National Advisory Committee on Blood and Blood Products | Comité consultatif national sur le sang et les produits sanguins

The National Plan for Management of Shortages of Labile Blood Components

THE NATIONAL PLAN FOR MANAGEMENT OF SHORTAGES OF LABILE BLOOD COMPONENTS

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ABBREVIATIONS

BGTD	Biologics and Genetic Therapies Directorate
BSS	Blood Shortages Subcommittee
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-BSS	National Advisory Committee Blood Shortages Subcommittee
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 administrating 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 original NAC-Blood Shortage Subcommittee (originally the NAC Blood Shortages Working Group (BSWG)) (NAC-BSS), 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.

Causes of Blood Contingencies*

Event	Potential for Demand Surge	Potential for Decreased Supply
Natural disasters: e.g., hurricane (tropical cyclone), severe windstorm (tornado), winter storm, wildfire, earthquake, flood, tsunami	✓	✓
Man-made hazards: e.g., industrial accident (fire, building collapse, hazardous material spill), chemical event, biological event, radiological event, nuclear event, explosive event	✓	✓
Pandemic outbreak	Unlikely	✓
Wide-area power outage		✓
Workplace violence	✓	✓ (if at CBS or hospital)
Mass casualty/multiple trauma	✓	
Massive transfusion of one patient	✓	
Inventory stockpiling	✓ (artificial demand)	✓ (blood not where required)
Manufacturing or testing failures/delays		✓
Product contamination/recall		✓
Labour disruption		✓
Transportation disruption		✓
Seasonal influence: e.g. increase in trauma; decrease in donations	✓	✓
Changes in donor deferral criteria		✓

*Adapted from Alberta Blood Contingency Project Final Report (Draft), November 2007

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 are also applicable to a shortage of fractionated or recombinant plasma protein products, and have been included the interim National Shortage Plan for Immunoglobulins. In the setting of a pandemic, the committees, activities and communication plans outlined in The Plan should be used to help address surges and ebbs in demand over a more protracted period by ensuring sufficient supply with minimal outdates and wastages protecting not only recipients but donors.

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.

- 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 is a subcategory within Green Phase. When declared it implies that CBS inventory levels are low with respect to a particular blood component or blood components but the lack of information regarding the hospital inventories does not allow for an accurate assessment of Amber or Red Phase risk. It will result in review of combined CBS and hospital inventories to determine the likelihood of crossing into Amber or Red Phase. It may act as a warning of a potential shortage if conservation initiatives are not implemented and serves as a signal for provinces/hospitals/RHAs to consider activating mitigation strategies.
- Amber Phase implies that the national blood inventory is insufficient to continue with routine transfusion practices, and provinces/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/RHAs, 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 a standard approach is taken towards optimization of blood transfusion practice and inventory management at the hospital level. 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. It is critical that each jurisdiction review every iteration of the Plan and ensure that there is clear understanding of the revisions. Revisions and the substantive change history of the Plan is documented 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, a 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 team 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 healthcare 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/RHAs 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 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

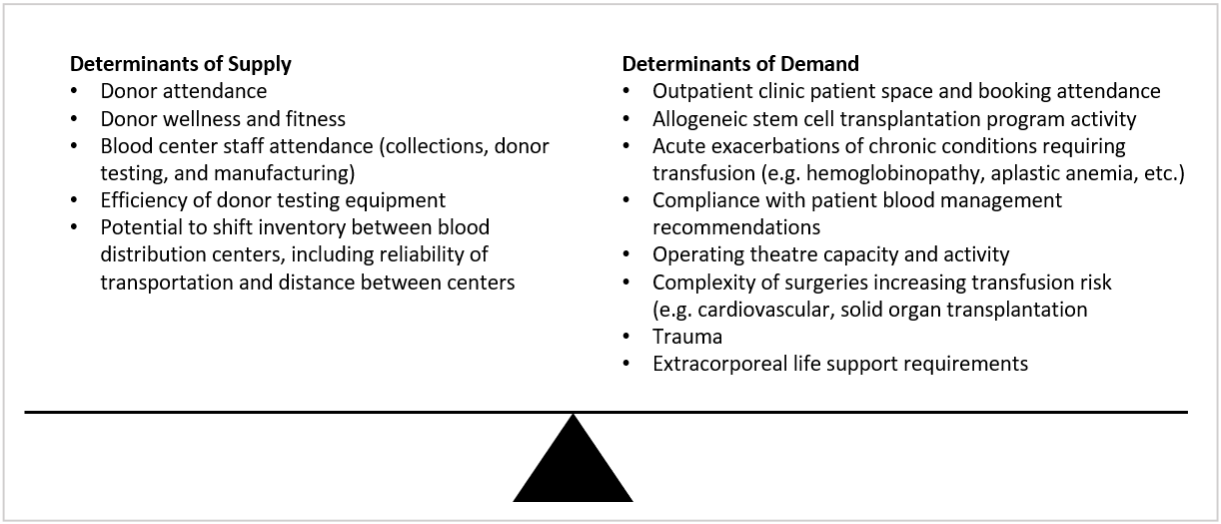
It is intended that the Plan will be used by key blood system participants who, for the purposes of the Plan, are defined to be Canadian Blood Services, hospitals and regional health authorities, the provincial and territorial Ministries of Health, and NAC members. Although some provinces have Provincial 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, healthcare 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 Phase or Red Phase. To help mitigate brief supply disruptions or provide more knowledge regarding hospital inventories/practices when supplies were tenuous but not yet at Amber Phase criteria, a subcategory within the Green Phase called a Green Phase Advisory was created in 2015. Since then, Green Phase Advisory activations have been declared to help mitigate red cell (two activations in 2016, one in 2020 and one in 2021), platelet (one in 2020) and cryoprecipitate (2018) inventory challenges to avoid shortages requiring changes in patient care.

During the COVID-19 pandemic, the implications of decreased donations in 2020 and resumption of clinical activities in 2021 triggered Green Phase Advisory activations. These declarations helped raise awareness of the Plan outside of the transfusion community and emphasized the need for vigilance and collaboration between all participants in the Canadian Blood System. Despite the decrease in blood collection due to decreased donor attendance in the initial weeks of the pandemic, the reduction in surgical activity and deliberate focus on transfusion appropriateness decreased blood component utilization in clinical environments and allowed avoidance of an Amber Phase or a Red Phase activation. This dynamic highlighted the need for ongoing blood system inventory monitoring to balance the shifts in both supply and demand during a pandemic. The balance of blood component supply and demand determinants in the Canadian blood system are depicted in the figure below and further discussed by Prokopchuk-Gauk et al. (Transfusion. 2021 Nov;61(11):3258-3266) in their publication on the Canadian Blood System's response to the COVID-19 pandemic.



Fortunately, during the initial stages of the COVID-19 pandemic, the decrease in donor activity was offset by decreased blood component utilization in the clinical environments allowing avoidance of Amber and Red phase activations. With each future challenge to the blood system, the primary goal of maintaining adequate components to secure supply for acute patient care, in addition to the requirements for those patients who require chronic transfusion support if the challenge could be prolonged, will need to be assessed and balanced with the impacts of the challenge on society and donors, if any.

Although we refer to this document as a national plan, this history may not be reflective of the experiences within the Province of Québec and Héma-Québec as they have a separate blood system, mentioned in the sections above. However, representatives from Québec are observers on the NAC-BSS and NEBMC and they have participated in the initial formation of The Plan's guiding principles. Québec has also used The Plan as a framework for their own contingency planning.

2 ASSUMPTIONS

The assumptions that were used in the initial 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:

- P/T authority and responsibility for the delivery of the Canadian healthcare 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: "*We are **Canada's Biological Lifeline**. Our role is to provide lifesaving products and services in transfusion and transplantation for Canadian patients, and to safeguard Canada's systems of life essentials in blood, plasma, stem cells, and organs and tissues"*;
- 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 business continuity 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.

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, healthcare 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 that were determined to be applicable in 2009-2012 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 in 2007, including 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 influenza planning. As work on the Plan progressed, other plans (i.e. both those being developed within Canada and those being developed internationally) became available for consultation and incorporation of applicable elements. 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 NAC Blood Shortage Subcommittee will review The Plan annually as well as after each activation (real or simulated) for approval by NAC and the CBS P/T Blood Liaison committee.

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 was recommended by the Canadian Medical Protective Association at the time of initial development, 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. Since the contents of The Plan were considered policy decisions not individual physician patient recommendations it was felt that the development of a national approach and document will, in and of itself, assist hospitals and physicians to make the most appropriate medical (and hence legal) decisions by providing a standard of care.

