

THE NATIONAL PLAN FOR MANAGEMENT OF SHORTAGES OF LABILE BLOOD COMPONENTS

Please note that due to the COVID-19 pandemic, immediate revisions to the approved 2017 version of this document are included in this version and some appendices that are not up to date have been removed. This interim document is still undergoing full stakeholder review at the time of posting. Work will continue to progress on revisions and please consider this a living document that will be updated on the website www.nacblood.ca with every revision .

NATIONAL ADVISORY COMMITTEE ON BLOOD & BLOOD PRODUCTS & CANADIAN BLOOD SERVICES



National Advisory Committee
on Blood and Blood Products

Comité consultatif national sur
le sang et les produits sanguins



Canadian
Blood
Services

BLOOD
PLASMA
STEM CELLS
ORGANS
& TISSUES

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TABLE OF CONTENTS

ABBREVIATIONS

ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

1 INTRODUCTION

- 1.1 The Canadian Blood System
- 1.2 Purpose and Scope
- 1.3 Key Participants and Stakeholders
- 1.4 History of Blood Shortages in Canada

2 ASSUMPTIONS

3 PLAN STRUCTURE – OVERVIEW

- 3.1 Phases of Inventory Availability
 - 3.1.1 Green Phase
 - 3.1.2 Amber Phase
 - 3.1.3 Red Phase
 - 3.1.4 Recovery Phase
 - 3.1.5 CBS Inventory Levels at Green, Amber and Red Phases
 - 3.1.6 Total Inventory Levels
 - 3.1.7 Actual Allocation of Blood Components in Times of Shortages
- 3.2 Key Participant Roles and Responsibilities
 - 3.2.1 Canadian Blood Services
 - 3.2.2 CBS-P/T Blood Liaison Committee
 - 3.2.3 Provincial and Territorial Ministries of Health
 - 3.2.3.1 Provincial/Territorial Blood Representatives
 - 3.2.3.2 Lead P/T Blood Representative
 - 3.2.4 National Advisory Committee on Blood and Blood Products
 - 3.2.5 Hospitals/Regional Health Authorities

4 EMERGENCY BLOOD MANAGEMENT COMMITTEES

- 4.1 National Emergency Blood Management Committee
 - 4.1.1 Mandate
 - 4.1.2 Membership
 - 4.1.3 Meetings/Quorum
 - 4.1.4 Communications
 - 4.1.4.1 NAC Members

The Plan for Management of Shortages of Labile Blood Components

4.1.4.2 P/T Representatives

4.2 Provincial/Territorial Emergency Blood Management Committees

4.3 Hospital/RHA Emergency Blood Management Committee

5 COMMUNICATIONS

6 SPECIFIC PARTICIPANT ACTIONS

6.1 Green Phase

6.1.1 Canadian Blood Services

6.1.2 Provinces/Territories

6.1.3 Hospitals/RHA

6.2 Amber Phase

6.2.1 Canadian Blood Services

6.2.2 Provinces/Territories

6.2.3 Hospitals/RHA

6.3 Red Phase

6.3.1 Canadian Blood Services

6.3.2 Provinces/Territories

6.3.3 Hospitals/RHA

6.4 Determination of the Allocation of Blood Components from CBS to Hospitals/RHA in Amber and Red Phases

6.5 Recovery Phase

Table 1: Guideline for the use of RBC transfusions in children and adults in shortage situations

Table 2: Guideline for the use of platelet transfusions in children and adults in shortage situations

APPENDICES

APPENDIX A: Approval and Revision History

APPENDIX B: Provincial / Territorial Blood Shortages Plans

APPENDIX C: Blood Contingency Plan Activation Pathways

APPENDIX D: Ethical Considerations in Management of Blood Shortages

APPENDIX E: Communications Plan – in the process of being revised.

APPENDIX F: Job Aid

APPENDIX G: Triage Tools

APPENDIX H: NEBMC Communication Templates – in the process of being revised.

APPENDIX I: Patient/Family Communication Template

ABBREVIATIONS

BGTD	Biologics and Genetic Therapies Directorate
BSWG	Blood Shortages Working Group
CBS	Canadian Blood Services
CBS P/T BLC	Canadian Blood Services Provincial/Territorial Blood Liaison Committee
CSA	Canadian Standards Association
H/REBMC	Hospital/Regional Emergency Blood Management Committee
HQ	Héma-Québec
HTC	Hospital Transfusion Committee
MBOS	Maximum Blood Ordering Schedule
NAC	National Advisory Committee on Blood and Blood Products
NAC-BSWG	National Advisory Committee Blood Shortages Working Group
NEBMC	National Emergency Blood Management Committee
P/T	Provincial/Territorial
P/TEBMC	Provincial/Territorial Emergency Blood Management Committee
PBCO	Provincial Blood Coordinating Office
PHAC	Public Health Agency of Canada
RBC	Red Blood Cells
RHA	Regional Health Authorities or alternate service providers/structure within a province. Service providers are responsible for the delivery and administering the operational aspects of the Plan in specified geographic areas authorized by the province.

ACKNOWLEDGEMENTS

The National Advisory Committee on Blood and Blood Products [NAC] and Canadian Blood Services [CBS] wish to acknowledge the contribution of the members of the NAC-Blood Shortage Working Group [NAC-BSWG], past and present, who have participated in the initial development and subsequent revisions of the National Plan for Management of Shortages of Labile Blood Products.

EXECUTIVE SUMMARY

Labile blood components, i.e. those blood components collected, produced and distributed by Canadian blood suppliers, are a vital resource supporting health care in Canada. The supply of these resources could be compromised by a number of external threats that may include but are not limited to, labour disruptions, endemic disease outbreaks, extreme weather disturbances or disruptions in transportation systems. In times of severe shortages, the allocation of blood components could present a significant challenge to the provision of health care. To prepare for such a challenge, the Canadian Blood Services (CBS) Provincial/Territorial (P/T) Blood Liaison Committee asked the National Advisory Committee on Blood and Blood Products (NAC) to develop a framework to determine the equitable allocation of labile blood components in times of severe shortage. In response to that request NAC, in collaboration with CBS, produced a draft framework document which was then widely circulated among potential stakeholders for comment, and then revised, taking into consideration the comments received. This document, the National Plan for the Management of Shortages of Labile Blood Components (hereafter called the Plan), which was first implemented in late 2009, is the recommended framework developed through that process.

The specific purpose of the Plan is to maximize the effectiveness of a response to any crisis which impacts the adequacy of the blood supply in Canada. The primary emphasis is on the jurisdictions served by CBS, but there is also contemplation of close collaboration with participants of the blood system in Québec. The Plan assumes that all efforts to increase the available supply of blood components have been exceeded and addresses the allocation of the available scarce blood supply. The Plan addresses labile blood components; however many of the principles would also be applicable to a shortage of fractionated or recombinant plasma protein products.

The Plan provides a framework which will enable P/T Ministries of Health and hospitals/regional health authorities (RHA) to develop their own blood shortage management plans in a manner that is congruent and complementary with the Plan. This approach is aimed at achieving the consistency and collaboration crucial to the effective management of a blood shortage.

Based on a number of stated assumptions, the Plan addresses four phases of inventory availability – Green, Amber, Red and Recovery.

The National Plan for Management of Shortages of Labile Blood Components

- [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 shortages that occur periodically and can be managed with existing CBS and hospital/RHA actions.
 - Green Phase Advisory implies that CBS inventory levels are low with respect to a particular blood component and that all hospitals need to determine their inventories and the likelihood of crossing into Amber or Red Phase.
- [Amber Phase](#) implies that the national blood inventory is insufficient to continue with routine transfusion practices and hospitals/RHA will be required to implement specific measures, as outlined in this document, in order to reduce blood usage.
- [Red Phase](#) implies that blood inventory levels are insufficient to ensure that patients with non-elective indications for transfusion will receive the required transfusion(s).
- [Recovery Phase](#) implies that blood component 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.

The roles and responsibilities of the principal participants, namely CBS, the P/T Ministries of Health and the Canadian hospitals/RHA, in each of these phases are described in this document. The emergency blood management committees that would be required to successfully manage a blood shortage as well as a proposed communication plan are also described.

The optimal management of a severe blood shortage will depend upon the commitment of all stakeholders in the blood system to work collaboratively to assure that scarce resources are used in a fair and equitable manner. The Plan is intended to provide a framework, which if followed, will ensure that optimization. It is nevertheless recognized that lessons will be learned in each shortage situation and it is anticipated that the Plan will undergo modification following each situation in which it is implemented. Revisions and the substantive change history of the Plan can be viewed in [Appendix A](#).

1 INTRODUCTION

1.1 The Canadian Blood System

Canada has two blood operators - Canadian Blood Services (CBS) which serves the provinces and territories except Québec and Héma-Québec (HQ) which serves Québec. CBS and HQ collect blood donations from voluntary donors, prepare blood components and distribute them to hospitals in their respective jurisdictions. CBS and HQ are funded by the provinces and territories that they serve, but the management of the blood supply is entirely CBS's and HQ's responsibility for their respective jurisdictions. Both CBS and HQ are also responsible for managing the supply of commercially obtained plasma protein products (e.g. intravenous immune globulin, albumin and coagulation factor concentrates) and recombinant coagulation factors.

Within the Ministry of Health (Ministries) in each province and territory (P/T) served by CBS there is one identified person, the P/T Blood Representative, who has the primary responsibility for interactions between CBS and their province/territory. The P/T Ministries of Health select one jurisdiction, on a rotating basis, to act as the Lead P/T on behalf of all jurisdictions for a period of two years.

The P/T Blood Representatives, together with selected representatives from the CBS executive and senior management teams form a committee known as the CBS Provincial/Territorial Blood Liaison Committee (CBS P/T BLC). This committee is co-chaired by a CBS representative and the P/T Blood Representative for the Lead Province. This committee meets on a regular basis and constitutes the major forum for formal communications between CBS and its funders.

CBS solicits advice from various stakeholders through its advisory committees (as well as other ad hoc forums). One such committee is the National Advisory Committee on Blood and Blood Products (NAC), a committee consisting of CBS representation as well as health care professionals with expertise in the field of transfusion medicine appointed by their respective P/T Ministries. The NAC reports to the CBS P/T BLC (current NAC membership and its terms of reference are provided on www.nacblood.ca). As described below NAC has played a pivotal role in the development of the Plan for Management of Shortages of Labile Blood Components.

1.2 Purpose and Scope

The purpose of the Plan is to maximize the effectiveness of a response (Provincial, Regional or National) to any crisis that affects the adequacy of the blood supply in Canada, with primary emphasis on the jurisdictions served by CBS, but also in contemplation of close collaboration with blood system participants in Québec, and other blood suppliers as deemed appropriate by CBS. The Plan provides a framework that will enable provincial / territorial Ministries of Health and hospitals/RHA to develop their own blood shortage management plans in a manner that is congruent and complimentary with the national framework. This approach is aimed at achieving the consistency and collaboration which is crucial to the equitable allocation of scarce blood resources in times of severe shortage. The Plan also recommends a proactive approach to inventory management through various

The National Plan for Management of Shortages of Labile Blood Components

Green Phase activities. The Plan addresses blood components collected, produced and distributed by CBS (i.e. red blood cell, platelet and frozen plasma components). However many of the principles would also be applicable to a shortage of fractionated or recombinant plasma protein products.

The intent of the Plan is not just to work “top down” from the blood supplier and/or NEBMC to the Provinces and hospital customers but to provide guidance on framework structures that can feed information regarding potential blood component inventory concerns “back up” through their respective hospital and/or provincial emergency blood management plans. See [Appendix C](#) for potential pathways of contingency plan activations.

1.3 Key Participants and Stakeholders

It is intended that the Plan will be used by key blood system participants who, for the purposes of the Plan, are defined to be Canadian Blood Services, hospitals and regional health authorities, the provincial and territorial Ministries of Health, and the NAC. Some provinces have Provincial Blood Coordinating Offices; while not referred to specifically in the Plan, it is assumed that they, under the auspices of the corresponding Ministry of Health, will also play a key role in the implementation of the Plan. The Plan delineates roles and responsibilities for each of these participants.

Stakeholders for the Plan are considered to be these participants, as well as others potentially affected (or representing those potentially affected) by the Plan such as patient/blood recipient societies, health care professional societies, Héma-Québec, Health Canada and others.

1.4 History of Blood Shortages in Canada

Since the creation of Canadian Blood Services in 1998, there have been no blood shortages that would have met criteria to call a national Amber or Red phase in Canada. A three year analysis between April 2011 and October 2014, demonstrated that there was only 2 days when red cell inventory at Canadian Blood Services dipped slightly below 12,000 units. Hence, only 0.16% of the time (out of a total of 1278 days measured) did the CBS RBC inventory level drop below 12,000 units in Canada (<4.2 days on hand). Only on one occasion was it necessary to issue a public appeal to donors in the face of poor donor clinic attendance.

During the same period, the daily red cell inventory at Héma-Québec fell below the optimal target of 8 days (hospital + blood supplier) for a total of 13 days: 2 days below 3600 RBC units (less than 5 days), 2 days below 3900 RBC units (less than 5.5 days) and 9 days below 4600 RBC units (less than 6.5 days). All these events occurred in 2004 and 2005. Their inventory had been maintained at its optimal level continuously for all blood groups from 2006 to 2015.

2 ASSUMPTIONS

The assumptions used in the development of the Plan are as follows.

- A. The Plan operates within the existing blood system structure, including the legislative and regulatory framework currently in place.

A basic principle of the Canadian blood system, as stated by Justice Horace Krever (*Commission of Inquiry on the Blood System in Canada Final Report, p.1047*) that is pertinent to this Plan is the following:

A fundamental value that must guide the blood supply system in Canada is that blood is a public resource, given altruistically by persons in Canada for the benefit of other persons in this country. Profit should not be made from the blood that is donated in Canada. The operator of the blood supply system must act as a trustee of this public resource for the benefit of all persons in Canada.

With respect to the Canadian legislative and regulatory framework, the main features pertinent to the Plan are the following:

- provincial and territorial authority and responsibility for the delivery of the Canadian health care system, pursuant to the principles of the *Canada Health Act*: each province or territory therefore has a role in the management of blood delivery and blood utilization in its jurisdiction, including its role in hospital oversight;
- Canadian Blood Services' mission: "*Canadian Blood Services operates Canada's blood supply in a manner that gains the trust, commitment and confidence of all Canadians by providing a safe, secure, cost-effective, affordable and accessible supply of quality blood, blood products and their alternatives*";
- regulation of the blood system by Health Canada, pursuant to the *Food and Drugs Act*, and adherence to a series of existing industry standards.

- B. The Plan assumes that all efforts to increase the available supply of blood components have been exhausted.

As indicated above (Section 1.2) and by the name of this document, the purpose of the Plan is to optimize the allocation of blood components when the supply of such components is severely compromised. It is not the purpose of the Plan to address mechanisms to increase the supply of blood components in the face of threats to that supply. Those aspects of emergency preparedness are extremely important and must be (and have been) addressed by CBS in their documents and plans. For the purposes of this Plan, it is assumed that in the instance of severe shortage CBS has already fully implemented such measures and in spite of this, the supply of blood is insufficient to meet demand.

The Plan for Management of Shortages of Labile Blood Components

C. The Plan promotes collaboration.

The Plan is intended to promote the most efficient use of a limited supply of blood components in a situation of emergency, through significant collaboration by participants in the Canadian blood system, collectively achieving the benefits and bearing the risks of doing so. The optimal allocation of blood components in a time of severe shortage will depend upon the ability of all participants to act in a highly professional, collaborative and transparent manner.

