Plan as Appendices. Updated the CBS hospital fax notification example as provided in National Plan.</td>
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