The NAC-BSS recognized, and continues to recognize, 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*** went through extensive stakeholder consultation with many national societies and patient representative groups. The final document and a truncated ***Synopsis for Triage Teams*** received the support of the P/T Ministers of Health (except for Québec) 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 in those provincial and hospital plans was also recommended. Both documents are available on the NAC website www.nacblood.ca in the Blood Shortage tab. The PT Ministers of Health supported these additional recommendations in October 2012. In 2019, a request for re-affirmation of support of these documents and confirmation that no changes were required had been sent out to all of the national societies that initially reviewed the document. No responses indicating a need to revise were received.

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 while maintaining reasonable protection of personal health information. Appendix G – provides examples of documentation tools. These forms may be adapted by hospitals 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 situations or a decrease in blood collections in one geographic 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 (i.e. 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 and activation of Provincial or Hospital Plans. However, it is assumed that such planning would still occur using the principles and mechanisms described in this national 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).

The details regarding each of the various phases are outlined in the sections below. A transparent national inventory and enhanced blood system inventory indicators based on the collection of standardised data elements is necessary for The Plan to function effectively during normal operations and during shortages.

Inventory Indicators	
Days on Hand	**Inventory Index**
Descriptive of blood supplier inventory levels Snapshot of available of blood component inventory provided as a function of the average daily issues by CBS assuming utilization is stable	Descriptive of national and/or provincial and/or hospital inventory levels Inventory index = Group specific or total inventory / ADRD*
* Average daily red cell demand (ADRD)= (transfused + outdated + wasted units)/ time period of data collection. i.e. ADRD annually = units used annually / 365 days ADRD quarterly = units used over 90 days/ 90 days	

The availability of data in real time is essential for the NEBMC to make informed decisions during a blood shortage. Therefore, this Plan supports ongoing development and monitoring the blood system by the red cell demand-based inventory indicators in the table above to be the most reliable method for monitoring and forecast of utilization.

The Inventory Index provides a mechanism for the NEBMC to compare provinces to one another in the time of activation of The Plan to facilitate distribution of units. The PEMBCs can then use the hospital-based Inventory Indices for all but their small stock holding facilities to assist in internal determination of which sites need inventory the most. One caveat to the index comparators is that, because the Inventory Index considers historical transfused, outdated and wasted units and as the inventory levels decrease the outdates should also decrease, high

historical outdates would overestimate the need for that province or site. It is a recommendation that both the outdate and wastage rates be conditioned to the amount of inventory being held. The high outdate and wastage rate associated with platelets and the long storage lengths for plasma increases the complexity of implementing inventory indices for non red cell components. At this time, inventory index calculations are only recommended for red cell units.

Currently, hospitals may enter inventory levels into the CBS Inventory Level webpage within the Blood Component and Product Disposition System. During a blood shortage, 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.

During a phase activation, the reports for the NEBMC are generated using available inventory data. National/provincial multi-level inventory reports are used during a shortage; they should also be leveraged for national, provincial and hospital shortage exercises. These reports contain all hospital submitted red cell inventory, including ADRD and Inventory Index calculations; as well as the CBS inventory, including the Days on Hand calculations. Excel-based, hospital inventory trend reports are prepared by CBS on a routine basis for hospital reference. This report contains daily hospital inventory data, average daily red cell demand and inventory index calculations. Hospitals with leaner inventory indices (e.g. 6-8 versus 9-10) may have best practices that could be leveraged and shared with other hospitals. The "ideal" Green Phase inventory index has not been established for all sites and scenarios. Instead, it is a multifactorial target that requires review and refinement when changes to clinical services, transfusion practices and blood component delivery/redistribution occur.

The Plan acknowledges that challenges may exist for hospitals to report daily inventory within a specific timeframe and to report disposition data by blood group to enable calculation of the average daily red cell demand (ADRD). Hospitals and provinces have indicated that some of these limitations include the configuration of hospital laboratory information systems and the workload and financial implications of data entry for the sole 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 unfortunately be limited to totals for the component type.

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 Phase Advisory

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 communicate these limitations to their hospital customers. 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, or if more information regarding hospital inventories/ clinical practices is required to more accurately predict patterns and assess the risk of entering an Amber Phase or Red Phase, the CBS, VP Medical Affairs and Innovation will consult with the NAC Chair to convene either the Core or the full NEBMC within 24-48 hours and consider activating a Green Phase Advisory. This will be done prior to going to a public media appeal for donors or requesting hospital customers to initiate blood conservation strategies

Hospitals/RHA will then need to submit their inventory numbers, by component and blood group as directed by the NEBMC to CBS to compile so that an accurate assessment of what the additional phase declarations and actions may be required. These combined CBS and Hospital inventory reports along with the NEBMC member's jurisdictional information regarding anticipated daily demand over the upcoming week(s) will facilitate NEBMC decision making and potential inventory reallocation. The NEBMC will also determine if there are changes to inventory management practices that could assist with and/or improve the situation internally at either CBS or the hospitals. If the situation cannot be improved upon internally, a mass public/media appeals may be undertaken to avert a blood shortage. Refer to Appendix E: Communications Plan Sections 3.1.3 and 3.1.4 for in-depth details.

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

	Normal Green Phase	Green Advisory Phase (serious but non-critical blood shortage)
RBCs	• > 4 DOH* for O Rh positive and A Rh-positive blood groups, and • >3DOH for all Rh-negative blood groups	• More than 3 successive days of 3-3.5 DOH for either O Rh positive or A Rh-positive blood groups • More than 3 successive days of 2-3 DOH for either 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 available inventory in comparison to the average daily red cell issues from CBS
**Refers to 'weeks on hand' defined as the available inventory in comparison to 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 Phase or Red Phase. Critical levels vary according to component (and in particular, in relationship to the component's acceptable storage period), to blood group, clinical activity 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 available inventory in comparison to 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 Phase or Amber Phase would usually be made only if CBS were forecasting a sustained decreased in inventory levels.

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 continually evolving as data is updated and modified to meet local needs, see Section 3.1.6 for the inventory criteria around the phases that include total inventory numbers.

Approximate inventory levels that could lead to the declaration of Amber or Red Phase if sustained are shown in tables provided by CBS and posted on the Blood Shortages tab at www.nacblood.ca.

Platelet Inventory – Canadian Blood Services

Platelet Inventory Level*	% 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 7 days and there is not uniform distribution to hospitals by age of the unit, platelet inventory levels are expressed as a percentage of the daily national requirement rather than "days on hand".

Frozen Plasma Inventory

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

Group AB Frozen Plasma Inventory Level*	CBS Days on Hand
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 will continue to change 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 BSS Inventory Working-Group such that total blood inventory levels can be reliably obtained, inventory criteria for ordering and phase declaration is continually adjusted and updated.

The following table provided is **an example** of how the Inventory Index might represent actual hospital inventory and a corresponding inventory phase. The calculations are based on a sample hospital disposition data excluding CBS inventory and using a calculated average daily red cell demand (ADRD) of 2056 red cell units.

Hospital ONLY National Number Units	Inventory Index	Phase
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

The NAC-BSS Inventory Working Group recommended that hospitals conduct inventory submission exercises to CBS on a quarterly basis. This allows a rolling twelve (12) month disposition reporting period to be available for calculating ADRD and aid in to determining the inventory indices that correspond to the phases of inventory availability for that facility. The recommendation suggested that this should occur in April, July, October and December of each year if the facility cannot submit on a regular basis. This data will facilitate increased accuracy for the provincial inventory indices on the NEBMC reports when The Plan requires activation.

3.1.7 Actual Allocation of Blood Components in Times of Shortages

The actual allocation of blood components to hospitals/RHAs in times of severe shortages will be determined by CBS in consultation with the NEBMC and P/TEBMCs (described in Section 4). They will take into consideration usual requirements, the nature of the situation leading to the shortage, inventory requirements, and work done by hospitals/RHAs 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 could include any or all of the following as appropriate for individual patients: erythropoiesis-stimulating agents, intravenous/oral iron, intraoperative cell salvage, thrombomimetics, antifibrinolytics, interventional radiologic procedures, image guided procedures on wards, rapid access to endoscopy, and non-invasive surgeries. Autologous blood donation will not be effective as an alternative to decreased allogeneic blood collections from the blood supplier as very few hospital programs currently exist.

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/TEMBCs, CBS will allocate blood inventory to hospitals on the basis of the Inventory Indices and ADRD to allow 'levelling' of the Inventory Indices across the country in times of blood shortage.

The "red line" inventory in small rural sites will require ongoing risk management discussions at the hospital / RHA transfusion committees and P/TEBMCs. Rural facilities that are holding inventory for the purposes of emergency stock would need to be managed in Green Phase Advisory, Amber Phase and Red Phase scenarios differently and each P/TEMBC should share their approach with the NEBMC members. In a Red Phase, it is assumed that there would be no holding of red cell inventory for hypothetical rare scenarios and that allocation decisions would be made on the basis of actual daily assessment of needs across all facilities.