D. The Plan is based upon established ethical principles.

During blood shortages, difficult decisions will need to be made on how to ration blood components. Collaborative approaches that may transcend the needs of a single patient, health care professional or institution may need to be implemented. This could represent a paradigm shift in decision-making for physicians—from a focus on individual patients to consideration of the “greater good”. Thus, in order to ensure acceptance and cooperation by all participants, a fair and transparent priority-setting process for rationing must be developed. The decision-making process used in the preparation of this Plan was based on established ethical principles as discussed in more detail in [Appendix D](#).

E. The Plan recognizes previous and ongoing work in this domain and represents an ongoing process.

The Plan was initially built upon the work related to management of blood shortages done by others and available at the time the NAC-BSWG began their work, in particular plans developed by the United Kingdom National Blood Service, Héma-Québec and the Nova Scotia Provincial Blood Coordinating Program, as well as the more general work done by groups responsible for disaster or pandemic planning. As work on the Plan progressed, other plans - both those being developed within Canada and those being developed internationally- became available and were consulted. Available Provincial / Territorial plans are listed in [Appendix B](#). The Plan also incorporates many of the initiatives already undertaken in Canadian hospitals to encourage optimal transfusion practice.

It will be necessary to refine and amend the Plan over time as more information becomes available, as inventory management and demand-forecasting methods evolve and when/if experience is gained in actual shortage situations. The participants will establish a process to periodically review and modify, as required, the content of the Plan.

F: The Plan acknowledges potential legal liability concerns.

The Plan recognizes the potential for legal activity on behalf of patients denied blood components in a shortage, where a decision not to administer blood - a decision made pursuant to the agreed-upon protocols in the Plan - results in an adverse outcome. It is recommended that the Plan undergo legal and/or risk management review by representatives of the participating institutions and that, to the extent possible, protections be put in place for those who will be applying the Plan and making real-time decisions pursuant to it. It is hoped that the development of a national Plan will, in and of itself, assist hospitals and physicians to make the most appropriate medical (and hence legal) decisions.

The Plan for Management of Shortages of Labile Blood Components

The NAC-BSWG recognizes the ethical dilemma placed on physicians/hospitals who will be asked to make difficult decisions to preserve and prioritize use of inventory. To provide support to those who will be responsible for making such decisions, NAC convened a subcommittee to develop guidelines for discontinuing blood transfusion therapy for patients with potentially massive requirements but in whom there is a very remote chance of benefit. . The resulting document ‘***Emergency framework for rationing of blood for massively bleeding patients during a red phase of a blood shortage***’ and a truncated ***Synopsis for Triage Teams*** received the support of the PT Ministers of Health (except for Quebec) on September 27, 2012. To ensure consistency of implementation should the emergency framework be operationalized during a Red phase blood shortage, the NAC has recommended that the *Synopsis for Triage Teams* be incorporated verbatim into provincial / regional / hospital blood shortage contingency plans. Referencing the full framework and adding the synopsis document as a section or appendix was recommended as well. Both documents are available on the NAC website www.nacblood.ca in the [Blood Shortage tab](#). The PT Ministers of Health supported these recommendations in October 2012.

Finally, for a variety of reasons including legal considerations, careful record-keeping of decisions made pursuant to the Plan will be of paramount importance. It is recommended that preparations be undertaken to make the recording of such decisions, in the event of a crisis, as easy and efficient as possible. [Appendix G](#)– provides examples of triage forms. These forms may be adapted by hospital or regional health authorities for use during a Red phase blood shortage.

- G. The Plan assumes that all areas of the country served by CBS would be simultaneously affected in an approximately equal manner; however provincial and/or regional differences can also be addressed by the Plan.

The Plan is written to address a severe shortage of the blood supply with the assumption that the demand for blood would be approximately equal across all jurisdictions served by CBS. However given the large size of the country, it is possible that different scenarios with respect to supply and demand could arise. Since CBS manages the blood inventory nationally, a decrease in blood supply due to large recall situation or a decrease in blood collections in one area (as could occur during a major and prolonged labour disruption) without a concomitant decrease in demand or increase in blood collections in other areas could result in a decrease in inventory available to all hospitals served by CBS. Alternately a simultaneous decrease in supply and demand could occur in one region only (as occurred during the 2002 SARS outbreak in Ontario) – this scenario would not likely necessitate the invocation of this Plan unless the blood supply was affected much more severely than the demand. If the blood supply were severely compromised, but the requirement for blood differed across the country, then decreased need for blood in one or several regions could be incorporated into decisions regarding blood component allocations. However it is assumed that such planning would still occur using the mechanisms described in this Plan.

- H. The Plan acknowledges Canada’s diverse geography and diverse expertise in Transfusion Medicine.

The Plan acknowledges Canada’s diverse geography, remote locations and the fact that there are many very small hospitals in rural locations that do not carry large blood inventories. The reality is that there is limited expertise in Transfusion Medicine in these remote and/or rural locations and this will need to be considered. Any reductions or recommendations will need to take these

jurisdictions and their special needs into consideration.

3 PLAN STRUCTURE – OVERVIEW

In keeping with other plans to manage blood shortages, this Plan considers four phases of inventory availability, defined below. Roles and responsibilities for the participants (CBS, P/T Ministries, and hospitals/RHA) are described in this section in general terms and then specifically for each of the participants in each of the phases in Section 6.

3.1 Phases of Inventory Availability

The Plan considers four phases of inventory availability – Green, Amber, Red and Recovery. An inventory availability or shortage phase could apply to a single component (e.g. platelets) or to a particular blood group of a component (e.g. O Rh negative red blood cells) or could involve multiple blood components. As well, different components could be in different phases (e.g. at one given time inventory availability for red blood cells could be at Amber Phase while that of platelets could be at Red Phase).

More information regarding each of the various phases is outlined in the sections below. A transparent national inventory and enhanced blood system inventory indicator based on the collection of certain standardised data elements is necessary for the Plan to function effectively during normal operations and during shortages. Historically we have used ‘days on hand’ which refers to the available blood component inventory at CBS. This may be an easy to capture number but past exercises have identified that it needs further refinement to ensure that all levels involved in The Plan understand the context. An enhanced indicator, such as the inventory index, which refers to the red cell demand base index, is needed to monitor regional, provincial and national red cell distribution during normal operation and in shortage, and to determine the trends in red cell supply and demand. This index is a necessity to use the national inventory data in a meaningful manner for equitable distribution of products in a shortage situation. For the calculation of this index, the collection of a few standard data elements is required. In addition, the availability of data in real time is also essential for the NEBMC to make an informed decision during a blood shortage. Therefore, this Plan supports further development and monitoring the blood system by a red cell demand based inventory indicator as the most reliable method for monitoring and forecast of utilization.

The minimum necessary data elements that should be captured are:

- a) Average daily red cell demand (ADRD)- for hospital, province and national
Red cell demand annually/ 365 days (or quarterly demand/90 days)
Red cell demand = transfused + outdated + wasted
- b) Actual inventory broken down by group (hospital and provincial)
Inventory Index = Inventory (Group specific or total)/ADRD

The enhanced inventory indicator takes into account outdated and wasted product. As the inventory decreases, outdates also decrease, so there may be an issue with including historical outdate rates. Ideally, the outdate and wastage rates should be conditioned on the amount of inventory.

The Plan for Management of Shortages of Labile Blood Components

Currently, hospitals may enter inventory levels into the CBS Inventory level webpage within the Blood Component and Product Disposition System. Reporting daily inventory enables CBS and the NEBMC to assess the TOTAL Blood Inventories (CBS and Hospital) across all jurisdictions served by CBS. With this real time data, CBS and the NEBMC are better equipped to determine appropriate actions required to manage the shortage.

There are reports readily generated with the available inventory data. National/provincial multi-level inventory reports are used during a shortage and can be leveraged for national, provincial and hospital shortage exercises etc. These reports contain all hospital submitted inventory, CBS inventory and average daily red cell demand and inventory index calculations. Hospital inventory trend reports are excel-based and are prepared on a routine basis for everyday hospital reference. This report contains daily hospital inventory data and average daily red cell demand and inventory index calculations. Hospitals with a leaner inventory index (6-8 versus 9-10) may have best practices that can be leveraged and shared with other hospitals. The “ideal” green phase inventory index has not been definitively established but subsequent inventory exercises will provide further data to support specific recommendations regarding inventory index.

The Plan acknowledges that challenges exist for some hospitals to report daily inventory within a specific timeframe. Significant challenges exist for hospitals regarding reporting disposition data by blood group. Disposition data is required to calculate Average Daily Red Cell Demand. At the present time, the participation rates for reporting disposition by blood group versus totals only varies across the country. Specific limitations, from hospital and provincial perspectives include the configuration of hospital laboratory information systems to produce reports of disposition by blood type and budgeting for data entry for the purpose of sharing with CBS. Until all hospitals can readily share disposition data by blood group, the inventory index calculations within the national and hospital specific inventory reports will be limited to totals only.

3.1.1 Green Phase

[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 Canadian Blood Services and hospital/RHA actions.

Green Advisory Phase

There could be brief situations where, while the overall inventory is in Green Phase, a particular blood type or component may be in limited supply and require CBS to issue an Advisory. Most of these situations will be brief, and CBS will communicate temporary inventory adjustments to hospitals through “business-as-usual” channels. Should the situation persist, prior to going to a public media appeal for donors, or to discussing the potential of an Amber phase, as co-chairs of the NEBMC the CBS VP, Medical Affairs and Innovation will consult with the NAC Chair to convene the NEBMC (within 24- 48 hrs) to determine if there are any changes to hospital inventory management practice which could assist with and/or improve the situation internally. If the situation cannot be improved upon internally, a mass public/media appeals may be undertaken to avert a blood shortage. Refer

The Plan for Management of Shortages of Labile Blood Components

to [Appendix E](#): Communications Plan Sections 3.1.3 and 3.1.4 for in-depth details.

The green advisory state is typically when CBS is low with respect to inventory of a particular component but is not completely sure what the hospital levels are. This state requires review of all hospital inventories to determine what the likelihood of crossing into Amber or Red phase would be. It would also be a warning for hospitals and provinces to look at any potential conservation strategies that could help avoid a shortage. Hospitals/RHA need to submit the inventory, by blood group and component within a specific timeframe to ensure that the NEBMC can make an assessment of what the phase would be. Ideally, inclusion of an estimate of daily demand over the next several days would be useful for updating the ‘days on hand’ index as well as supporting inventory reallocation.

Approximate CBS national inventory levels that could constitute a Green Advisory Phase relative to the Normal Green Phase are described as follows:

Inventory Levels- CBS- Normal Green Phase and Green Advisory Phase

	Normal Green Phase	Green Advisory Phase (serious but non-critical blood shortage)
RBCs	<ul style="list-style-type: none">• > 4 DOH* for O Rh positive and A Rh positive blood groups, and• >3DOH for all Rh negative blood groups	<ul style="list-style-type: none">• More than 3 successive days of 3-3.5 DOH for <u>either</u> O Rh positive or A Rh positive blood groups• More than 3 successive days of 2-3 DOH for <u>either</u> O Rh negative or multiple other Rh negative groups
Transfusable Plasma (Type O, A, B only)	> 2WOH**	1-2 WOH
Transfusable Plasma (Type AB) or CSP or Cryoprecipitate	> 3WOH	2-3 WOH
Platelets	CBS can provide > 90% of the national daily requirement May include seeing 80-90% unit/fill rates in a few sites but recovery must occur within 12-24 hours	CBS can provide 80-90% of the national daily requirement May include seeing lower unit/fill percentages in a few sites but recovery must occur within 12-24 hours

* Refers to ‘days on hand’ defined as the average daily issues of red cells from CBS

**Refers to ‘weeks on hand’ defined as the average weekly issues of plasma from CBS

3.1.2 Amber Phase

[Amber Phase](#) implies that blood inventory levels are insufficient to continue with routine transfusion practice and hospitals/RHA will be required to implement specific measures to reduce blood usage.

3.1.3 Red Phase

[Red phase](#) implies that blood inventory levels are insufficient to ensure that patients with non-elective indications or need for transfusion will receive the required transfusion(s).

3.1.4 Recovery Phase

[Recovery Phase](#) implies that blood component inventories have begun to increase and are expected to be maintained at a level that would enable hospitals to move from Red to Amber and subsequently to the Green Phase, or from Amber to Green Phase.

3.1.5 CBS Inventory Levels at Green, Amber and Red Phases

It is not possible, a priori, to define concisely national inventory levels which would automatically trigger the declaration of an Amber or Red Phase. Critical levels vary according to component (and in particular, in relationship to the component's acceptable storage period), to blood group and to the anticipated length of a given shortage (including the effect of projected collections). Red blood cell (RBC) inventories (i.e. inventories of units ready for release, exclusive of units in processing/testing) at CBS are categorized as optimal through critical according to the number of "days on hand" (defined as the average daily issues of red cells from CBS) which, as shown below, correspond approximately to inventory levels that could represent Green, Amber and Red Phase inventories. In actual functioning, a separate determination is made daily at CBS for the inventory for each blood group. Internally, CBS has defined response mechanisms that are activated if there are three successive days of less than 72 hours on hand for more than one of the following red blood cell blood groups: O Rh Positive, O Rh Negative, A Rh Positive or A Rh Negative. Other defined response mechanisms follow for platelets and plasma. The declaration of an Amber or Red Phase would depend as much on the predicted ability of CBS to increase blood inventories through increased collections as the actual inventory on any one day, i.e. the declaration of a Red or Amber Phase would usually be made only if CBS were forecasting a sustained decreased in inventory levels. The CBS inventory levels are set based on an analysis of recent daily demand levels at the blood type level for each of the CBS sites that issue products to hospitals. These estimates are then adjusted to compensate for expected increase in product demand for the upcoming usage period. It is however acknowledged that over 50% of the blood that may be available for patient use will be held in hospital inventories and may not be reflected in the criteria established within The Plan below. Hospitals may currently enter inventory levels by blood group and component into the CBS Inventory Level webpage within the Blood Component and Product Disposition System to enable assessment of TOTAL blood product inventories (blood supplier and hospital combined) across the country in near to real time criteria. This process is evolving with further data available, see Section 3.1.6 for the inventory criteria around the phases that include total inventory numbers.

The Plan for Management of Shortages of Labile Blood Components

Approximate inventory levels that could lead to the declaration of Amber or Red Phase if sustained are shown in the following tables. The numbers below are accurate as of August 11, 2016. Updates to these numbers are provided on the Blood Shortages tab on www.nacblood.ca or on the CBS site www.blood.ca.

The Plan for Management of Shortages of Labile Blood Components

Platelet Inventory – Canadian Blood Services

<i>Platelet Inventory Level*</i>	% of National Requirement
Green Phase (minimal decrease to optimal)	80-100% of daily national requirement
Amber Phase (serious)	25-79% of daily national requirement, recovery NOT expected within 12-24 hours
Red Phase (critical)	<25% of daily national requirement, recovery NOT expected within 12-24 hours

*As platelets only have a shelf-life of 7days platelet inventory levels are expressed as a percentage of the daily national requirement rather than “days on hand”.

The Plan for Management of Shortages of Labile Blood Components

Frozen Plasma Inventory

<i>Frozen Plasma Inventory Level (Total of groups O, A and B only)</i>	<i>CBS Days On Hand</i>
Green Phase (minimal decrease to optimal)	>7 days
Amber Phase (serious)	3 – 7 days
Red Phase (critical)	< 3 days

<i>Group AB Frozen Plasma Inventory *Level</i>	<i>CBS Days On Hand</i>
Green Phase (minimal decrease to optimal)	>14 days on hand
Amber Phase (serious)	6 – 14 days
Red Phase (critical)	< 6 days

*Cryoprecipitate inventory criteria typically mimic those of Group AB plasma for the estimates of CBS Days on Hand but this may require re-evaluation as more hospitals/RHAs transition to the alternative of fibrinogen concentrate.