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 (CBS)

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 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, CBS will have an active role in declaring the various phases of blood component shortages and recovery from such shortages as well as distributing blood components in accordance with the phase of criticality. These activities would occur in consultation with NEBMC (described in Section 4.1 below).

CBS 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, and 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 maintaining 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 periodically 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/RHAs 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.

3.2.3.1 Provincial/Territorial (P/T) 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 (NAC)

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 initially convened the NAC Blood Shortage Subcommittee Group (NAC-BSS) in September 2007. The NAC-BSS subsequently established working groups to evaluate communication, inventory management and allocation guidelines. The allocation working 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-BSS 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 members will also play a key role on the NEBMC; the Chair of the NAC will co-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 will participate in the H/REBMC, how they integrate with P/TEMBCs 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/Territorial or Hospital/RHA 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-BSS 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, a small group of NEBMC members, known as the Core NEBMC, may meet to discuss the inventory situation and strategies / next steps that could be brought for consideration of the full 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 BSS Chair
- Co-Chairs of the CBS-P/TBLC
    - Lead Province Ministry of Health Official
    - CBS Director of Health Policy and Governmental Affairs

NEBMC communications must be timely to be effective in mitigating or managing blood shortages and can be optimally achieved by sharing updates in a standardized fashion. NEBMC documentation templates have been created for the NEBMC Secretariat, provided by the office of the CBS VP Medical Affairs and Innovation, to use for communications to NEBMC members informing all NEBMC members of the discussions that occurred at any Core or full NEBMC meetings. Relevant information from discussions of the NEBMC (summaries, actions/next steps and messaging) will be documented by the NEBMC Secretariat and distributed as follows:

- The Secretariat will distribute the completed Core NEBMC meeting summary to all NEBMC members for information.
- The Secretariat will distribute the completed NEBMC meeting summary to all NEBMC members, as soon as possible after a meeting.

- Members of NEBMC will further disseminate the information onto their respective P/TEBMC and Hospital/ RHA EMBCs, 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/RHAs 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 Phase Advisory, Amber Phase or Red Phase activation, and subsequent recovery from these situations;
- provide recommendations on the distribution of blood components in Amber Phase and Red Phases;
- provide recommendations as to whether or not to implement the 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 NAC-BSS 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 CBS VP, Medical Affairs and Innovation. The Vice-Chair of NAC shall act as chair in the absence of either NEBMC co-chairs.
The membership of the NEBMC will include the following:

- CBS officials as determined by CBS and including the following:
  - 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 représentative (Ex-Officio)

- Héma-Québec représentative (Ex-Officio)
- If available and appropriate, the Core NEBMC may also consider ad-hoc representation of the following groups:
  - Health Canada BGTD representative
  - Blood transfusion recipient representatives – recommendations are that at least one should be an actual blood transfusion recipient (present or past) while others could be representatives of applicable patient societies.
  - Stakeholder representatives from other national societies that may be impacted by the blood shortage.
  - Additional experts as required 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).

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.

4.1.3 Meetings/Quorum

NEBMC will hold regular meetings, emergency simulation meetings and meetings convened at the time of shortage (potential or actual).

If no shortages (potential or actual) occur, regular meetings and emergency simulation meetings will be extremely important to ensure that the committee can effectively function in times of shortage and will be convened at the call of one of the Co-Chairs of the NEBMC, twice per year.

The first of these meetings should be used for reviewing The Plan to maintain currency and the second should be used for a blood shortage simulation exercise with the purposes of increasing NEBMC comfort and awareness in handling blood shortages.

A "job aid" has been developed by the NAC-BSS to support NEBMC 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.

4.1.4.3 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.
- Establish risk management assessment and communication regarding the specific impact to chronically transfused recipients.

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 could also 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 Hospital Liaison Specialist(s), Canadian Blood Services

In the event the situation warrants, the P/TEMBC 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
  - Hospital / Health authority Risk Managers
  - 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)
- Canadian Blood Services Medical Officer
- Other individuals as designated by the group

4.3 Hospital/RHA Emergency Blood Management Committee

As indicated in 4.2, the P/T Ministries of Health are responsible for forming a P/T EMBC. Depending on the provincial / territorial structure there may be a need to further develop additional hospital and/or Regional Health Authority (RHA) Emergency Blood Management Committees (H/REBMC) to provide or facilitate bidirectional communication and implementation of blood contingency activities. In some provinces/territories, it is possible that the P/TEBMC and H/REBMC would be one single entity.

The H/REBMC, if required, should have a mandate to develop site or regional Blood Shortage Management Plans in accordance with the guidelines outlined in both this national and their respective provincial plans. They are to ensure that these plans are appropriately communicated

and adhered to in times of blood shortages and should serve as the communication conduit to the P/TEBMC.

H/REBMC membership will likely vary from facility to facility but should ensure that there is inclusion of clinical groups who are involved in treating patients with acute high volume transfusion requirements as well as those who are chronically transfused. In many facilities, the existing Hospital/ Regional Health Authority Transfusion Committee may act as the H/REBMC. The following outlines potential membership:

- Representative of hospital/RHA senior or executive management
- Medical Director, Transfusion Service
- Head, Department of Internal Medicine (or in larger centres could be Heads of Critical Care Medicine and/or Haematology/Oncology)
- Head, Department of Surgery
- Head, Department of Anesthesiology
- Head, Emergency Department
- Head, Obstetrics/Gynecology Department
- Chair of the Blood Transfusion Committee
- Director / Practice Lead 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.
However, if a **Green Phase Advisory** is declared, the stakeholder activities are a hybrid of Green Phase and Amber phase actions depending on the scenario and direction of the NEBMC if not already specified 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 CBS and Héma-Québec (especially in Green Phase Advisory).
- 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. (especially in Green Phase Advisory).
- 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. (especially in Green Phase Advisory).
- Work with P/T Ministries and hospitals/RHAs 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/RHAs 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/RHAs to follow The Plan's guidelines and monitor their compliance in doing so, particularly with respect to the following activities which will all need to be in place and active during a Green Phase Advisory:
    - development of transfusion committees as per the CSA Blood and Blood components standard Z902;
    - implementation of transfusion guidelines (with stricter adherence monitoring during Green Phase Advisory);
    - 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/RHAs and with CBS;
    - participation in blood component disposition and inventory reporting to CBS. During Green Phase Advisory activations, this will increase to daily reporting.
    - development of blood redistribution programs and other methods/programs to minimize blood component outdating (these may need to be expanded during a Green Phase Advisory);
    - activation of H/REBMC if required for simulations or during Green Phase Advisory.
- 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 Phase Advisory, 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 small rural sites and risk mitigation strategies. Need to determine and socialize how "holding inventory sites" that are

for safety/emergency stock with variable demand would be managed in green phase advisory, amber phase and red phase scenarios.

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) and communication plan capable of reaching all clinical groups that use blood components and/or products. (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 for situations when particular components are not available (e.g. ABO/Rh identical components, irradiated cellular components) for both acute and chronic recipients of blood components.
- Monitor adherence to transfusion guidelines, including the performance of transfusion audits. Stricter enforcement may be required during Green Phase Advisory.
- Exercise scrutiny of transfusion orders that are outside hospital/RHA guidelines especially during Green Phase Advisory.
- Ensure application of available blood alternatives and conservation methodologies. Further emphasis and education regarding these blood sparing alternatives and conservation strategies are required during Green Phase Advisory.
- Develop and implement a strategy for perioperative blood inventory management**,** such as a maximum blood ordering schedule (MBOS) or an alternate strategy, to enable 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 group (versus totals only) for reporting to CBS. This will be a mandatory requirement during Green Phase Advisory activations.
- In collaboration with 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. Enhanced redistribution may be required during Green Phase Advisory activations.
- 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 the Plan.
- Develop a documentation process for release or non-release of blood components in Amber Phase or Red Phase.
- Notify CBS 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. This will need to be emphasized during Green Phase Advisory activations.
- 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 frontline medical staff. This will need to be emphasized during Green Phase Advisory activations.
- 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 Green Phase Advisory, 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 P/Ts with the percentage capture of inventory reporting.
- Provide P/Ts with the provincial average daily red cell demand (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 CBS, implement the pre-determined 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 (see table 1 and 2 for definitions).
- 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.
- 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/or cryoprecipitate transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of alternatives such as prothrombin complex concentrate and/or fibrinogen concentrate. Group A plasma may also be considered as an alternate to group AB plasma if appropriate mitigation and monitoring can be put in place. (Examples of mitigation strategies include measurement of isohemagglutinin titres, determination of maximal allowable volume, patient weight considerations).
- Refer all requests for the affected blood components that do not fulfill pre-determined acceptance criteria to the Transfusion Medicine Medical Director or designate prior to issuing product.
- Assess the impact of the shortage on chronic transfusion recipients and potential delivery of alternatives that could be appropriate for individual patients.
- 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 requested by the P/T NEBMC
- 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 patient death or major morbidity.
    - Emergency medical procedures are those in which a transfusion of the affected blood component would be required within 24 hours in order to prevent patient death or major morbidity.
- Notify senior management of hospitals/ RHA of the requirement to follow the Red Phase Emergency Framework if activated by the NEBMC.
- 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 patient death or major morbidity.
- 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/or cryoprecipitate transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of alternatives such as prothrombin complex concentrate and/or fibrinogen concentrate. Group A plasma may also be considered as an alternate to group AB plasma if appropriate mitigation and monitoring can be put in place. (Examples of mitigation strategies include measurement of isohemagglutinin titres, determination of maximal allowable volume, patient weight considerations),
- Implement and follow the Red Phase Emergency Framework if activated by the NEBMC.
- 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 by blood group and component and report inventories (frequency determined by NEBMC) within the specified timeframe to
  CBS. Provide the data to the P/TEBMC 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 possible methods could be considered and, in an actual shortage situation, it may be that any combination of these methods could 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 Phase and Red Phase. CBS would then issue to each hospital/RHA the amount of blood requested and these amounts would correspond to the restricted Amber Phase or Red Phase activities. The Plan recommends that hospitals/RHAs served by CBS strive to reach and maintain this goal.

   However, 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 reporting.

Each province would direct CBS as to the precise distribution of components in its own province (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). If the P/TEBMC for that province has not convened, then CBS should liaise with the P/T and NAC representatives for direction as to how to distribute units for that province. 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/RHAs 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. 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, it does not imply business as usual for front line operations. Although elective medical and surgical transfusions will be permitted to proceed, there may be limitations 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 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 (acute and chronic) on the basis of urgency on advice provided by the responsible EBMC.
    - 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.
    - 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.
    - 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

During or shortly after the recovery phase, it is also critical to debrief, review and revise 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/Medical Procedures [4]	**Non-Surgical Anemias/Medical Procedures [4]**	**Non-Surgical Anemias/Medical Procedures [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 or other chronic transfusion needs, 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 or other chronic transfusion needs, 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 NAC website: Emergency framework for rationing of blood for massively bleeding patients during a red phase blood shortage.

[2] Urgent surgery – patient likely to have major morbidity if surgery not performed within the next 1 to 28 days

[3] Emergency surgery – patient likely to die or have major morbidity within 24 hours without surgery

[4] Non-surgical anemias include anemia associated with bone marrow failure, post traumatic injury, extracorporeal membrane oxygenation (ECMO), post-operative states and associated with obstetrics. Medical procedures include but are not limited to simple transfusion, exchange transfusion, high-dose chemotherapy and stem cell transplant.

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 Phase or Amber Phase, the hospital/RHA transfusion medicine 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	**Major Hemorrhage**	**Major Hemorrhage**
Immune thrombocytopenia and life- or limb-threatening bleeding maintain PC >10 x 10^9/L. For head trauma or CNS bleeding maintain a PC >100 x 10^9/L Other significant bleeding, or acute promyelocytic leukemia at acute presentation, maintain a PC >50 x 10^9/L.	For head trauma or CNS bleeding maintain a PC > 80 x 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 <50x 10^9/L).	Same as Amber phase.
Invasive procedures/ surgery/ ECMO	**Invasive procedures/ surgery/ECMO**	**Invasive procedures/ surgery**
For non-surgical invasive procedures maintain a PC of >20 x 10^9/L (central venous catheter insertion, paracentesis, thoracentesis) For lumbar puncture maintain a PC >50 x 10^9/L For ECMO maintain a PC > 50-80 x 10^9/L For CNS surgery maintain a PC>100 x 10^9/L	Urgent [1] and emergency [2] surgery in consultation with H/RBEMC. In presence of active bleeding or surgical procedure maintain a PC > 50 x 10^9/L If CNS trauma/surgery a PC > 80 x 10^9/L. For non-surgical invasive procedures (other than bone marrow biopsy) maintain a PC > 10 x 10^9/L with image guidance. For lumbar puncture maintain a PC >20 x 10^9/L For ECMO maintain a PC >50 10^9/L	Emergency surgery in consultation with H/RBEMC. Any requests for platelet transfusion must be reviewed by designated medical personnel.
Bone marrow failure/ stem cell transplantation/ chemotherapy/ Chronic transfusion recipients (CTR)	**Bone marrow failure/ stem cell transplantation/ chemotherapy/Chronic transfusion recipients (CTR)**	**Bone marrow failure/ stem cell transplantation/ chemotherapy/CTR**
Adhere to a maximum threshold PC of 10 x 10^9/L for prophylactic platelet transfusions.	Adhere to a maximum threshold PC of 10 X 10^9/L for prophylactic transfusions; consider lowering this threshold to 5 x 10^9/L. Transfuse autologous stem cell transplant patients only if symptoms of bleeding. All requests for a platelet transfusion in non-bleeding patients with a PC >10 x 10^9/L must be reviewed by designated medical personnel. Split PC doses and use half doses in non-bleeding patients if necessary.	Cease all prophylactic transfusions. Any request for platelet transfusions in non-bleeding patients must be reviewed by designated medical personnel.

[1] Urgent surgery – patient likely to have major morbidity if surgery not performed within the next 1 to 28 days

[2] Emergency surgery – patient likely to die or have major morbidity within 24 hours without surgery

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.
- Lower PC thresholds for platelet transfusions for surgical bleeding or special procedures should be used.
- In Red Phase or Amber phase, the hospital/RHA transfusion medicine 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 most responsible physician in the patient's chart, and every effort must be made to obtain specific patient consent.

APPENDICES

APPENDIX A:

Approval and Revision History

Version 2022

Changes throughout the body of the text to change Blood Shortage Working group (BSWG) to Blood Shortage Subcommittee (BSS) and sub-group to working group as part of conformance to standardized NAC nomenclature

Version 2021

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

a) Removal of the caveat on title page
b) Addition of footer with date on every page of the document
c) Changes throughout the document to provide consistent naming of Green Phase Advisory, P/T and P/TEBMC.
d) Improved definition and functions of Green Phase Advisory in Executive Summary and Section 3.
e) Added a Table highlighting various "conditions" that could contribute to a blood shortage and a figure that highlights the balance of supply and demand
f) Significant updating of Section 1.4 – History of Blood Shortages in Canada, including a section addressing the COVID-19 pandemic and lessons learned.
g) Clarification of wording in Section 2 to provide clearer understanding that these were the assumptions used in the initial creation of The Plan. Updated the information regarding the consultation performed with the Emergency Framework / Triage. Increased information regarding historical context regarding legal liability was provided under section 2f.
h) Correction of broken hyperlinks and updates to links to blood shortage documents.
i) Significant revision of section 3.1 to improve understanding and clarity of the definitions behind Days on Hand and Inventory Index and how these parameters will be used by the NEBMC.
j) Rationale regarding percentage reporting of platelets in comparison to days on hand expanded in Section 3.
k) Updates to conservation strategies suggested in section 3.1.7.
l) Improved clarity on the role and functions of the NEBMC and NEBMC secretariat in section 4.1
m) Updated recommendations for membership of P/TEMBC to be reflective of current CBS representation in provinces
n) Clarified the need for H/R EMBCs may be optional depending on the provincial structure.
o) Throughout the document, clarified the considerations that may be necessary to be inclusive of the needs for chronic transfusion recipients. Within section 6, provided clarity around Green Phase Advisory activities, removed reference to CMV seronegative components (6.1.3), removed definitions of elective and urgent procedures (6.2.2, 6.2.3,6.3.2 and 6.3.3); included reference of Red Phase Emergency Framework (6.3.3) and improved wording in 6.4 to allow for a combination of allocation strategies could be employed.
p) Table 1 and 2 – updated footnotes to include the definitions of urgent and emergent as well as surgical versus medical anemias.
q) Updated and confirmed links in Appendix B: Provincial/ Territorial Blood Shortage Plans
r) Updated and verified consistency for Appendix F: Job Aid
s) Addition of updated Appendix H: NEBMC Documentation template
t) Addition of Appendix I: Patient Communication template

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 CBS logo throughout document.
c. Table of contents – indication that Appendix H is 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 Health Policy and 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 Fibrinogen 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 Phases 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.
p. Minor editorial and formatting changes.

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 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 Subcommittee, 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.