3.1.6 Total Inventory Levels

CBS inventory levels represent only a part of the total inventory within the blood system, as a large part (and likely the majority) of the total inventory at any one time is already in storage in hospital/RHA blood banks. The information above reflects the “days on hand” inventory cut-offs for CBS which should be reflected in hospital / RHA ordering practices for the same phase. The national TOTAL blood product inventories (blood supplier and hospital combined) are derived from hospitals reporting their inventory levels by blood group and component in near to real time using the CBS Inventory Level webpage within the Blood Component and Product Disposition System. As work proceeds with CBS, the hospitals and the NAC BSWG Inventory Sub-Group such that total blood inventory levels can be reliably obtained, inventory criteria for ordering and phase declaration is being adjusted.

The following table provided by CBS is an example of how the Inventory Index might represent actual hospital inventory and a corresponding inventory phase. The calculations are based on actual 2015-2016 hospital disposition data that excluded CBS inventory and a calculated ADRD of 2056 red cell units.

The Plan for Management of Shortages of Labile Blood Components

Hospital ONLY National Number Units –	Inventory Index	Phase – <i>not yet determined, presented for consideration and reference only</i>
25,000	12.16	Green
20,000	9.73	Green
19,000	9.24	Green
18,000	8.75	Green
17,000	8.27	Green
16,000	7.78	Green Advisory
15,000	7.30	Green Advisory
14,000	6.81	Amber
10,000	4.86	Red
5,000	2.43	Red

There is a recommendation from the NAC BSWG Inventory Sub-Group for hospitals to conduct inventory submission exercises on a quarterly basis. A rolling twelve (12) month disposition reporting period will be used to calculate ADRD. The exercises will aid to determine the inventory indices that correspond to the phases of inventory availability. These exercises are proposed for December, April, July and October of each year.

A hyperlink will be provided to the NAC website for the provision of timely information on the national inventory indices: <http://www.nacblood.ca/resources/shortages-plan/index.html> .

3.1.7 Actual Allocation of Blood Components in Times of Shortages

The actual allocation of blood components to hospitals/RHA in times of severe shortages will be determined by CBS in consultation with national and P/T blood emergency management committees (described in Section 4) and will take into consideration usual requirements, the nature of the situation leading to the shortage, inventory requirements, and work done by hospitals/RHA as part of Green Phase activities (as described in [Section 6.1](#)). Further details concerning the blood product allocation process are given in [Section 6.4](#).

Blood conservation strategies should be implemented at the hospital/ RHA level as a means to mitigate a more serious blood component inventory situation. Blood conservation strategies should include any or all of the following: erythropoiesis-stimulating agents, thrombomimetics, intravenous/oral iron, antifibrinolytics, intraoperative cell salvage, interventional radiologic procedures, autologous blood donation for elective surgical procedures, rapid access to endoscopy, and non-invasive surgeries.

During a blood shortage, the NEBMC is responsible for assessing the level of shortage and the impacts, both short term and long term, the shortage may have on the blood supply. A key element in inventory management, during a blood shortage, is knowledge of the level of inventory of blood components at hospitals within Provinces and Territories and at CBS.

In consultation with the NEBMC and P/T emergency committees, CBS will be allocating actual blood inventory on the basis of the inventory indices and ADRD to allow 'levelling' of the inventory indices across the country in times of blood component restraint. CBS will also assist hospitals/RHAs in levelling inventory indices by facilitating sharing of best practices. PTs will

The Plan for Management of Shortages of Labile Blood Components

ensure that all hospitals have their ADRD, inventory indices and minimal inventory level calculations in place and facilitate ‘levelling’ of inventory indices across the country by sharing and/or incorporating best practices. Hospitals/RHAs will participate in Blood Component and Product Disposition and Inventory reporting to CBS and ensure that the inventory index is optimized by implementing or sharing best practices from other facilities.

The “red line” inventory in rural sites – will need to have some risk management discussions at the hospital and provincial committee levels. Need to consider how “holding inventory sites” that are for safety / emergency stock which has variable demand would be managed in green advisory, amber and red phase scenarios. Considerations include the risk of holding units for “just in case” scenarios versus refusing blood to a patient in another facility because no units are available there.

3.2 Key Participant Roles and Responsibilities

This section outlines the general roles and responsibilities of the following agencies/institutions as they relate to blood components only. They do not include broader responsibilities from a public health perspective. Each agency/institution has a responsibility to develop disaster preparedness plans that include blood shortage management as a key element and are appropriate to each respective agency/institution. Within all of the categories listed below, there is the expectation that each representative to the NEBMC would ensure that they have identified a designate in the event that they are unavailable. This designate should be clearly communicated to the NEBMC Secretariat provided by the office of CBS’s VP, Medical Affairs and Innovation.

3.2.1 Canadian Blood Services

Canadian Blood Services (CBS) manages the blood supply in all provinces and territories except Québec. As part of this mandate, CBS currently engages in a number of activities to identify, avert and as necessary, alleviate and manage a national shortage. Its basic activity in this regard is the ongoing management of the inventory as a single national inventory (as opposed to multiple regional inventories). CBS and Héma-Québec have an informal understanding on the sharing of blood products, recognizing the sharing will always remain subject to availability.

CBS has developed and continues to refine business continuity and business recovery plans to minimize the impacts of adverse events on the national inventory. In the CBS Business Continuity Management Framework, it is recognized that events/disasters could negatively affect the availability of donors, CBS staff, equipment, IT systems, transportation systems and/or facilities upon which the maintenance of the national inventory are critically dependent. Business continuity and recovery plans have been developed to mitigate disruptions to each of these critical dependencies.

To ensure that its Business Continuity Management planning takes into consideration industry best practices, CBS is a member of an international group of blood suppliers, including the American Red Cross, America’s Blood Centres, the Australian Red Cross Blood Service, and the European Blood Alliance.

With respect to the specific requirements of the Plan, Canadian Blood Services will have the

The Plan for Management of Shortages of Labile Blood Components

ultimate responsibility for declaring various phases of blood component shortages and recovery from such shortages as well as determining the distribution of blood components in accordance with the phase of criticality. However, both these activities would occur only following consultation with the National Emergency Blood Management Committee (NEBMC, described in [Section 4.1](#) below) and in consideration of its advice.

Canadian Blood Services will also have a key role in coordinating communications as detailed in [Section 5](#) below and will provide the secretariat for the NEBMC (Section 4.1).

3.2.2 CBS-P/T Blood Liaison Committee

The general mandate of the CBS P/T Blood Liaison Committee (CBS P/T BLC) is to facilitate the work between the participating governments and CBS to support CBS in the provision of a safe, secure and affordable national blood supply.

For the purposes of this Plan, the CBS P/T BLC is responsible for establishing the [NEBMC](#) and its terms of reference, including membership and lines of communication that will enable the rapid response and decision-making necessary for it to function effectively during a blood shortage.

The CBS P/T BLC is also responsible for reviewing the Plan from time to time and ensuring that the NAC updates the Plan as required.

3.2.3 Provincial and Territorial Ministries of Health

Given that the provision of health care and essential services falls under provincial/territorial jurisdiction, there are a number of ways in which the Ministries of Health and their staff will be involved in the execution of the Plan. Every provincial/territorial Ministry of Health is responsible for the development of detailed provincial/territorial plans to manage blood component shortages, including the establishment in each province/territory of a Provincial/Territorial Emergency Blood Management Committee (P/TEBMC) and its terms of reference. Provincial/Territorial plans should comply with the requirements outlined in the Plan and should be linked to each province/territory's other emergency preparedness plans. It is strongly recommended that a standardized phasing system of inventory availability (Green, Amber, Red and Recovery as defined in this Plan) be adopted by all provinces/territories. Finally, the P/T Ministry should play a leadership role in encouraging hospitals/RHA to comply with their provincial plan and the Plan and, in collaboration with the P/TEBMC, to monitor the level of compliance in the institutions within their jurisdiction.

The Plan for Management of Shortages of Labile Blood Components

3.2.3.1 Provincial/Territorial Blood Representatives

A major responsibility of the P/T Blood Representative in each province/territory is to provide advice and support to the Deputy Minister and Minister of Health on issues affecting the blood system. In this capacity, P/T Blood Representatives would have central roles to play in the establishment of a Provincial/Territorial Emergency Blood Management Committee (P/TEBMC) and the development of their respective detailed provincial/territorial/hospital/RHA plans to manage shortages of blood components.

All P/T Blood Representatives will participate on the NEBMC; providing a link between national and P/T response plans to ensure a consistent and coordinated national response to a blood component shortage (see [Section 4](#) below). In this capacity, P/T Blood Representatives will be responsible for ensuring the establishment of both internal and external lines of communications to enable consistency and coordination within and among P/T jurisdictions, hospitals/RHA and the blood operators.

3.2.3.2 Lead P/T Blood Representative

The P/T Blood Representative of the Lead P/T will play a leadership role in facilitating communications between the various participants / stakeholders and their respective provincial/territorial Ministry.

3.2.4 National Advisory Committee on Blood and Blood Products

The NAC mandate is to provide medical and technical advice on the utilization management of blood and blood products to the P/T Ministries and CBS. In light of this mandate, and given NAC's expertise, NAC was requested by the CBS P/T BLC to develop this Plan. For this work NAC convened the NAC Blood Shortage Working Group (NAC-BSWG) in September 2007. The NAC-BSWG subsequently established sub-groups to evaluate communication (Appendix E) inventory management and allocation guidelines. The allocation group has largely focused on guidance for discontinuing blood transfusion therapy for patients with potentially massive requirements but in whom there is a very remote chance of benefit ([Section 2, part F](#)).

The NAC-BSWG will review the implementation and outcomes of the Plan after each simulation exercise and live activation, for ongoing refinement and modification of the Plan, and shall report these findings to all members of the NEBMC.

NAC will also play a key role on the NEBMC; the Chair of the NAC will Chair the NEBMC and all NAC members will be members of the NEBMC (see [Section 4.1](#)).

3.2.5 Hospitals/Regional Health Authorities

Each facility/region should establish a Hospital/RHA Emergency Blood Management Committee (H/REBMC) (see [Section 4.3](#)) and a Hospital/RHA Blood Shortage Management Plan. The purpose of a Hospital/RHA Blood Shortage Management Plan is to delineate lines of responsibility, decision-making processes, and effective communication to enable the H/REBMC to respond appropriately during a shortage. Such hospital/RHA plans should also define which staff members

The Plan for Management of Shortages of Labile Blood Components

will participate in the H/REBMC and how a reduction in blood component usage will be achieved.

Hospital/regional blood shortage management plans should be based on, and comply with, the requirements outlined in this Plan. It is strongly recommended that a standardized phasing system of inventory availability (Green, Amber, Red and Recovery as defined in the Plan) be adopted by all Hospital/Regional Blood Shortage Management Plans.

4 EMERGENCY BLOOD MANAGEMENT COMMITTEES

This section describes the blood emergency management committees at the national, provincial/territorial and hospital/RHA levels that will be necessary to facilitate information flow and decision making.

The activities of these various committees are meant to be collaborative but in the setting of local or regional shortages, there may not be activation of higher level committees such as the National Emergency Blood Management Committee. This does not preclude the activities of the Provincial or Hospital Committees from occurring to manage the local shortage situation.

4.1 National Emergency Blood Management Committee

A National Emergency Blood Management Committee (NEBMC) is necessary to ensure the implementation of the Plan. The NAC-BSWG carefully considered the size and functioning of this committee. The membership and terms of reference of the NEBMC were developed taking into consideration the need for all regions to share information and have input into decision-making, while acknowledging the challenge of convening a large committee in a timely manner.

Prior to the convening of the entire NEBMC, the Core NEBMC may discuss the inventory situation and bring forward a number of strategies and next steps for consideration and discussion by the NEBMC, should it be determined that the NEBMC be convened. The members of the Core NEBMC will include:

- NAC Chair (NEBMC Co-Chair)
- CBS VP Medical Affairs and Innovation (NEBMC Co-Chair)
- CBS Chief Supply Chain Officer and VP Donor Relations

- NAC BSWG Chair
- Co-Chairs of the CBS-PTBLC (Lead Province Ministry of Health Official and Canadian Blood Services Director of Governmental Affairs)

NEBMC communications should be timely and this can be optimally achieved by sharing regular updates. For this purpose, meeting tools (for examples of NEBMC meeting tools see Appendix H) have been developed by CBS as NEBMC Secretariat provided by the office of the CBS VP

The Plan for Management of Shortages of Labile Blood Components

Medical Affairs and Innovation. These tools will assist with communications to NEBMC members and inform the Full NEBMC of the discussions that occurred with the Core NEBMC. Relevant information from discussions of the NEBMC (summaries, actions/next steps and messaging) will be documented by the NEBMC Secretariat prior to and during the meeting and distributed as follows:

- The Secretariat will distribute the completed Core NEBMC tool to the members of the Full NEBMC for information.
- The Secretariat will distribute the completed Full NEBMC tool to all the members of the NEBMC as soon as possible after a meeting.
- Members of the Full NEBMC will further disseminate the information from a meeting onto the respective PEBMC, as appropriate.

The major components of the NEBMC Terms of Reference are as follows:

4.1.1 Mandate

The National Emergency Blood Management Committee (NEBMC) will develop recommendations and provide advice to the P/T Ministries of Health, hospitals/RHA and CBS to support a consistent and coordinated response to critical blood shortages in Canada.

To this end, the NEBMC will:

- provide advice to CBS with respect to determining the appropriateness of declaring an Green Advisory, Amber or Red phase situation, and subsequent recovery from these situations;
- provide recommendations on the distribution of blood components in Amber and Red phases;
- provide recommendations as to whether or not to implement triage and rationing guidelines for massively bleeding patients in a Red phase;
- provide recommendations on previously unforeseen circumstances related to critical blood shortages;
- provide recommendations concerning the communication of the shortages to key stakeholders;
- ensure the necessary communication between the NEBMC and the P/TEBMCs occurs;
- task the Blood Shortage Working group to review and report upon the implementation of the Plan and subsequent outcomes after each simulation exercise and live activation
- ensure ongoing refinement and improvements to the Plan.

4.1.2 Membership

The NEBMC will be co-chaired by the current chair of the NAC and the CBS VP Medical Affairs and Innovation . The Vice-Chair of NAC shall act as chair in the absence of either NEBMCco-chairs.

The membership of the NEBMC will include the following:

- CBS officials as determined by CBS and including the following

The Plan for Management of Shortages of Labile Blood Components

- VP, Medical Affairs and Innovation
- Chief Supply Chain Officer and VP Donor Relations
- Director, Integrated Supply Chain Planning
- Director, Plasma Protein Products Formulary Program
- Medical Director and Special Advisor, Plasma Derived Products
- Medical Director, Medical Services and Hospital Relations
- Director, Health Policy & Governmental Affairs
- Director, Communications
- all National Advisory Committee for Blood and Blood Products (NAC) members
- all Provincial/Territorial Blood Representatives
- Québec Ministry representative (Ex-Officio)
- Hema-Québec representative (Ex-Officio)
- Health Canada BGTD representative (Ex-Officio)
- two blood transfusion recipient representatives, chosen jointly by CBS and NAC; one should be an actual blood transfusion recipient (present or past) and the other should be a representative of an appropriate patient society that receives blood components.

Every member of the NEBMC is responsible for naming a designate in the event that they are unavailable. They are responsible for ensuring that the CBS Secretariat has up to date contact information for both the NEBMC member and their designate. The term of any member will be determined by the body that appointed them.