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:
    - **Hold 2 regular teleconferences per year**
        - First call to review the Plan for currency
        - Second call to increase awareness
    - **Revised Triage Tools**
        - Patient Record
        - Triage Tracking Log
    - **Job Aid Created**
        - A "job aid" was developed by the BSS 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.
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.

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

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 BSS Chair'

Removed and Archived Appendices:

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

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 Appendices:
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 Appendices:

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-BSS) 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.

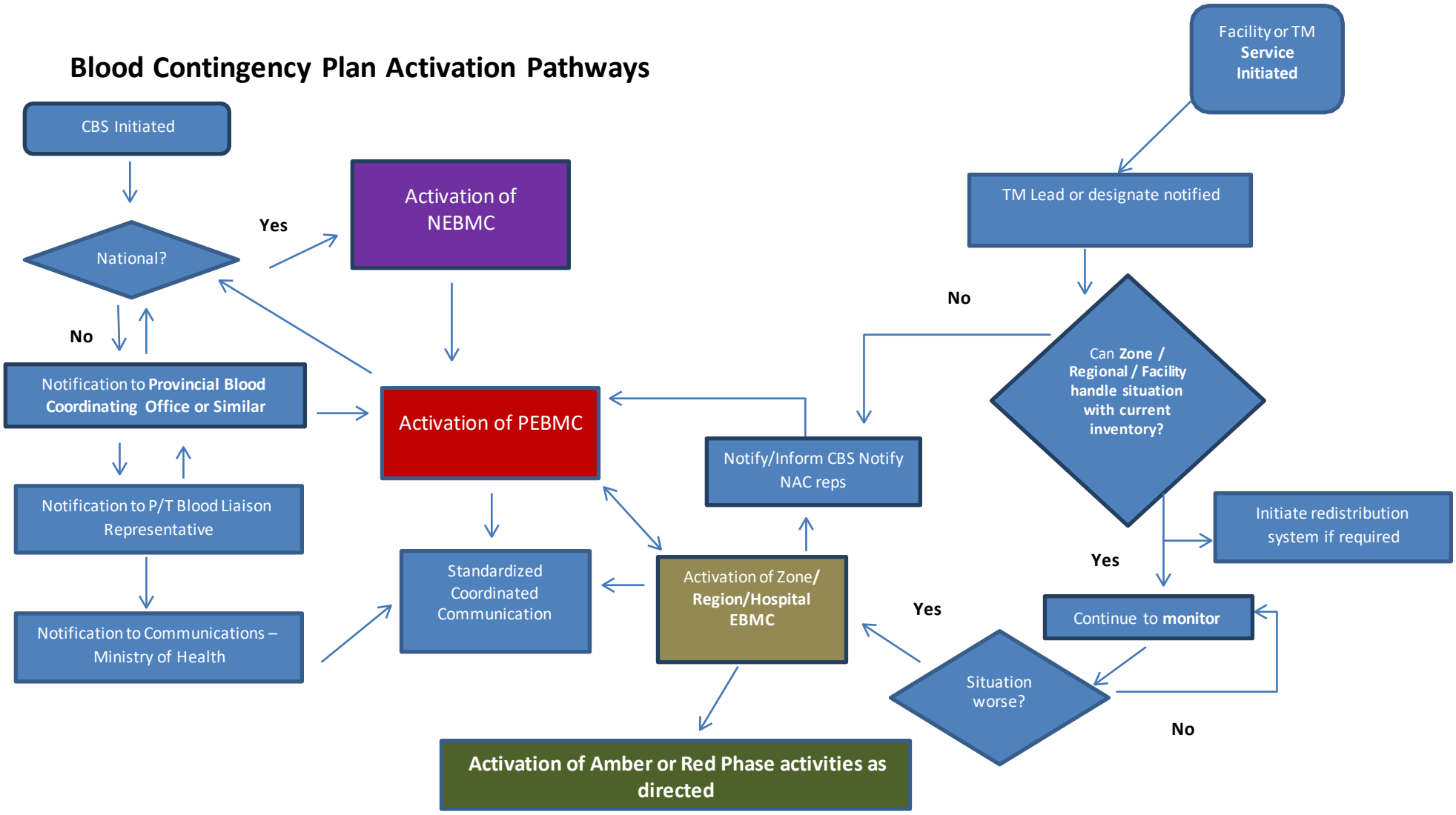
APPENDIX B:

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/
Manitoba	MB-Blood-Shortages-Plan-July30.pdf (bestbloodmanitoba.ca)
Ontario	Ontario Emergency Blood Management Toolkit
Newfoundland and Labrador	https://www.gov.nl.ca/hcs/bloodservices/resources/blood-manage/
Prince Edward Island	https://src.healthpei.ca/blood-transfusion-services
Nova Scotia	Clinical Practice Guidelines | Nova Scotia Health Authority - Corporate (nshealth.ca)
New Brunswick	https://www.nacblood.ca/resources/shortages-plan/NB%20Blood%20Shortages%20Plan%20Final%20%20V3.1%20June%202017.pdf

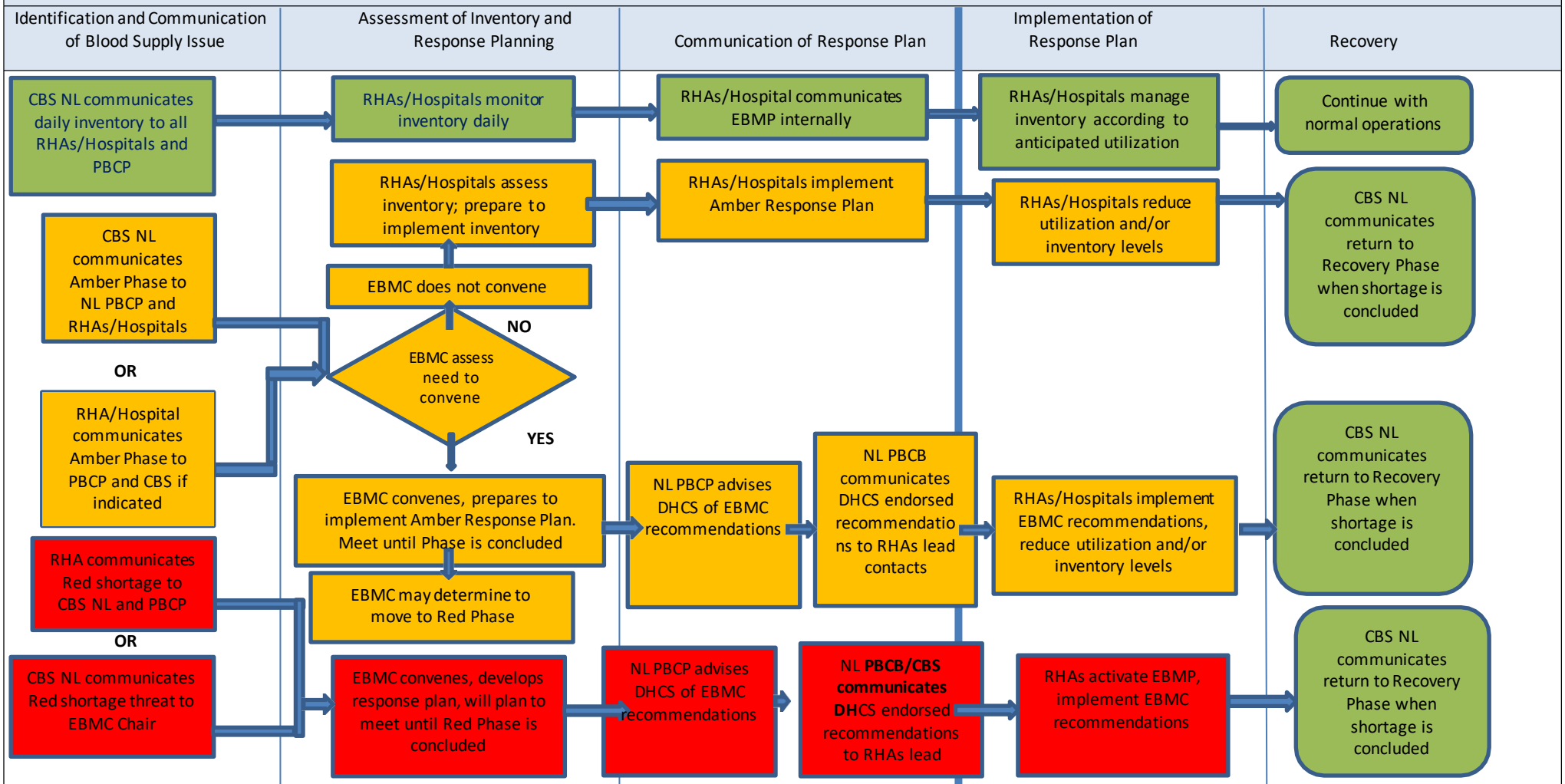
APPENDIX C: EXAMPLE ONLY

Adapted from Alberta Blood Contingency Plan – September 2014 version



APPENDIX C - Example Only

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



It is possible that shortages are so sudden and severe that a Red Phase is called, or after a period of Amber Phase that a Red Phase is called. The communication pathway will be the same in an Amber or Red Phase. NL09.004 Version 2, Effective Date 2013-10-18

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 healthcare 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 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 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): 13931394.
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

TABLE OF CONTENTS

ABBREVIATIONS (for Appendix E: Communications Plan)

BSS:	Blood Shortages Subcommittee
CBS:	Canadian Blood Services
CBS-P/T BLC:	Canadian Blood Services Provincial/Territorial Blood Liaison Committee
HQ:	Héma-Québec
NAC:	National Advisory Committee on Blood and Blood Products
NAC-BSS:	National Advisory Committee Blood Shortages Subcommittee
NEBMC:	National Emergency Blood Management Committee
P/T:	Provincial/Territorial
NERT:	CBS National Emergency Response Team
LERT:	CBS Local Emergency Response Team
P/TEBMC	Provincial/Territorial Emergency Blood Management Committee
PEBMC:	Provincial Emergency Blood Management Committee
PBCO:	Provincial Blood Coordinating Office
PHAC	Public Health Agency of Canada
RBC:	Red Blood Cells
RHA:	Regional Health Authorities

1.0 INTRODUCTION

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 who are partners involved in managing a blood shortage are Canadian Blood Services (CBS), the Provincial Territorial (PTs) 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.

This communications appendix 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.
The communications appendix is broken down into four periods, corresponding to the phases of the Plan.

***Note**: This appendix provides overarching and general principles and key messages and outlines high-level communications flow. It is imperative that each jurisdiction produces its own communications plan based on specific needs, all while keeping consistent with direction from this document. It is also recommended that local communications committees include local CBS communications staff, where possible.*

2.0 GENERAL APPROACH

1.1. Communications Guiding Principles

In order to maintain trust, build confidence and ensure credibility among our diverse stakeholder groups, all partners in managing a blood shortage will commit to uphold and demonstrate the following communications principles during all phases of a shortage:

- Practice openness, honesty and transparency
- Provide a quick and timely response to situations/issues
- Use frank, clear and direct communications
- Be honest and transparent regarding safety and supply issues
- Inform employees and relevant stakeholders before the general public, whenever possible
- Use consistent messages and regular communications
- Ensure collaboration and coordination of communications between partners
- Be careful not to assign blame for the situation on any organization or partner in the supply chain
- Explain not only what each of us is doing, but the "why" and "how" behind a decision or action
- Provide an opportunity for audience/stakeholder education on the blood system/ongoing need for blood

1.2. Overarching Communications Objectives

The overarching communications objectives before, during and after a blood shortage situation are as follows:

- Maintain and build the trust and confidence of Canadians by demonstrating that Canadian Blood Services, the National Blood Emergency Management Committee (NEBMC) and the provinces and territories have a plan in place to ensure an optimized and equitable supply of blood and blood products for Canadians, even in the face of scarce supply.
- Ensure health providers have the information they need to make good patient care decisions.
- Demonstrate that Canadian Blood Services, the P/T Ministries of Health and RHAs/hospitals are working in close collaboration to manage the situation as effectively as possible.
- Reassure and involve stakeholders – particularly those who depend on blood products
- Engage Canadians as part of mitigation/recovery efforts

2.3 Core Messages

- Canadian Blood Services, the P/T Ministries of Health and your local hospital/RHA have an effective plan in place to ensure the safe, optimal and equitable supply of blood and blood products for Canadians in the event of a blood shortage situation.

- Through the national inventory and inter-provincial collaboration, the plan ensures that patients who need blood products the most are the priority.
- Jurisdiction-specific core messages to be determined by provincial/local plans

2.4 Additional Key Messages

Additional key messages will be developed according to the inventory availability and the individual circumstances. Key message development will be driven by CBS in consultation with the NEBMC. To ensure timeliness of key message development, the core NEBMC and/or NEBMC secretariat may be called upon to draft communications.

2.5 Key Audiences

Key audiences may vary from phase to phase, and each organization will have its own specific key internal and external stakeholders to address. However, the following is a list of shared key audiences that are likely to be impacted or concerned about blood shortages:

Internal

- Canadian Blood Services staff/volunteers
- Federal and P/T Health Ministries
- RHAs/hospital staff
- Héma-Québec
- PHAC
- Jurisdiction-specific internal audiences to be determined by provincial/local plans

External

- Health system clinicians, nurses and allied healthcare workers
- Transfusion medicine and outpatient procedure clinics
- Individual patients requiring blood and/or their loved ones
- News media
- General public

2.6 Recommended Spokespersons

Appropriate spokespersons, and their delegates, need to be identified at each phase, based on the shortage situation, the issue, and the jurisdiction. Examples of spokespeople are included below but final decisions/nominations need to be made by the appropriate EBMC:

National:

- CBS Chief Executive Officer/designate
- CBS Co-Chair of NEBMC
- NAC Co-Chair of NEBMC
- Health Ministers/designates

Provincial:
Provincial spokespeople should be decided by the PEMBC, but may include:

- P/T Ministry of Health designate
- P/T Chief Medical Officer of Health
- Provincial NAC representatives
- CBS Medical representatives, if applicable

Regional:
Regional/Hospital spokespeople should be decided by the local EMBC but may include:

- Chairs of Hospital/Regional EBMCs
- Hospital / RHA Transfusion Medicine Medical Directors
- CBS Medical Representatives, if applicable

Stakeholders/Partners:

- Depending on the length and severity of the shortage, it may be appropriate to identify other stakeholders or partners who may be available and/or willing to publicly support the contingency plan and to appeal to Canadians for donations.

2.7 Tactics

Communication tactics will vary from phase to phase and use a variety of existing internal and external communications channels that each partner has at its disposal. The nucleus for all communications must be a common set of key messages that have been developed and endorsed by CBS and the NEBMC. Each partner will speak to its area of responsibility and expertise.

3.0 PHASE SPECIFIC INVENTORY COMMUNICATIONS PLANNING

As national blood inventory levels fluctuate, the general principles, strategies and objectives will remain constant; however, as the inventory lowers and specific actions are required that may be very visible to the public and that may impact patient care, the communications needs will intensify. The following sections outline how communications, in each phase, will build on the essential elements laid out above.

3.1. 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, as required.

3.1.1 Green Phase Communications Approach

The Green Phase is characterized by a wide range of inventory levels, from optimal levels, to temporary shortages of various components, to lower levels which risk progression into a shortage phase (Green Phase Advisory) that could require alternate recruitment or collection strategies to be employed. Though the operational plan only calls for activation of the NEBMC when considering moving to an Amber Phase or Red Phase, consultation with the NEBMC chair and other members of the Committee may also be advisable under certain conditions in the Green Phase.

3.1.2 Green Phase Activities

During optimal inventory situations, Canadian Blood Services communications about issues and activities related to the national blood inventory will occur through business-as-usual channels. During the Green Phase, while inventory levels are optimal, communication activities related to this appendix should focus on emergency preparedness. The following are some of the activities that should be conducted:

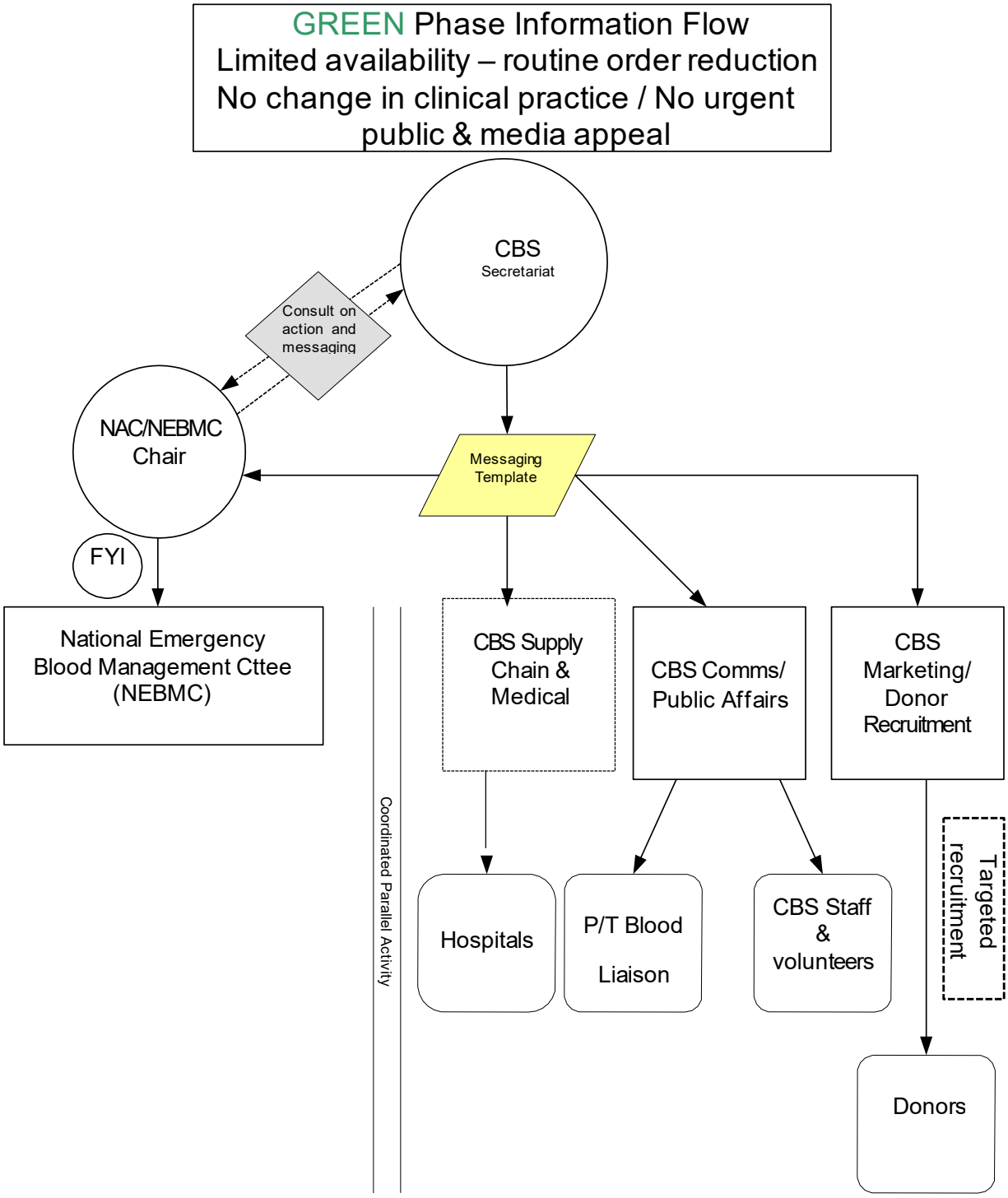
- Endorsement of this communications plan appendix
- Development of similar communications plans at the provincial level and the RHA/hospital level
- Development and updating (yearly) of contact lists of Emergency Blood Management Committee members
- Distribution of the contact list to members
- Table top exercises
- Amending and enhancing the communications plans based on opportunities/challenges identified in exercises

3.1.3 Green Phase Advisory – Temporary Reduction of Hospital Order Fill Rates

While the overall inventory is in Green Phase, occasionally a particular blood type or component may be in limited supply and require CBS to make cuts to routine hospital orders. Most of these situations will be brief, and CBS will communicate temporary inventory adjustments to hospitals through "business-as-usual" channels. (Annex 1)
Should the situation extend over one week, the following process is recommended:

1. If no change in hospital inventory management practice is recommended, CBS will continue to communicate updated information through "business-as-usual channels". See Annex 1 example.
2. These inventory updates would be distributed to PTBLC, NEBMC, hospitals and other stakeholders via CBS' business-as-usual channels.

Should the situation persist, the NEBMC co-Chairs will convene the Core NEBMC or full NEBMC to determine if there are any changes to hospital inventory management practice can assist with and/or improve the situation internally.

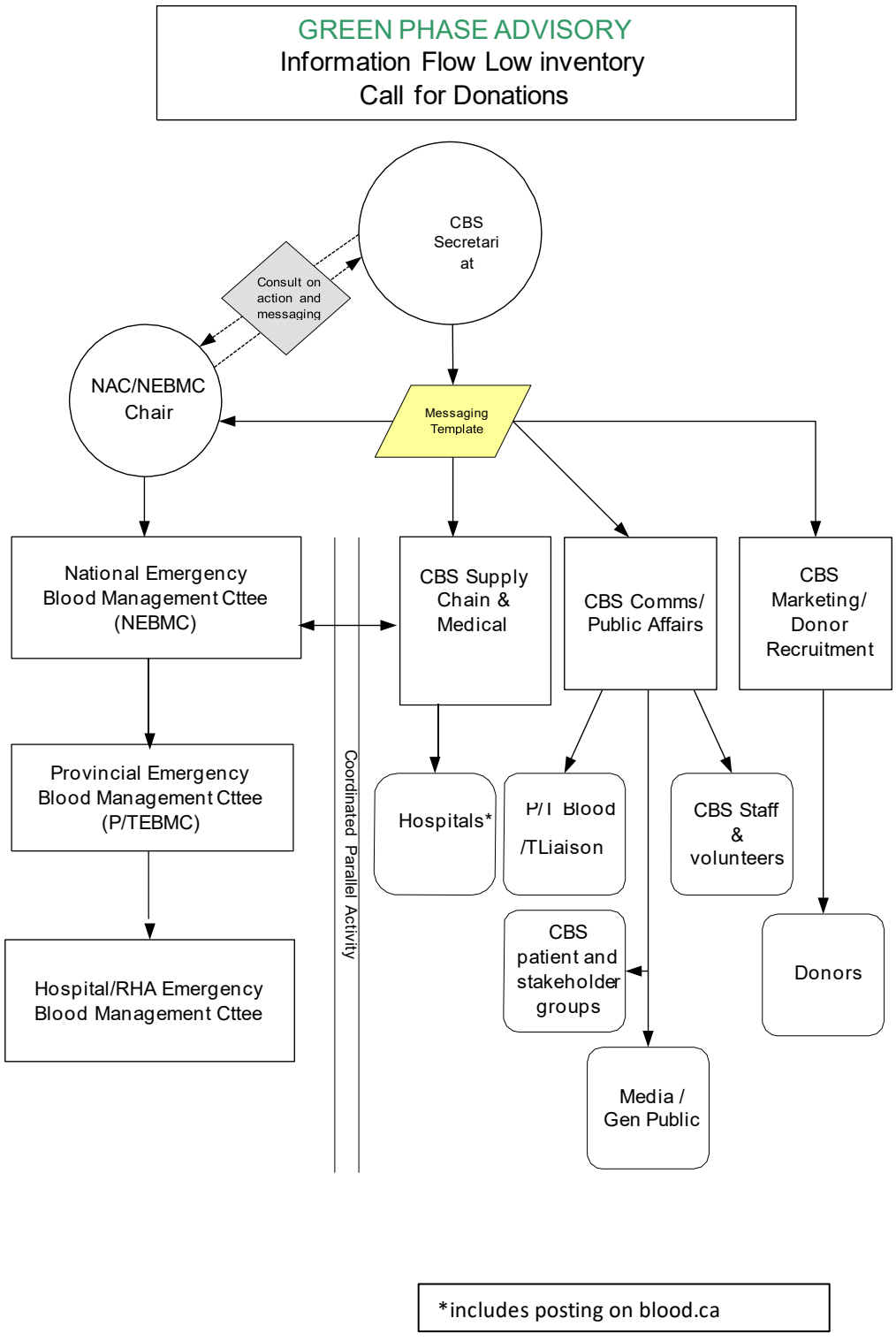

GREEN Phase Information Flow
Limited availability – routine order reduction
No change in clinical practice / No urgent public & media appeal
CBS
Secretariat
Consult on action and messaging
NAC/NEBMC Chair
Messaging Template
FYI
National Emergency Blood Management Cttee (NEBMC)
Coordinated Parallel Activity
CBS Supply Chain & Medical
CBS Comms/ Public Affairs
CBS Marketing/ Donor Recruitment
Hospitals
P/T Blood Liaison
CBS Staff & volunteers
Targeted recruitment
Donors

3.1.4 Green Phase Advisory – Increased Communications for Donations

Canada boasts of a very loyal blood donor base whose repeat donations give the blood system the stability in needs. However, when surges in demand, weakening of supply, or a combination thereof, begin to erode the national inventory, and when all other recruitment efforts have been exhausted, increased communication to express urgent need may be undertaken to avert a shortage. If the shortage is specific to a certain blood group or component, the messaging should be as targeted as possible, i.e., O-negative blood or platelet donors, to prevent the system from being overwhelmed dealing with donors that are not required urgently.