The NEBMC may invite additional experts to meetings on an ad hoc basis to provide expertise on the subject matter being discussed (e.g. Public Health Agency of Canada in the event of a blood shortage secondary to an infectious risk, Regional representatives from CBS supply chain).

4.1.3 Meetings/Quorum

NEBMC will hold regular meetings, emergency simulation meetings and meetings convened at the time of potential shortages or shortages.

Note: Potential Shortages could be brief situations where, while the overall inventory is in Green Phase, a particular blood type or component may be in limited supply and require CBS to issue a Green Advisory. Most of these situations will be brief, and CBS will communicate temporary inventory adjustments to hospitals through “business-as-usual” channels. Should the situation persist, prior to going to a public media appeal for donors, or to discussing the potential of an Amber phase, the CBS CSCO will consult with the NEBMC Chair to convene the NEBMC (within 24-48 hrs) to determine if there are any changes to hospital inventory management practice can assist with and/or improve the situation internally.

Regular meetings and emergency simulation meetings will be extremely important to ensure that the committee can effectively function in times of potential shortages or shortages and will be convened at the call of the Chair of the NEBMC, twice per year.

The first of these 2 meetings would be used for reviewing the Plan to maintain currency and the second would be used for a blood shortage exercise with the purposes of increasing NEBMC

The Plan for Management of Shortages of Labile Blood Components

comfort in handling such events. The meetings should be scheduled two years out by Canadian Blood Services acting as the secretariat to the NEBMC.

A “job aid” has been developed by the Blood Shortage Working Group to support members during an actual blood shortage. This job aid summarizes the mandate of the NEBMC, describes the shortage phases and implications for transfusion, and provides a high-level summary of how communications would unfold once the NEBMC reached decisions. Refer to [Appendix F](#).

There will be no requirement for quorum and decisions of the NEBMC will be made by consensus. Consensus is defined as 80% (or greater) agreement of the NEBMC members present. In the event consensus is reached, the CBS Chief Supply Chain Officer and VP Medical Affairs and Innovation will take the NEBMC recommendation as their primary consideration in rendering decisions related to matters identified by the NEBMC mandate. In the event that consensus cannot be reached, CBS will make the decisions using knowledge of current and future CBS inventories and considering the advice received from the NEBMC.

4.1.4 Communications and Support

4.1.4.1 Secretariat

A Secretariat, provided by CBS, shall support the work of the NEBMC. The Secretariat shall be responsible for:

- maintaining an up-to-date contact list of members and their designates;
- arranging meetings/teleconferences at the direction of the Chair, including planned and unplanned simulation meetings;
- reporting all proceedings and recommendations of the NEBMC to all members of the NEBMC and their designates;
- distribution of relevant information and reports from P/TEBMC, CBS or other relevant sources to all NEBMC members and their designates.

4.1.4.2 NAC Members

In their NEBMC role, NAC members will serve as medical/technical advisory representatives for their respective provinces to the NEBMC. In conjunction with their P/T representative, they will facilitate dissemination and implementation of NEBMC recommendations to their P/TEBMC and H/REBMC.

4.1.4.2 P/T Representatives

In their NEBMC role, P/T representatives will facilitate the dissemination and implementation of NEBMC recommendations within their respective ministries of health and to their P/TEBMC.

4.2 Provincial/Territorial Emergency Blood Management Committees

It is the responsibility of the Ministries of Health of each province or territory to establish a Provincial (or Territorial) Emergency Blood Management Committee (P/TEBMC) and its terms of reference, which should include the following responsibilities:

- develop a response plan to minimize the provincial/territorial impact of blood shortages;
- work in accordance with the guidelines outlined in this Plan;
- ensure that the recommendations of the NEBMC and resulting national decisions are appropriately communicated within its jurisdiction;
- solicit feedback on implementation of the Plan from the H/REBMC;
- provide the conduit for communications/feedback between the NEBMC and H/REBMCs;
- establish a process to monitor adherence to the Plan in times of blood shortages;
- establish recommendations to manage non-adherence to the Plan in times of blood shortages.

Thus, each P/TEBMC will work collaboratively as required with the NEBMC and its jurisdiction's H/REBMCs.

Provinces or territories may wish to consider having a core or an executive P/TEBMC and then an expanded membership depending upon the extent of the crisis.

Core team members must include:

- P/T Blood Representative
- Provincial NAC member(s)

Core team members would also usually include:

- Chief Medical Officer of Health
- Medical Director(s) Provincial Blood Program (if applicable)
- Program Manager Provincial Blood Program (if applicable)
- Representatives of tertiary care centre blood transfusion services
- Representatives of rural or remote sites
- Regional Medical Officers(s), Canadian Blood Services
- Regional Director(s), Canadian Blood Services
- Regional Hospital Liaison Specialist(s), Canadian Blood Services

In the event the situation warrants, the core team members could be expanded to include:

- District/Regional Health Authorities and/or tertiary care centre CEOs
- District/Regional Health Authorities and/or tertiary care centre designates for:
 - Transfusion Service Medical Directors
 - Laboratory Managers
 - Risk Managers

The Plan for Management of Shortages of Labile Blood Components

- Medical Ethicist
 - Transfusion Safety Officers
 - Quality Specialists
 - Nursing administrators
 - Executive management representatives
 - Physician user group representatives
 - Chairs of transfusion committees
 - Communication Specialists
- Blood recipient representative(s)
- Other individuals as designated by the group
-

4.3 Hospital/RHA Emergency Blood Management Committee

Each hospital or Regional Health Authority (RHA) has a responsibility to establish a Hospital/RHA Emergency Blood Management Committee (H/REBMC) whose mandate is to develop a Blood Shortages Management Plan in accordance with the guidelines outlined in this Plan and to ensure that these plans are appropriately communicated and adhered to in times of blood shortages. H/REBMCs should also serve as the communication conduit to the P/TEBMC. In small provinces/territories it is possible that the P/TEBMC and H/REBMC would be one single body.

H/REBMC membership will vary from facility to facility; the following outlines potential membership:

- Representative of hospital/RHA senior or executive management
- Medical Director, Blood Transfusion Service
- Head, Department of Internal Medicine (or in larger centres could be Heads of Critical Care Medicine and Haematology/Oncology)
- Head, Department of Surgery
- Head, Department of Anesthesiology
- Head, Emergency Department
- Head, Obstetrics/Gynecology Department
- Chair of the Blood Transfusion Committee
- Director of Nursing
- Transfusion Service Laboratory Manager
- Transfusion Safety Officer
- Hospital/RHA Risk Manager
- Director, Communications/Public Affairs
- Other members as deemed appropriate by the Hospital/RHA Blood Transfusion Committee.

5 COMMUNICATIONS

Effective and timely communication is critical in attempts to mitigate a national blood shortage, while in a shortage situation and afterwards during recovery efforts. The principal organizations involved in managing a blood shortage are Canadian Blood Services (CBS), the Provincial / Territorial (P/Ts) Ministries of Health and Regional Health Authorities (RHAs)/hospitals. Each organization is independent, and has its own communications infrastructure, procedures and complexities. However, a common course of action is required by these partners, however different they may be, to promote alignment, consistency and collaboration during a crisis or potential crisis.

The communications plan ([Appendix E](#)) proposes a framework to achieve the best collaboration, allowing all parties to provide timely, accurate and credible information to various internal and external stakeholders for the purposes of operational and informational communication.

Per section 4.1, NEBMC meeting tools will assist in communications with the Core NEBMC and the Full NEBMC membership.

A template for patient/family notification of blood shortages is provided in Appendix I.

6 SPECIFIC PARTICIPANT ACTIONS

This section of the Plan provides recommendations for specific actions for blood system participants during the four phases of the plan.

It is assumed that each of the participants will have developed general emergency response/ business continuity plans and that these plans will be activated as required during a period of blood shortages, in addition to activating plans specific to blood shortages.

6.1 Green Phase

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 with existing Canadian Blood Services/hospital actions.

During the Green Phase, actions will focus on ensuring that plans to address potential shortages are developed and that blood components are used safely and appropriately, as described below.

6.1.1 Canadian Blood Services

- Confirm support for this Plan including the policy, legal and ethical implications of the Plan. Develop a comprehensive disaster preparedness plan.
- Manage the inventory nationally, including daily monitoring of the inventory and distribution of inventory across the country as appropriate.
- Ensure that mechanisms are in place for rapid sharing of inventory between Canadian Blood Services and Héma-Québec.
- Develop internal strategies to respond to periodic requirements to increase blood donations.
- Coordinate the functioning of internal emergency response committees with the NEBMC activities/recommendations.
- Hold mock drills to evaluate internal and external responses to blood shortages.
- Provide leadership for the use of the Blood Component Disposition Report to monitor component outdates and to implement measures to decrease such outdates.
- Assist hospitals/RHA in determining their Green phase (i.e. optimal), Amber phase (i.e. serious), and Red phase (i.e. critical) inventory levels.
- Assist hospitals/RHAs and liaise with provincial partners in “leveling” inventory indices across the country by facilitating sharing of best practices.
- Develop communication strategies and plans to inform hospitals, Health Canada, and provincial/territorial Ministries of Health of changes in inventory levels, including both decreases below optimum levels and recovery to normal levels.
- Work with P/T Ministries and hospitals/RHA to establish systems for transparent sharing of information pertaining to hospital/RHA blood component inventories and blood component utilization, including sharing of information among hospitals/RHA

The Plan for Management of Shortages of Labile Blood Components

and with CBS.

6.1.2 Provinces/Territories

- Confirm support for this Plan including the policy, legal and ethical implications of the Plan.
- Identify and empower a government program/agency or committee charged with the development of provincial/territorial blood component shortage management plans.
- Establish Provincial/Territorial Blood Emergency Management Committees.
- Actively encourage all hospitals/RHA to follow the Plan's guidelines and monitor their compliance in doing so, particularly with respect to the following activities:
 - development of transfusion committees as per the CSA Blood and Blood components standard Z902Section 4.4
 - implementation of transfusion guidelines
 - participation in blood component disposition and inventory reporting to Canadian Blood Services
 - establishment of systems for transparent sharing of information pertaining to hospital/RHA blood component inventories and blood component utilization, including sharing of information among hospitals/RHA and with Canadian Blood Services
 - development of blood redistribution programs and other methods/programs to minimize blood component outdating
 - implementation of H/REBMC
- Determine a process as well as, determination of the responsible party/hospital for reporting daily inventory, by blood group and component within the NEBMC specified daily timeframe, to CBS via the Blood Component and Product Disposition System during an Green Advisory Phase, Amber Phase, Red Phase and/or Recovery Phase, as requested.
- Liaise with CBS to facilitate “leveling” of inventory indices across the country by sharing of and/or incorporating best practices.
- Support hospitals reporting disposition by blood group.
- Ensure communication plans are developed and implemented in Hospitals/RHAs.
- Determine the “red line” inventory in rural sites. Need to consider how “holding inventory sites” that are for safety / emergency stock which has variable demand would be managed in green advisory, amber and red phase scenarios. Considerations include the risk of holding units for “just in case” scenarios versus refusing blood to a patient in another facility because no units are available there.

6.1.3 Hospitals/RHA

- Confirm support for this Plan including the policy, legal, and ethical implications of the Plan.
- Ensure that there is a functional Hospital/RHA Transfusion Committee (HTC). (In most hospitals/RHA the HTC will oversee the activities listed below.)
- Develop and implement transfusion guidelines. These should address both appropriate indications and appropriate dosing of blood components and should include guidelines

The Plan for Management of Shortages of Labile Blood Components
for situations when particular components are not available, e.g. CMV seronegative

RBCs/platelets, ABO/Rh identical components, etc.

- Monitor adherence to transfusion guidelines, including the performance of transfusion audits.
- Exercise scrutiny of orders that are outside hospital/RHA guidelines.
- Ensure application of available blood conservation methodologies.
- Develop and implement a strategy for perioperative blood inventory management, either a maximum blood ordering schedule (MBOS) or an alternate strategy. This enables improved deferral / cancellation criteria during shortages.
- Develop processes for inventory management including guidelines for efficient inventory utilization and acceptable levels of outdating blood components.
- Ensure that inventory index is optimized by implementing or sharing best practices from other facilities.
- Participate in Blood Component Disposition by ABO versus totals only for reporting to Canadian Blood Services.
- In collaboration with Canadian Blood Services and provincial partners, determine the hospital/RHA inventory levels or Green (optimal), Amber (serious) and Red (critical) levels, by blood group and component.
- Develop a mechanism for the redistribution of product between hospitals/RHA.
- Establish a Hospital/RHA Emergency Blood Management Committee with a mandate to develop, implement and maintain a blood shortage plan that encompass all four phases of this Plan.
- Develop a documentation process for release or non-release of blood components in Amber or Red Phase.
- Notify Canadian Blood Services of situations that could result in increased demand or reduced availability of blood components.
- Have ongoing discussions regarding risk management strategies so that the front line medical staff are aware.
- Ensure that all hospitals have their average daily red cell demand, inventory indices and minimal inventory level calculations and that this has been communicated to the front line medical staff.
- Determine a process as well as determination of the responsible party/hospital for reporting daily inventory, by blood group and component within a specific timeframe, to CBS via the Blood Component and Product Disposition System during an Advisory Green Phase, Amber Phase, Red Phase and/or Recovery Phase, as requested.

6.2 Amber Phase

Amber Phase implies that blood inventory levels are insufficient to continue with routine transfusion practice and hospitals/RHA will be required to implement specific measures to reduce blood usage.

During the Amber Phase, the following actions will be taken.

6.2.1 Canadian Blood Services

- Implement the predetermined communications plan (see [Appendix E](#)).
- Activate internal plans appropriate for Amber Phase.
- In collaboration with the NEBMC and P/TEBMCs, decrease blood component issues to hospitals to levels determined appropriate to the situation (see [Section 6.4](#)).
- Provide PTs with the percentage capture of inventory reporting.
- Provide PTs with the provincial ADRD and inventory index.
- Monitor hospital/RHA inventory requests to evaluate compliance with the Plan and/or the NEBMC and P/TEBMCs recommendations and report possible instances of non-adherence to the NEBMC and the appropriate P/T Blood Representative(s).
- Provide any other appropriate/necessary information to provinces/territories to assist them to coordinate their communications to hospitals/RHA and the public.

6.2.2 Provinces/Territories

- Activate P/TEBMC internal plans appropriate for Amber Phase – local or national.
- In collaboration with Canadian Blood Services, implement the predetermined communications plan (see [Appendix E](#)).
- Notify senior management of hospitals/RHA of the requirement to defer elective medical and surgical procedures which have a greater than 10% chance of requiring the affected blood components.
 - Elective procedures are considered to be all procedures which are not urgent or emergency procedures. Urgent procedures are those for which a patient is likely to have major morbidity if the procedure is not performed within the next one to 28 days. Emergency procedures are those that need to be performed within 24 hours in order to prevent the patient's death (or major morbidity such as paralysis).
- (Medical procedures may be as simple as the administration of a blood component.)
- Monitor hospital compliance with and implementation of the actions required in Amber Phase.

6.2.3 Hospitals/RHA

- Activate internal plans appropriate for Amber Phase – local or national.
- Convene the Hospital/RHA Emergency Blood Management Committee to monitor and control utilization of the affected blood components.
- Implement pre-established communications plans.
- Adjust inventory levels of affected components to levels consistent with those previously determined appropriate for Amber Phase.
- Request inventory from CBS based on Amber Phase requirements.
- Defer/cancel elective surgical procedures requiring the affected blood components.
 - Elective surgical procedures are considered to be all surgical procedures which are not urgent or emergency procedures. Urgent surgical 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. Emergency surgical procedures are those that need to be performed within 24 hours in order to

The Plan for Management of Shortages of Labile Blood Components

prevent the patient's death (or major morbidity such as paralysis).

- Defer/cancel elective medical procedures requiring the affected blood components. (Medical procedures also include administration of a blood component.)
- For RBC transfusions, follow guidelines for Amber Phase as outlined in [Table 1](#).
- For platelet transfusions, follow guidelines for Amber Phase as outlined in [Table 2](#).
- For frozen plasma and cryoprecipitate transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of alternatives such as prothrombin complex concentrate and fibrinogen concentrate. Group A plasma may also be considered as an alternate to group AB if appropriate mitigation and monitoring can be put in place
- Refer all requests for the affected blood components that do not fulfill pre-determined acceptance criteria to the Blood Bank Medical Director or designate prior to issuing product.
- Implement the documentation process for release or non-release of blood components. Examples of documentation tools are available via various current provincial blood shortage plans in [Appendix B](#).
- Collect data on total blood inventory on a daily basis and provide it to the province and territories as necessary
- Collect data on hospital utilization of blood as necessary.
- Report inventory (frequency determined by NEBMC), by blood group and component within a specific timeframe, to CBS.

6.3 Red Phase

Red Phase implies that blood inventory levels are insufficient to ensure that patients with non-elective indications for transfusion will receive the required transfusion(s).

During the Red Phase all actions begun in Amber Phase (assuming that the Red Phase is preceded by an Amber Phase) will be continued. In particular, ongoing communications as described in the communication plan ([Appendix E](#)) remain vitally important. In addition, the following actions will be taken.

6.3.1 Canadian Blood Services

- Implement the predetermined communications plan (see [Appendix E](#)).
- Activate internal plans appropriate for Red Phase.
- In consultation with the NEBMC and P/TEBMCs, decrease blood component issues to hospitals to levels determined appropriate to the situation (see [Section 6.4](#)).
- Monitor hospital/RHA inventory requests to evaluate compliance with the Plan and/or the NEBMC and P/TEBMCs recommendations and report possible instances of non-adherence to the NEBMC and the appropriate P/T Blood Representative(s).
- Provide any other appropriate/necessary information to provinces/territories to assist them to coordinate their communications to hospitals/RHA and the public.

6.3.2 Provinces/Territories

- Activate P/TEBMC internal plans appropriate for Red Phase – local or national.
- In collaboration with Canadian Blood Services, implement the pre-determined communication plan (see [Appendix E](#))
- Notify senior management of hospitals/RHA of the requirement to defer all medical and surgical procedures requiring the affected blood components with the exception of emergency surgical/medical procedures.
 - Emergency surgical procedures are those that need to be performed within 24 hours in order to prevent the patient’s death (or major morbidity such as paralysis).
 - Emergency medical procedures are those in which a transfusion of the affected blood component would be required within 24 hours in order to prevent the patient’s death (or major morbidity)
- Monitor hospital compliance with and implementation of the actions required in Red Phase.

6.3.3 Hospitals/RHA

- Activate internal plans appropriate for Red Phase – local or national.
- Convene the Hospital/RHA Emergency Blood Management Committee to monitor and control utilization of the affected blood components.
- Implement pre-established communications plans.
- Adjust inventory levels of affected components to levels consistent with those previously determined appropriate for Red Phase.
- Request inventory from CBS based on Red Phase requirements. (See also [Section 6.4.](#))
- Defer/cancel all medical/surgical procedures requiring the affected components with the exception of emergency surgical procedures.
 - Emergency surgical procedures are those that need to be performed within 24 hours in order to prevent the patient’s death (or major morbidity such as paralysis).
- To the extent possible, defer haematopoietic stem cell transplantation and chemotherapy treatments and any other medical treatments requiring ongoing need for the affected blood components.
- For RBC transfusions, follow guidelines for Red Phase as outlined in [Table 1](#).
- For platelet transfusions, follow guidelines for Red Phase as outlined in [Table 2](#).
- For frozen plasma and cryoprecipitate transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of “alternatives” such as prothrombin complex concentrate and fibrinogen concentrate . Group A plasma may also be considered as an alternate to group AB if appropriate mitigation and monitoring can be put in place. (
- Refer all requests for the affected blood components that do not fulfill pre-determined acceptance criteria to the Blood Bank Medical Director or designate prior to issuing product.
- Implement the documentation process for release or non-release of blood components.
- Examples of documentation tools are available via various current provincial blood shortage plans in [Appendix B](#)

The Plan for Management of Shortages of Labile Blood Components

- Collect data on total blood inventory on a daily basis by blood group and component and report inventories (frequency determined by NEBMC) within the specified timeframe to CBS. Provide the data to the province and territories as necessary.
- Collect data on hospital utilization of blood as necessary.

6.4 Determination of the Allocation of Blood Components from CBS to Hospitals/RHA in Amber and Red Phases

The way in which decisions for the allocation of blood components from CBS to hospitals/RHA in Amber or Red Phase will be made cannot be determined definitely *a priori*. However the following 3 possible methods could be considered and, in an actual shortage situation, it may be that a combination of these 3 methods would be used.

- 1) The first and ideal scenario would be that, in Green Phase, every hospital/RHA would optimize its blood use according to the Green Phase recommended activities and would have predetermined the amount of blood required to support the restricted activities permitted in Amber and Red Phases. In that ideal scenario CBS would then issue to each hospital/RHA the amount of blood requested and these amounts would correspond to the restricted Amber or Red Phase activities. This Plan recommends that hospitals/RHA served by CBS begin to strive now to reach this goal.

However, in practice, all hospitals/RHA may not have completed this work at the time of a blood shortage. In that case, actual blood component allocations during times of severe shortage will be determined by CBS in consultation with the NEBMC and where appropriate (e.g. in the case of a regional disaster) selected P/TEBMC, using either one or a combination of the following methods.

- 2) Blood component issues from CBS could be determined using the percentage of blood normally going to each province - if the whole country was equally affected by the situation then the percentages would be what they currently are; if provinces were not affected equally by the underlying situation then it could be decided that blood allocation would not be the same as under normal conditions. However this method has the potential disadvantage of making equal cuts to provinces whose hospitals/RHA have strived to optimize blood use in Green Phase as those that have not made any such efforts; this would have to be taken into account as far as possible.
- 3) Blood component issues from CBS could be decreased to an equivalent number of units per capita in all provinces. This method of allocation would have to be adjusted to consider the number of emergency procedures likely to be performed in more populous provinces versus those with smaller populations and less intensive medical or surgical procedures. However it would have the advantage of not further penalizing provinces where extensive efforts had been made to optimize blood utilization.
- 4) Blood component issues from CBS could be 'levelled' by the inventory index with NEBMC recommendations across the country. This method of allocation is most suitable when red cell demand is the most reliable indicator for monitoring and assessment of the blood system based on the best available disposition data and participation rates for

The Plan for Management of Shortages of Labile Blood Components reporting.

For either of the latter 2 scenarios, each province would direct CBS as to the precise distribution of components in its provinces (e.g. an equivalent decrease to all hospitals or relatively smaller or larger decreases to selected institutions such as hospitals in remote areas or hospitals performing relatively more emergency procedures who might receive relatively smaller decreases). Each hospital/RHA would determine the distribution of components to individual patients or categories of patients within its institution(s), while respecting the transfusion guidelines described above and presented in [Tables 1](#) and [2](#).

In any of the above scenarios it is unlikely that blood issues to hospitals in the territories would be decreased as these represent a small absolute number of blood components.

In addition, as described above, it will be important for each Ministry, in conjunction with CBS, to monitor the compliance of hospitals/RHA with the Plan and for the Ministry to intervene, if necessary, in situations where non-compliance is identified.

6.5 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 resumption of transfusion activities.

The Recovery Phase implies that blood inventory levels have begun to increase and are expected to be maintained at a level that would facilitate resumption of transfusion activities through a graded return from Red to Amber and subsequently to Green, or from Amber to Green Phase. However, the recovery of hospital transfusion activity and restoration of optimal inventories must be cautious and gradual to ensure that the overall blood inventory levels – or those of a particular blood product- do not cause return to shortage levels.

It is this phase that has the highest capacity for conflicting messaging and it is critical that all participants in the blood contingency plan act consistently and cautiously as recommended by the NEBMC. Even if the phase is upgraded to Green – this does not imply business as usual for front line operations. Many elective medical and surgical transfusions will be permitted to proceed but may be limited in terms of the number of procedures or units allotted per procedure. There is a significant chance that a rapid increase in demand of blood products as a response to the backlog of postponed transfusion related procedures will result in a return to the previous shortage stage or worse.

6.5.1 Canadian Blood Services

- Maintain continued contact with National, Provincial and Regional / Hospital EBMCs to facilitate restoration of internal activity.
- Maintain standard communications with consistent key messages at all levels/stages of the recovery – containing key messages recommended by the

The Plan for Management of Shortages of Labile Blood Components NEBMC.

- Slowly adjust inventory levels / fill rates of affected components to levels consistent with those previously determined as appropriate for effective recovery
- Slowly or partially replace emergency stocks to sites that had inventory redistributed
- Participate in debriefing activities within 4-6 weeks following the event to review and revise internal policies and procedures of CBS as well as the various National, Provincial and Hospital plans as a process of continued improvement

6.5.2. Provinces / Territories

- Maintain continued contact with National, Provincial and Regional / Hospital EBMCs to direct restoration of internal activity.
- Maintain standard communications with consistent key messages at all levels/stages of the recovery – containing key messages recommended by the NEBMC.
- Participate in debriefing activities within 4-6 weeks following the event to review and revise internal policies and procedures of CBS as well as the various National, Provincial and Hospital plans as a process of continued improvement

6.5.3 Hospitals/ RHAs

- Maintain continued contact with National, Provincial and Regional / Hospital EBMCs to direct restoration of internal activity.
- Maintain standard communications with consistent key messages at all levels/stages of the recovery – containing key messages recommended by the NEBMC.
- Slowly adjust inventory levels of affected components to levels consistent with those previously determined as appropriate for effective recovery.
- Slowly reinstitute medical /surgical procedures / transfusions on the basis of urgency on advice provided by the responsible EBMC
 - o It will be critical to review documentation of patients who did not previously meet criteria for release of blood products to determine those patients of higher urgency for transfusion
 - o Continue to refer all requests for affected blood components that do not meet predetermined criteria to the Transfusion Medicine medical director or designate before issue of product
 - o Continue to document the release or non-release of blood products
- Slowly or partially replace emergency stocks to sites that had inventory redistributed
- Provide daily inventory numbers to CBS/responsible party
- Participate in debriefing activities within 4-6 weeks following the event to review and revise internal policies and procedures of CBS as well as the various National, Provincial and Hospital plans as a process of continued improvement

The Plan for Management of Shortages of Labile Blood Components

During or shortly after the recovery phase, it is also critical to debrief, review and revise the various The Plan, as well as Regional, Provincial and Hospital plans as a process of

continued improvement. There should be ongoing implementation of improved utilization

of blood component strategies that have resulted as part of the blood shortage to help prevent future shortages.

Table 1: Guideline for the use of RBC transfusions in children and adults in shortage situations

Green Phase	Amber Phase	Red Phase
Major Hemorrhage	Major Hemorrhage	Major Hemorrhage
Follow your hospital/RHA guidelines	Follow your hospital/RHA guidelines	Follow your hospital/RHA guidelines Follow triage/emergency framework if instructed by NEBMC ¹
Surgery/Obstetrics	Surgery/Obstetrics	Surgery/Obstetrics
Follow your hospital/RHA guidelines	Urgent ² and emergency ³ surgery in consultation with H/RBEMC. Peri/post partum hemorrhage. Consider use of alternatives to minimize red cell requirements. The minimal number of units to stabilize patient should be used.	Emergency situations in consultation with H/RBEMC Follow triage/emergency framework if instructed by NEBMC ¹
Non-Surgical Anemias ⁴	Non-Surgical Anemias ⁴	Non-Surgical Anemias ⁴
Follow your hospital/RHA guidelines	All requests for RBC transfusion in patients with a Hb level > 70 g/L must be reviewed by designated medical personnel. For patients with hypoproliferative anemias, single unit transfusion should be provided if alternatives to red cells are unsuccessful and significant symptoms associated with anemia are present. Reassessment of severity of symptoms after each unit is required.	All requests for RBC transfusion in patients with a Hb level > 60 g/L must be reviewed by designated medical personnel. For patients with hypoproliferative anemias, single unit transfusion should be provided if alternatives to red cells are unsuccessful and significant symptoms associated with anemia are present. Reassessment of severity of symptoms after each unit is required.

¹ These guidelines are available on www.nacblood.ca

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

⁴ Includes anemia following bone marrow failure, trauma, surgery and delivery

Notes

- 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.
- In Red or Amber phases, the hospital/RHA 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.

Table 2: Guideline for the use of platelet transfusions in children and adults in shortage situations

Green Phase	Amber Phase	Red Phase
Major Hemorrhage Immune thrombocytopenia and life- or limb-threatening bleeding maintain PC $>10 \times 10^9/L$. For head trauma or CNS bleeding maintain a PC $>100 \times 10^9/L$ Other significant bleeding, or acute promyelocytic leukemia at acute presentation, maintain a PC $>50 \times 10^9/L$.	Major Hemorrhage For head trauma or CNS bleeding maintain a PC $> 80 \times 10^9/L$. Withhold routine platelet issue in massive hemorrhage packs in the absence of a confirmed indication for platelet transfusion (ex. platelet dysfunction, PC $<50 \times 10^9/L$)"	Major Hemorrhage Same as Amber phase
Invasive procedures/ surgery For non-surgical invasive procedures maintain a PC $>20 \times 10^9/L$ (central venous catheter insertion, paracentesis, thoracentesis) For lumbar maintain a PC $>50 \times 10^9/L$ For CNS surgery maintain a PC $>100 \times 10^9/L$	Invasive procedures/ surgery Urgent ² and emergency ³ surgery in consultation with H/RBEMC In presence of active bleeding or surgical procedure maintain a PC $> 50 \times 10^9/L$ or if CNS trauma/surgery a PC $> 80 \times 10^9/L$ For non-surgical invasive procedures (other than bone marrow aspiration or biopsy) maintain a PC $> 10 \times 10^9/L$ with image guidance.	Invasive procedures/ surgery Emergency surgery in consultation with H/RBEMC All requests for platelet transfusion must be reviewed by designated medical personnel
Bone marrow failure/ stem cell transplantation/ chemotherapy Adhere to a maximum threshold PC of $10 \times 10^9/L$ for prophylactic platelet transfusions.	Bone marrow failure/ stem cell transplantation/ chemotherapy Adhere to a maximum threshold PC of $10 \times 10^9/L$ for prophylactic transfusions; consider lowering this threshold to $5 \times 10^9/L$. 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 $>10 \times 10^9/L$ must be reviewed by designated medical personnel.	Bone marrow failure/ stem cell transplantation/ chemotherapy Eliminate all prophylactic transfusions. All requests for platelet transfusions in non-bleeding patients must be reviewed by designated medical personnel

The Plan for Management of Shortages of Labile Blood Components

Notes

- PC = Platelet Count
- 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
- Follow the same guidelines for cancelling/performing surgery as described in Table 1
- Split doses of platelets (apheresis or buffy coat) should be considered if available. Health Canada advises that splitting doses of platelets is considered aliquoting and is not a processing activity which requires registration. Sample aliquoting procedures are available on the NAC website.
- Lower PC thresholds for platelet transfusions for surgical bleeding or special procedures (such as ECMO) should be used.
- In Red or Amber phases, the hospital/RHA 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.

APPENDICES – Hyperlinks and some appendices under revision

Appendix A	<u>Approval and Revision History</u>
Appendix B	<u>Provincial / Territorial Blood Shortages Plans</u>
Appendix C	<u>Blood Contingency Activation Pathways</u>
Appendix D	<u>Ethical Considerations in Management of Blood Shortages</u>
Appendix E	<u>Communications Plan - under revision</u>
Appendix F	<u>The National Emergency Blood Management Committee Job Aid</u>
Appendix G	<u>Triage Tools</u>
Appendix H	NEBMC Communication tools – under revision
Appendix I	Patient / Family Communication tool

APPENDIX A: Approval and Revision History

Version 2020

Changes to the body of the text which include but are not limited to:

- a. Insertion of caveat on the title page about revision due to pandemic.
- b. Change in CBS logo on front page.
- c. Table of contents – indication that appendix E and H are being revised so are not included. Previous Appendix H CBS Business Continuity Plan removed and replaced with new Appendix H NEBMC communication tools. Appendix J Patient/Family communication tool renamed Appendix I.
- d. Correction of links to blood shortage documents wherever possible.
- e. Changes to the Core NEBMC/NEBMC to indicate that it is co-chaired between the Chair of NAC and the CBS VP Medical Affairs and Innovation. Addition of CBS Director of Governmental affairs as a Core NEBMC member. Clarification that the NEBMC secretariat is provided by the office of CBS's VP Medical Affairs and Innovation.
- f. Changes throughout document to reflect new positions/ titles of CBS representatives
- g. Removal of component tables with number of units that correspond to each phase with indication that regularly updated information is available on the CBS and NAC websites. No percentage indications provided for cryoprecipitate but correlates to AB plasma and discussion regarding impact of conversion to Fib Concentrates.
- h. Changes to indicate 7 day storage of platelets.
- i. Clarification that the table in 3.1.6 reflects only hospital inventory.
- j. Within section 3.2 – further emphasis on the need to provide delegates, removal of references to CBS Business Continuity plan
- k. Within section 6.1.2 – removed reference of year to the CSA Blood And Blood Components Z902 standard.
- l. Added PCC, fibrinogen concentrate and group A plasma as considerations in both Amber and Red Phase for frozen plasma and cryoprecipitate considerations.
- m. Table 1 – clarified naming of triage document, included earlier consideration of alternatives, and clarified that non-surgical anemia included bone marrow failure.
- n. Table 2 – included considerations regarding provision of platelets with MHP packs in Amber phase.
- o. Appendix F – updated to be consistent with full plan document.

Version 2017

General changes to the body which include but are not limited to:

- a. Wordsmithing to improve clarity and style
- b. Minor editorial changes
- c. Section 3.1.5 addition of tables to provide clarity on the CBS Days on Hand and approximate number of units or percentages associated with each phase of activation for all components
- d. Section 3.1.6 insertion of table demonstrating hospital only inventory indices and association with each phase of activation
- e. Core NEBMC - clarification on membership and communication responsibilities of the Core NEBMC, NEBMC secretariat and the full NEBMC,
- f. Addition of Appendix I – NEBMC Communication Templates
- g. Addition of Appendix J – Patient/Family communication Tool

Version 2015

General changes to the body which include but not limited to:

- a. Wordsmithing to improve clarity and style.
- b. Minor editorial changes.
- c. Committees (Section 4)- Clarity provided on top down and bottom up activations. Clarity on the role of the local and national emergency blood management committees and the collaborative nature of their work. Inclusion of 'local or national' for direction on the activation of P/TEBMC appropriate for Amber or Red Phase.
- d. Committees (Section 4)- Updates to titles/designations.
- e. Inventory Phases-Inclusion of Green Phase Advisory- Implies that CBS inventory levels are low with respect to a particular blood component and that all hospitals need to determine their inventories and the likelihood of

The Plan for Management of Shortages of Labile Blood Components

crossing into Amber or Red Phase.

f. Changed the term 'alert' to 'advisory' for the terminology used in all communications.

g. General Inventory- Major changes to section 3.1 on the phases of inventory availability including:

- Revised section 3.1 narrative to include the concept of Inventory Indices and reporting of daily inventories.
- Included a new table in 3.1.1 to provide visualization of data for Normal Green Phase versus Green Phase Advisory.
- Tables in 3.1.5- All except platelets- Addition of numbers of units translating to DOH broken down by blood group; Included updated units provided by CBS.
- Tables in 3.1.5- Plasma- Further broken down by AB and non-AB. Included updated units provided by CBS.
- Table in 3.1.6- Provided examples of Inventory Indices and corresponding Phases using hospital data.
- Re-worded 'TOTAL' inventory in 3.1.6 relative to the wording in 3.1.5.
- Major revision to 3.1.7- Included the concept of 'levelling' of inventory indices in times of blood shortages based on the inventory indices and ADRD; Included 'red line' inventory in rural sites.

h. Specific Participant Actions (Section 6)- Updated participant actions through all the phases to include the development of:

- ADRD, Inventory Indices and minimal inventory calculations.
- Processes for daily reporting of inventory levels.
- Inclusion of 'best practices' into the 'level' indices.
- Enhanced communication.
- Risk management assessments for 'holding' facilities.

i. Provinces/Territories and Hospitals/RHA- Participant Actions (6.1.2 and 6.1.3)- The issue of 'Hub' hospitals was not included in this version of the Plan to avoid delays in the distribution of the document. It may be considered a provincial operational issue. It will be included in the next version of the document.

j. CBS (6.2.1)- Included the provision of provincial ADRD and Inventory Indices to the actions of CBS.

k. Recovery Phase (Section 6.5)- Included a debriefing timeframe of '4-6 weeks following the event' into the actions of CBS, PTs and Hospitals/RHA.

l. Recommendation from the Blood Shortages Working Group, Inventory Planning Sub-Group (Section 3.1.6)- Total Inventory Levels- There were 2 recommendations included:

- Hospitals should conduct inventory submission exercises on a quarterly basis-April, July, October and December.
- A rolling twelve (12) month disposition reporting period will be used to calculate ADRD. These exercises will aid to further refine the inventory indices corresponding to phases of inventory availability.

m. Guidelines for Inventory Utilization/ Criteria- Updated Tables 1 and 2 as follows:

- Table 1- Guidelines for Red Cells- Updated with the best-available clinical guidelines in amber and red phases for surgery/obstetrics and non-surgical anemias.
- Table 2- Guidelines for Platelets- Updated with feedback from Ontario and the best-available clinical guidelines for major hemorrhage, invasive procedures/surgery and bone marrow failure/stem cell transplant/chemotherapy.

n. Platelets-Splitting- Table 2- Notes- Updated to include guidance from Health Canada that splitting of platelets is aliquotting and is not a registered activity. Feedback noted no need for an appendix on splitting of platelets.

o. Included the word 'National' in the title.

p. Standardized Communication Templates (Annex 1, 2 and 3)- Updated the standardized communication templates from the NEBMC to Hospitals during the phases of inventory availability.

q. Updated the revision history for 2015.

r. Job Aid- Updated to capture the changes in the parent document.

s. Appendix H- Business Continuity Management Policy- Updated the roles and responsibilities according to recent information from CBS.

The Plan for Management of Shortages of Labile Blood Components

Version 2014-12-18

Routine review/revisions General changes to the body which include but not limited to:

- a. Wordsmithing to improve clarity/style,
- b. Enhancements to the operational performance ,
- c. Updating of roles /titles
- d. Minor editorial changes.
- e. Removed the word “National” from the title as misleading
- f. Clarified the process must work not just top down but bottom up. Hospital and provincial emergency blood management plans have to realize that they can move a provincial/regional shortage up the scale by notify the NEBMC through their representatives on the NEBMC. Examples of Provincial Activation Pathways added to the Plan
- g. Purpose and Scope clarified – process for convening the NEBMC is fluid and can move in many directions
- h. Lessons learned post Nov 14, 2013 simulation/validation exercise incorporated:

- i. **Hold 2 regular teleconferences per year**

1. First call to review the Plan for currency
 2. Second call to increase awareness

- ii. **Revised Triage Tools –**

1. Patient Record
 2. Triage Tracking Log

- iii. **Job Aid Created**

A “job aid” was developed by the BSWG to support the NEBMC during an actual blood shortage. This aid summarizes the mandate of the NEBMC, describes the shortage phases/their implications for transfusion, and provides a high-level summary of how communications should unfold once the NEBMC reached decisions.

- i. History of Blood Shortages in Canada updated by CBS to reflect a period from 2011 to 2014.
 - j. Improved CBS Inventory Levels at Green, Amber and Red Phases. This data along with the provision for Hospitals to enter inventory levels into the Inventory Level webpage within the CBS Blood Component and Product Disposition system will enable assessment of TOTAL blood product inventories (blood supplier and hospital combined) across the country in near to real time criteria.
 - k. Added context around Green Advisory and convening NEBMC to balance inventory etc.
 - l. Clarity of CBS’ relationship with Héma-Québec
 - m. NEBMC Titles updated to reflect CBS’ internal role & responsibly changes
 - n. Members of the NEBMC are now responsible for naming a designate in the event that he/she is unavailable
 - o. NEBMC Mandate updated: to reflect to task the Blood Shortage WG to review and report upon the implementation of the Plan and subsequent outcomes after each simulation exercise and live activation for ongoing refinement and improvements to the Plan.
 - p. Added duties for the Secretariat
 - q. Removed the link to the CBS’ Business continuity as these plans are only posted internally at CBS and there are many (for various reasons and locations) which change frequently. Added CBS business continuity policy in 3.2.1.
 - r. Noted a large recall situation could potentially lead to a shortage situation

Appendices

New Appendices

APPENDIX C: Blood Contingency Plan Activation Pathways

APPENDIX F: The National Emergency Blood Management Committee Job Aide

APPENDIX G: Triage Tools

APPENDIX H: POL006 CBS Business Continuity Policy

Archived Appendices

APPENDIX C: CBS Business Continuity Plans replaced with Blood Contingency Plan Activation Pathway. Business Continuity Policy embedded in Section 3.2.1 - CBS

APPENDIX F: The National Emergency Blood Management Committee Terms of References removed as redundant information and replaced with The National Emergency Blood Management Committee Job Aide

The Plan for Management of Shortages of Labile Blood Components

APPENDIX G: Guidelines for the Optimal use of Blood Components was removed as links no longer worked, info not current, etc., and replaced with Triage Tools

Version 2012-01-18

Version change

General changes to the body to improve clarity, and to reflect current processes, roles and titles. Included but not limited to:

Additions:

The Plan recommends a proactive approach to inventory management through various Green Phase activities added.

The CBS inventory levels are set based on an analysis of recent daily demand levels at the blood type level for each of the CBS sites that issue products to hospitals. These estimates are then adjusted to compensate for expected increase in product demand for the upcoming usage period. It is however acknowledged that over 50% of the blood that may be available for patient use will be held in hospital inventories and may not be reflected in the criteria established within The Plan. A subcommittee has been struck to improve transparency between hospitals and the blood supplier to enable real time assessment of TOTAL blood product inventories (blood supplier and hospital combined) across the country. Once this data is available, the inventory criteria around the phases will be readjusted.

Red Cell Inventory, CBS # Units on Hand, Green Phase – '> 8,900 units', revised to: '>9,280 units'. Amber Phase – '6,000 to 8,899', revised to: '6,172 to 9,279'. Red Phase – '< 5,999', revised to: '<6,172).

Frozen Plasma Inventory, CBS # Units on Hand, Green Phase – '8,900 units', revised to: '8,098 units'. Amber Phase – '2,700 – 8,899 units', revised to: '2,429 – 8,097 units'. Red Phase – '< 2,699 units', revised to: '2,428 units'.

Cryoprecipitate Inventory, CBS # Units on Hand, Green Phase – '2,800', revised to: '3,580'. Amber Phase – '800 – 2,799 units', revised to: '1,074 to 3,579 units'. Red Phase – '<799 units', revised to: '<1,074 units'.

Blood conservation strategies should be implemented at the hospital/ RHA level as a means to mitigate a more serious blood component inventory situation. Blood conservation strategies should include any or all of the following: erythropoiesis-stimulating agents, thrombomimetics, intravenous/oral iron, antifibrinolytics, intraoperative cell salvage, interventional radiologic procedures, autologous blood donation for elective surgical procedures, rapid access to endoscopy, and non-invasive surgeries.

Provide recommendations as to whether or not to implement triage and rationing guidelines for massively bleeding patients in mid-2012 circulation.

Prior to the convening of the entire NEBMC, a small group may discuss the inventory situation and bring forward a number of strategies and next steps for consideration and discussion by the NEBMC, should it be determined that the NEBMC be convened. The members of this small group will include:

- CBS Chief Operating Officer
- NAC Chair
- CBS Vice President, Medical, Scientific and Research Affairs
- NAC BSWG Chair'

Appendices

Removed and Archived:

Appendix A – 'National Advisory Committee on Blood and Blood Products membership and Terms of Reference'

The Plan for Management of Shortages of Labile Blood Components

Appendix B – ‘Stakeholder Consultation in the Development of the National Plan for the Management of Shortages of Labile Blood Components’

Appendix E – ‘Other Blood Shortages Planning Documents’

Appendix H – ‘Documentation Toolkit -Documentation Toolkit has been provided as examples of forms that may or may not be adapted by hospital or regional health authorities for use during a blood shortage.’, removed_

Revised:

Appendix F - New bullet added: ‘provide recommendations as to whether or not to implement triage and rationing guidelines for massively bleeding patients in a Red phase;’

Added:

Appendix A – Approval and Revision History

Appendix B – Provincial / Territorial Blood Shortages Links to provincial blood contingency plans that have examples of forms that may be adapted by hospital or regional health authorities for use during a blood shortage.’

Appendix E – Section 5.0 on Communications removed and replaced with a Communications Plan. The communications plan (Appendix E) proposes a framework to achieve the best collaboration, allowing all parties to provide timely, accurate and credible information to various internal and external stakeholders for the purposes of operational and informational communication.’ ‘Effective and timely communication is critical in attempts to mitigate a national blood shortage, while in a shortage situation and afterwards during recovery efforts. The principal organizations involved in managing a blood shortage are Canadian Blood Services (CBS), the Provincial / Territorial (P/Ts) Ministries of Health and Regional Health Authorities (RHAs)/hospitals. Each organization is independent, and has its own communications infrastructure, procedures and complexities. However, a common course of action is required by these partners, however different they may be, to promote alignment, consistency and collaboration during a crisis or potential crisis.

Version 2009-09-28

In January 2007, Canadian Blood Services approached the CBS P/T BLC with a request that a coordinated plan be developed to address the allocation of available blood components to Canadian hospitals (and ultimately Canadian patients) served by CBS in times of extreme shortage. The CBS P/T BLC endorsed this request and asked the NAC to provide the leadership for the development of a National Plan for Management of Blood Shortages that would:

- identify important ethical principles to be applied when faced with blood shortages;
- provide recommendations for the integration, in times of significant blood shortages, of the activities of institutions/organizations involved in blood collection, distribution and use;
- provide recommendations for the distribution and utilization management of blood components in times of significant blood shortages;
- outline roles and responsibilities of CBS, provincial/territorial authorities and hospitals/regional health authorities (RHA) with respect to the allocation of scarce blood components in times of shortage and to the preparation required to be ready to effectively manage such shortages;
- provide reference materials for hospitals/RHA to facilitate their development of plans to manage blood shortages;
- review and update the Plan at least every 5 years, or more often if necessary, and after each instance in which the Plan is used.

NAC in turn convened the National Advisory Committee Blood Shortage Working Group (NAC-BSWG) and tasked it with the development of the Plan. A final Draft Plan was prepared and disseminated for stakeholder comment in the fall of 2008.

Version 2009-09-28 was endorsed by the National Advisory Committee on Blood and Blood Products, Canadian Blood Services, and the Provincial/Territorial Ministries of Health in jurisdictions served by CBS.

APPENDIX B

Provincial / Territorial Blood Shortages Plans

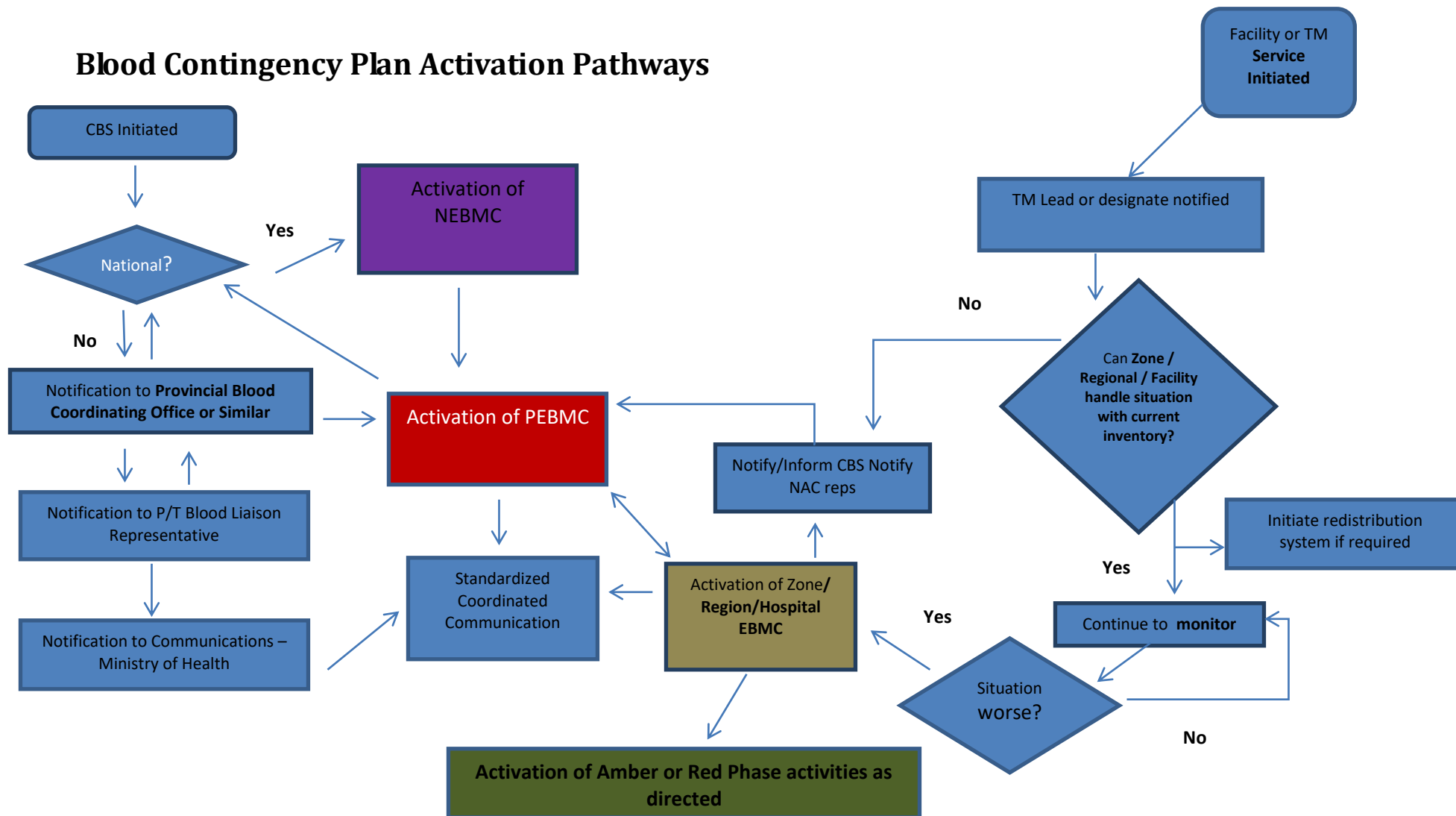
British Columbia	http://www.pbco.ca/images/Contingency/um.cont.0001_bcbloodcontingencyplan.pdf
Alberta	https://www.alberta.ca/blood-coordinating-program.aspx
Saskatchewan	http://saskblood.ca/resources/blood-shortage-plan/
Ontario	http://www.health.gov.on.ca/en/pro/programs/emb/plan_blood_shortages/ http://www.health.gov.on.ca/en/pro/programs/emb/plan_blood_shortages/docs/plan_blood_shortages.pdf
Newfoundland and Labrador	http://www.health.gov.nl.ca/health/bloodservices/pdf/emergency_blood_management_plan.pdf

The Plan for Management of Shortages of Labile Blood Components

APPENDIX C EXAMPLE ONLY

Adapted from Alberta Blood Contingency Plan – September 2014 version

Blood Contingency Plan Activation Pathways

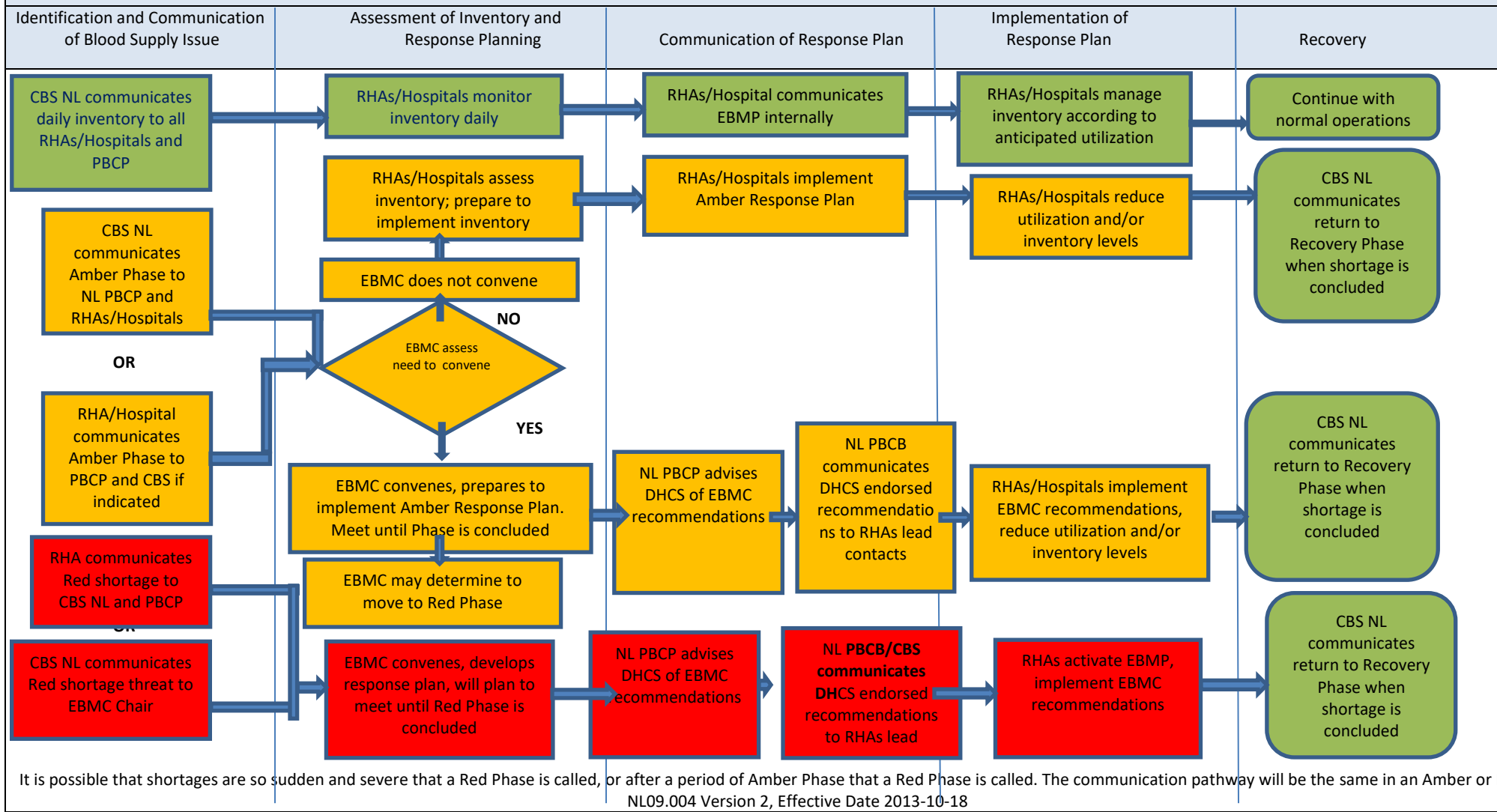


The Plan for Management of Shortages of Labile Blood Components

The Plan for Management of Shortages of Labile Blood Components

APPENDIX C - Example Only

Adapted from Newfoundland and Labrador Emergency Blood Management Plan (EBMP)



APPENDIX D:

Ethical Considerations in Management of Blood Shortages

Rationale

During blood shortages, difficult decisions will need to be made on how to ration blood products. A fair and transparent priority-setting process (rationing) based on shared ethical values must be developed.

Why?

- To ensure acceptance and cooperation, need to make the values behind decisions public
- Decisions based on shared ethical values will carry greater trust, legitimacy and authority
- World Health Organization (WHO) requires emergency planners to address ethical issues and to use an ethical framework for emergency preparedness planning

Who?

- Emergency planners involved in the development of plan for management of blood shortages, i.e. Canadian Blood Services, hospital representatives, representatives of the provincial and territorial governments, national and regional liaison groups, patient groups and members of general public.

How?

- Emergency planners will convene a public consultation with various stakeholders including provincial blood coordinating offices, regional health authorities, hospitals, patient representatives and public at large. Public consultation is necessary to confirm that the current plan is based on ethical values shared by members of society.

Tools for development of an ethical framework

The document *Stand on Guard for Thee* was published in the aftermath of Severe acute respiratory syndrome (SARS) epidemic in Toronto. The purpose of the document was to provide emergency planners with essential tools to create an ethical framework on which emergency preparedness plans may be based.

The document identifies ten **substantive values** to guide ethical decision-making. A few of these values are of particular relevance for the plan involving management of blood shortages.

1 *Equity*

It is paramount to maintain equity in crisis situations. During a shortage, a finite pool of available blood products will be distributed in a fair manner to those who have the greatest need and greatest opportunity to benefit from them. Similar cases will be treated similarly to allow for a fair distribution of benefits and burdens.

2 *Solidarity*

Blood shortage calls for collaborative approaches that set aside traditional values of self-interest or territoriality among provinces, hospitals or health care professionals.

3 *Trust*

Decision-makers must maintain stakeholders trust while implementing control measures during an evolving crisis.

4 *Stewardship*

Those entrusted with governance roles should be guided by the notion of stewardship: trust, ethical behavior, and good decision-making. Decisions regarding resources should strive to achieve best patient health and public health outcomes under shortage situation.

Five **procedural values** were also identified.

1. **Reasonable** – decisions must be made by credible and accountable people and based on reasons that stakeholders agree are relevant to meeting health needs in crisis
2. **Open and transparent** – decision-making process must be open to scrutiny
3. **Inclusive** - stakeholders should be engaged in the decision-making process. Decisions should be made with stakeholders' views/beliefs

The Plan for Management of Shortages of Labile Blood Components

in mind

4. **Responsive** – there should be opportunities to revisit and revise decisions as well as the mechanisms to address any disputes and complaints.
5. **Accountable** – there should be a mechanism in place to ensure that decision makers are answerable for their actions and inactions

During a shortage, allocation of scarce blood products should be guided by the above values. When available resources are exceeded, the focus will shift from doing the best for the individual patient to the public health goal of doing the greatest good for the greatest number while balancing obligations to individuals and individual needs. Depending on the severity of the shortage, this may include suspension of prophylactic transfusions and elective procedures requiring blood products to allow provision of emergency treatments. This may also involve cessation of transfusion support in terminal or moribund patients. Whatever maybe the case, an attempt should be made to provide a consistent level of care across all affected regions.

A fair and transparent priority-setting process (rationing or resource allocation) must be developed. Decision-makers should

- engage stakeholders in determining what criteria should be used to make resource allocation decisions
- demonstrate how these decisions are defensible in light of the priority setting criteria and available information
- ensure that clear rationales for allocation decisions are publicly accessible
- provide justification for any deviation from the pre-determined criteria
- ensure that there exist formal mechanisms for stakeholders to bring forward any new information, to appeal or raise concerns about particular decisions and to resolve disputes
- evaluate the process to assess its adequacy and impact on all involved parties

On a national level, a single blood shortage contingency plan will be developed. The plan will be developed by representatives of blood suppliers, governing structures, and hospitals. Members of broader public and professional and patient interest societies will be solicited for input. This plan will identify the key players, define phases of shortage and specify actions that are to occur in each phase. To ensure the success of the plan, each province/territory and each hospital must review and endorse the plan.

Uniform guidelines of transfusion practice should be developed and adhered to. Presence of guidelines will reduce the potential for each physician to have to design and defend individual strategies for individual cases and will ensure consistency in practice. Ideally guidelines should be implemented on a national basis with government providing policy support for implementation. Appropriate liability protections for providers and institutions must be assured. The guidelines should be based on existing evidence and include indications for receiving a scarce

The Plan for Management of Shortages of Labile Blood Components

blood product and a prioritization tool. Transfusion guidelines should also include exclusion and/or stopping criteria to limit utilization of scarce resources in patients deemed unsalvageable. Whenever possible, inclusion and exclusion criteria should be based on objective information. Criteria should be implemented in a tiered fashion, so that as resources are exhausted, another tier of exclusion criteria is implemented. Guidelines should be published and widely disseminated amongst all stakeholders.

A multidisciplinary triage committee should be set up in each institution to assist with decision-making re: blood rationing on a case by case basis. The existence of such committee will ensure that all departments/services are treated fairly and that decision-making process is transparent. Proceedings of this committee will be recorded to allow for a retrospective review of the process for adequacy and efficacy.

Further Reading [Ethics]

1. Stand on guard for thee. A report of the University of Toronto Joint Centre for Bioethics Pandemic Influenza Working Group. November 2005
2. Pandemic triage: the ethical challenge. Melnychuk, RM and Kenny, NP. CMAJ 2006; 175(11): 1393-1394.
3. Lo, B. and Katz, MH. Clinical decision making during public health emergencies: Ethical considerations. Annals of Internal Medicine 2005; 143: 493-498.
4. Markkula center for applied ethics. A framework for thinking ethically. Accessed on May 28, 2007. <http://www.scu.edu/ethics/practising/decision/framework.html>.
5. Ontario Health Plan for an Influenza Pandemic. September 2006.
6. The Canadian Pandemic Influenza Plan for the Health Sector.
7. Ethical issues in transfusion medicine. Macpherson, CR, Domen, RE and Perlin, T. eds. AABB Press 2001.
8. Hick, JL and O’Laughlin, DT. Concept of operations for triage of mechanical ventilation in an epidemic. *Academic Emergency Medicine* 2006, 13: 223-229.
9. Koenig, KL, Cone, DC, Burstein, JL, and Camargo, CA. Surging to the right standard of care. *Academic Emergency Medicine* 2006, 13: 195-198.

APPENDIX E:
Communications Plan – under revision

1.

The Plan for Management of Shortages of Labile Blood Components

The Plan for Management of Shortages of Labile Blood Components

Annex 1 – National Inventory Shortage Advisory Template



National Advisory Committee
on Blood and Blood Products

Comité consultatif national sur
le sang et les produits sanguins



URGENT: IMMEDIATE ACTION REQUIRED

To: ALL HOSPITAL SITES
From: National Emergency Blood Management Committee*
Subject: <appropriate colour> PHASE ADVISORY

National Inventory SHORTAGE Advisory

Date and time of issue	<Date and Time (EDT)>
Inventory Availability Phase	<appropriate colour or recovery> PHASE
Product(s)	<product type, ABO and Rh as required>
Description	<p><Include the following in this section:</p> <ul style="list-style-type: none"> • what has contributed/caused this shortage • what corrective actions are being taken • how long the shortage is expected to last>
Impact on hospitals	<p><In this section provide direction for hospitals></p> <p><for advisory activation> Follow directives in the <<insert phase here>> section of The National / Provincial / RHA or Hospital blood shortage plan.</p> <p>Action required: All hospitals are to provide inventory levels by Noon EDT <<indicate frequency here>>. Hospital inventory is to be reported via the Blood Component and Product Disposition system: https://www.blood.ca/en/hospitals/blood-component-and-product-disposition-system For hospital customers within the provinces of British Columbia and Manitoba, please follow your local approved processes for sharing inventory data with Canadian Blood Services.</p> <p><for recovery> Action required: Hospitals are still encouraged to provide inventory levels on a regular basis to Canadian Blood Services/ responsible party per routine process.</p>
For more information	<p>For additional info, contact:</p> <ol style="list-style-type: none"> 1. Your Hospital Liaison Specialist, Canadian Blood Services 2. Your representative to the Provincial Emergency Blood Management Committee 3. Your representative to your Hospital Emergency Blood Management Committee

*The National Emergency Blood Management Committee 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>

If you require this advisory in an accessible format, please contact your local Canadian Blood Services Hospital Liaison Specialist

APPENDIX F: JOB AID

Note: The specific purpose of ‘The Plan’ is to maximize the effectiveness of a response to any crisis which impacts the adequacy of the blood supply in Canada. This Job Aid outlined below is a quick resource of information providing guidance on different strategies. Refer to ‘The Plan’ for detailed specifics.

1.0 NEBMC Mandate

The National Emergency Blood Management Committee (NEBMC) will develop recommendations and provide advice to the P/T Ministries of Health, hospitals/RHA and CBS to support a consistent and coordinated response to critical blood shortages in Canada.

2.0 Shortage Phases and Potential Implications for Transfusions

NOTE: For more detailed information:

- For RBC transfusions, follow guidelines for relevant phase declared as outlined in [Table 1](#) of the ‘Plan’.
- For platelet transfusions, follow guidelines for relevant phase declared as outlined in [Table 2](#) of the ‘Plan’.
- For frozen plasma and cryoprecipitate transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of “alternatives” such as prothrombin complex concentrate and fibrinogen concentrate . Group A plasma may also be considered as an alternate to group AB if appropriate mitigation and monitoring can be put in place.. (The decrease in elective procedures should also help lead to a decrease in the use of these components.)

Green Phase

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 Canadian Blood Services and hospital/Regional Health Authorities (RHA) actions.

- During the Green Phase there should be no interruption of transfusion services. Actions should be focused on ensuring understanding of/development of Blood Shortages Plan(s) and that blood components are used safely and appropriately.
- During a Green Advisory Phase there could be brief situations where, while the overall inventory is in Green Phase, a particular blood type or component may be in limited supply and require CBS to issue an Advisory. Most of these situations will be brief, and CBS will communicate temporary inventory adjustments to hospitals through “business-as-usual” channels. Should the situation persist, there may be a requirement by CBS to issue a public media appeal to donors to donate.
- The green advisory state requires review of all hospital inventories to determine what the likelihood of crossing into Amber or Red phase would be. It would also be a warning for hospitals and provinces to look at any potential conservation strategies that could help avoid a shortage. Hospitals/RHA need to submit the inventory, by blood group and component within a specific timeframe to ensure that the NEBMC

The Plan for Management of Shortages of Labile Blood Components
can make an assessment of what the phase would be.

Amber Phase

Amber Phase implies that blood inventory levels are insufficient to continue with routine transfusion practice and hospitals/RHA will be required to implement specific measures to reduce blood usage.

- In collaboration with the NEBMC and P/TEBMCs, decrease blood component issues to hospitals to levels determined appropriate to the situation.
- Defer elective medical and surgical procedures which have a greater than 10% chance of requiring the affected blood components.
 - Elective procedures are considered to be all procedures which are not urgent or emergency procedures. Urgent procedures are those for which a patient is likely to have major morbidity if the procedure is not performed within the next one to 28 days. Emergency procedures are those that need to be performed within 24 hours in order to prevent the patient's death (or major morbidity such as paralysis).
- Report inventory (frequency determined by the NEBMC) by blood group and component within a specified timeframe to CBS.

Red Phase

Red phase implies that blood inventory levels are insufficient to ensure that patients with non-elective indications or need for transfusion will receive the required transfusion(s).

- In consultation with the NEBMC and P/TEBMCs, decrease blood component issues to hospitals to levels determined appropriate to the situation.
- Defer/cancel all medical/surgical procedures requiring the affected components with the exception of emergency surgical/medical procedures.
 - Emergency surgical procedures are those that need to be performed within 24 hours in order to prevent the patient's death (or major morbidity such as paralysis).
 - Emergency medical procedures are those in which a transfusion of the affected blood components would be required within 24 hours in order to prevent the patient's death (or major morbidity).
- Report inventory (frequency determined by the NEBMC) by blood group and component within a specified timeframe to CBS.
- NEBMC will make recommendations as to whether or not to implement triage and rationing guidelines for massively bleeding patients in a Red phase.

Recovery Phase

Recovery Phase implies that blood component inventories have begun to increase and are expected to be maintained at a level that would enable hospitals to move from Red to Amber and subsequently to the Green Phase, or from Amber to Green Phase.

- Recovery Phase implies that blood inventory levels have begun to increase and are expected to be maintained at a level that would facilitate resumption of transfusion activities through a graded return from Red to Amber and subsequently to Green, or

The Plan for Management of Shortages of Labile Blood Components
from Amber to Green Phase. However, the recovery of hospital transfusion activity and restoration of optimal inventories must be cautious and gradual to ensure that the

- overall blood inventory levels – or those of a particular blood product- do not cause return to shortage levels.
- Slowly adjust inventory levels of affected components to levels consistent with those previously determined as appropriate for effective recovery.
- *Slowly reinstitute medical /surgical procedures / transfusions on the basis of urgency*
- Conduct debriefing activities within 4-6 weeks following the event.

3.0 Convening of NEBMC and Communication Cascades

In situations of anticipated shortage, it is most likely that CBS would already, while still in a Green Phase, have communicated with hospitals and P/T Departments of Health about impending shortages prior to actually activating this communication network.

The activities of these various committees are meant to be collaborative but in the setting of local or regional shortages, there may not be activation of higher level committees such as the National Emergency Blood Management Committee. This does not preclude the activities of the Provincial or Hospital Committees from occurring to manage the local shortage situation.

Hospital/ P/TEBMC /RHA must be aware that they too can move a provincial/regional shortage up the scale and can notify the NEBMC through their representatives on the NEBMC. In other words the plan is to work not just top down (CBS to NEBMC Regional Health Authorities-RHAs) but bottom up (Hospitals/RHAs to PT Rep to NEBMC).

Two representatives' of the National/Provincial Emergency Blood Management Committee are the PT representative and the provincial NAC representatives. These representatives are responsible to ensure communications within their jurisdiction.

The Secretariat duties for NEBMC are the responsibility of CBS.

In advance of activating any part of the plan there may be consultation between CBS's VP Medical Affairs and Innovation or CBS's Chief Supply Chain Officer/ VP Donor Relations and the chair of the NAC. The Core NEBMC may also meet to discuss a situation prior to convening the entire NEBMC. Updates and information sharing that does **NOT** require a decision by the NEBMC will be distributed to members by the NEBMC secretariat.

Green Phase Advisory - Potential Shortages could be brief situations where, while the overall inventory is in Green Phase, a particular blood type or component may be in limited supply and require CBS to issue a Green Advisory. Most of these situations will be brief, and CBS will communicate temporary inventory adjustments to hospitals through "business-as-usual" channels. Should the situation persist, CBS's VP Medical Affairs and Innovation or Chief Supply Chain Officer/VP Donor Relations will consult with CoreNEBMC to convene the NEBMC (within 24 – 48 hrs) to determine if there are any changes to hospital inventory management practice can assist with

The Plan for Management of Shortages of Labile Blood Components
and/or improve the situation internally.

- NAC Chair (NEBMC Co-Chair)
- CBS VP Medical Affairs and Innovation (NEBMC Co-Chair)
- CBS Chief Supply Chain Officer and VP Donor Relations
- NAC BSWG Chair
- Co-Chairs of the CBS-PTBLC (Lead Province Ministry of Health Official and Canadian Blood Services Director of Governmental Affairs)

CBS CSCO or VP Medical Affairs and Innovation advises NAC Chair
CBS produces Inventory Advisories for NEBMC
NEBMC Secretariat shares info with NEBMC members
CBS forwards messaging to its Stakeholders (P/T Liaison committee, hospitals, patient groups and donors)
The PT Rep of the NEBMC or Provincial NAC representative will share information with their respective PEBMC
PEBMC shares info with hospital/RHA EBMC (if applicable)

Amber Phase - As indicated in ‘The Plan’, a shortage situation is most likely to be identified by CBS, but it may also be identified by a region/health authority and escalated accordingly. In either case, contact with the NEBMC Chair would be required to convene a meeting of the NEBMC (usually within **24 hours**) to determine next steps. Meetings will be called weekly, at a minimum, during an Amber phase.

CBS produces Inventory Alerts/Key Messaging based upon agreed decisions at the NEBMC meeting.
NEBMC Secretariat shares info with NEBMC members
In parallel, key messaging will be distributed as follows:
<ul style="list-style-type: none"> • The PT Rep of the NEBMC, or Provincial NAC representative to provide information to their respective PEBMC • CBS to provide information to: <ul style="list-style-type: none"> • Key divisions and departments at CBS including Business Continuity infrastructure • Hospitals (inventory status only information as hospital actions will be communicated by the PEBMC) • The PEBMC to provide information to their respective Hospital/RHA EBMC who in turn would then evoke their internal communication plan/s.
Note: The PEBMC will have approximately 8 hours to disseminate information, after this time allotment, CBS will commence disseminating information to external stakeholders, donors, media as deemed appropriate.

Red phase - As indicated in ‘The Plan’, a shortage situation is most likely to be identified by CBS, but it may also be identified by a region/health authority and escalated accordingly. In either case, contact

The Plan for Management of Shortages of Labile Blood Components
 with the NEBMC Chair would be required to convene a meeting of the NEBMC (usually within **4 hours**) to determine next steps. Meetings will be called twice a week, at a minimum, during a Red phase.

CBS produces Inventory Alerts/Key Messaging based upon agreed decisions at the NEBMC meeting.
NEBMC Secretariat shares info with NEBMC members
In parallel, key messaging will be distributed as follows:
<ul style="list-style-type: none"> • The PT Rep of the NEBMC or Provincial NAC representative to provide information to their respective PEBMC
<ul style="list-style-type: none"> • CBS to provide information to:
<ul style="list-style-type: none"> <ul style="list-style-type: none"> • Key divisions and departments at CBS including Business Continuity infrastructure
<ul style="list-style-type: none"> <ul style="list-style-type: none"> • Hospitals (inventory status only information as hospital actions will be communicated by the PEBMC)
<ul style="list-style-type: none"> • The PEBMC to provide information to their respective Hospital/RHA EBMC who in turn would then evoke their internal communication plan/s. <p>Note: PEBMC will have approximately 8 hours to disseminate information, after this time allotment, CBS will commence disseminating information to external stakeholders, donors, media as deemed appropriate.</p>

APPENDIX G: Triage Tools – Patient Record **SAMPLE ONLY**

Massive Transfusion Record for Patient: Emergency Disposition of Blood during Red Phase Blood Shortage

Section A: To be completed by TMS Technologist		
Patient Initials/Tracking Number :	Hospital Number:	Patient location:
Reason for Massive hemorrhage:	Date of Triage :	Time of Triage:
Predicted to need >10 units in the next 24 hours <input type="checkbox"/> Yes <input type="checkbox"/> No (if no refer to standard tracking log)	Age: _____ Hemoglobin: _____ Platelet: _____ INR: _____ PTT: _____ Fibrinogen: _____	Blood Group: _____ pH: _____ Lactate: _____ Temp: _____
Has patient received product in the previous 24 h? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list products:	Product Requested	
Section B: Forward to TMS Director/Triage Team to complete		
Meets any exclusion criteria <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, which one(s)?	Date/Time of assessment:	SOFA score:
Meets any specific exclusion criteria <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, which one(s)?	Date/Time of assessment:	SOFA score:
Decision made to administer <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	Date/Time:	Number of units & products transfused:
Patient outcome at 24 hours:	Date/Time:	Re-assessment Decision:
Comments regarding patient/family completed by Triage Team:		
Triage Documentation completed by:	Signature:	
Triage Officer Name:	Signature:	
Follow-up:		
Patient Outcome at Discharge:	Patient Outcome at 6 months:	

APPENDIX G: Triage Tools - Triage Tracking Log SAMPLE ONLY

Triage Tracking Log – Emergency Disposition of Blood

Is Patient needing or predicted to need massive transfusion? ☐ Y ☐ N

If yes, go to “Massive Transfusion Record for Patient” If no, complete line below.

Date: _____ Facility: _____ Units Affected: _____

Is Patient needing or predicted to need massive transfusion? ☐ Y ☐ N If yes, go to “Massive Transfusion Record for Patient” If no, complete line below.

Patient Initials/Tracking Number	Patient MRN	Age	ABO /D	Ordering Physician	Indication Not Bleeding = NB Bleeding = B Unknown = U In the OR = O	Hgb /Plt	# of Components Ordered	# of Components Issued	
									Y

Comments: _____

Is Patient needing or predicted to need massive transfusion? ☐ Y ☐ N If yes, go to “Massive Transfusion Record for Patient” If no, complete line below.

Patient Initials/Tracking Number	Patient MRN	Age	ABO /D	Ordering Physician	Indication Not Bleeding = NB Bleeding = B Unknown = U In the OR = O	Hgb /Plt	# of Components Ordered	# of Components Issued	
									Y

Comments: _____

Is Patient needing or predicted to need massive transfusion? ☐ Y ☐ N If yes, go to “Massive Transfusion Record for Patient” If no, complete line below.

Patient Initials/Tracking Number	Patient MRN	Age	ABO /D	Ordering Physician	Indication Not Bleeding = NB Bleeding = B Unknown = U In the OR = O	Hgb /Plt	# of Components Ordered	# of Components Issued	
									Y

Comments: _____

APPENDIX I: Patient/Family Communication Tool

Patient / Family Notification of Blood Shortages

We, “enter name of province, health authority or hospital”, are currently experiencing a shortage of “enter name of blood component or product here”.

In the interest of patient safety, it is necessary to defer non-urgent medical transfusions and reschedule non-urgent surgical procedures.

We would like to assure you that Canadian Blood Services (CBS), as well as our hospital based transfusion service, are taking all possible actions to improve/ conserve the blood inventory. We sincerely apologize for any inconvenience this may cause and we appreciate your patience and understanding.

Once inventory levels have stabilized, your physician or their office will arrange rescheduling of your transfusion or your procedure, if still required. Should you have any questions regarding this notice, please discuss with your physician.

More information may also available on:

- enter name of province, health authority or hospital and your website (s)
- Canadian Blood Service www.blood.ca.