In the event of public communications stressing urgent need, the following procedure should guide the information flow:

1. NEBMC discusses the communication needed
2. CBS cascades messaging to its stakeholders (CBS-P/T Blood Liaison Committee, hospitals, patient groups, donors, etc.) via business-as-usual channels
3. NEBMC members share with their P/TEBMC
4. P/TEBMC members share with hospital/RHA EBMCs (if applicable)


GREEN PHASE ADVISORY
Information Flow Low inventory
Call for Donations
CBS Secretariat
Consult on action and messaging
NAC/NEBMC Chair
Messaging Template
National Emergency Blood Management Cttee (NEBMC)
CBS Supply Chain & Medical
CBS Comms/ Public Affairs
CBS Marketing/ Donor Recruitment
Provincial Emergency Blood Management Cttee (P/TEBMC)
Hospitals*
P/T Blood /TLiaison
CBS Staff & volunteers
Hospital/RHA Emergency Blood Management Cttee
CBS patient and stakeholder groups
Donors
Media / Gen Public
Coordinated Parallel Activity
*includes posting on blood.ca

3.2 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.

3.2.1 Amber Phase Communications Approach

The declaration of an Amber Phase means that patient care is being impacted, either by delay, cancellation or postponement of non-urgent procedures that require blood and/or blood products. During an Amber Phase clear, consistent and coordinated communication will be essential towards maintaining the trust of key stakeholders and informing them of how the situation is being managed so that optimal care decisions can be made for patients.

3.2.2 Determination of an Amber Phase

As indicated in the operational 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 co-Chairs would be required to convene a meeting of the NEBMC to take the next steps in making a final determination of the phase.

3.2.3 Convening the NEBMC

The co-Chairs of the NEBMC will call a meeting of the NEBMC and their designates as quickly as appropriate to the severity and time-sensitivity of the situation, typically within 24 hours.

At this time, the NEMBC would discuss if the shortage could be managed internally. The final determination of the phase would be made by the CBS, with this counsel from the NEBMC being the primary consideration.

3.2.4 Frequency of NEBMC Meetings during Amber Phase

The NEBMC co-chairs will hold, at a minimum, weekly meetings during the Amber Phase, and possibly more depending on the nature of the shortage. At the very least, the NEBMC will meet going into and out of each phase of this plan.

3.2.5 Communications Between Meetings

For updates and information sharing that does not require a decision by the NEBMC, electronic memoranda will be distributed to the members from the NEBMC secretariat. Additionally, hospitals will continue to receive inventory bulletins. (Annex 2)

3.2.6 Approval of Key Messages

At the end of each teleconference, the NEBMC co-Chairs will summarize the key decisions of the meeting and ensure key messages are formulated, so that NEBMC members can cascade communication to the PEBMCs and CBS' internal/external stakeholders. Key messages from CBS should focus on the state of the inventory, a confirmation of the phase, mitigation efforts being made to address the situation and when the group can expect further communication. Key messages from the NEBMC should focus on the impact on clinical practice and transfusion protocols, and the counsel being made to the Provinces, RHAs and hospitals on how to best triage the limited supply of blood they have available through in-hospital supplies, and what they can expect from CBS.

3.2.7 Cascading Communication

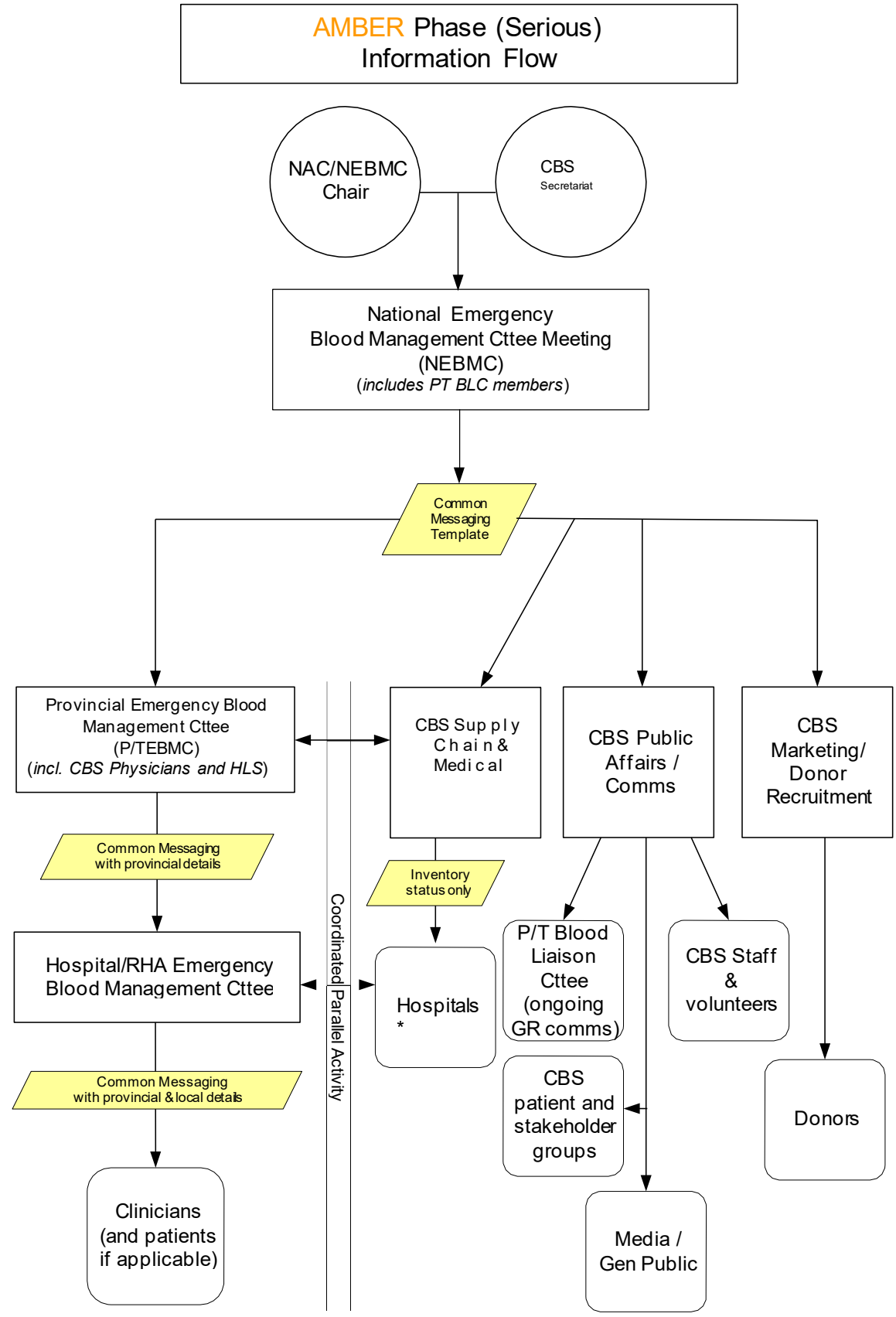
The NEBMC will be the conduit to the P/TEBMC, via Inventory Advisories (or Blood Shortage Advisories). It is imperative that those involved in managing the shortage (i.e. CBS, NEBMC, P/TEBMCs, and Hospital/RHA EBMCs) coordinate and align on external outreach to stakeholder groups, media.

Process:

1. NEBMC approved key messages are distributed to the entire NEBMC.

2. In parallel, key messages will be circulated to:
   a. Key divisions and departments at CBS, including its Business Continuity infrastructure (National and Local Emergency Response Teams). CBS will communicate inventory status only (hospital action is to be communicated by the PEBMC) to hospitals via fax, email and/or text messages. If available, other channels of information dissemination may be required to ensure communication has been received.
   b. The Provincial/Territorial Emergency Blood Management Committee via either the P/T Blood Liaison Committee Representative or Provincial NAC representatives.
   c. The Hospital/Regional EBMCs via the P/TEBMC members.

3. The P/TEBMC will be given approximately 8 hours (exact time to be determined by the NEBMC) to cascade information, after which time CBS will begin outreach to external stakeholder groups, donors and the media (if appropriate).


AMBER Phase (Serious)
Information Flow
NAC/NEBMC
Chair
CBS
Secretariat
National Emergency
Blood Management Cttee Meeting
(NEBMC)
(includes PT BLC members)
Common
Messaging
Template
Provincial Emergency Blood
Management Cttee
(P/TEBMC)
(incl. CBS Physicians and HLS)
CBS Supply
Chain &
Medical
CBS Public
Affairs /
Comms
CBS
Marketing/
Donor
Recruitment
Common Messaging
with provincial details
Inventory
status only
Coordinated Parallel Activity
Hospital/RHA Emergency
Blood Management Cttee
Hospitals
*
P/T Blood
Liaison
Cttee
(ongoing
GR comms)
CBS Staff
&
volunteers
Common Messaging
with provincial & local details
CBS
patient and
stakeholder
groups
Donors
Clinicians
(and patients
if applicable)
Media /
Gen Public
*includes posting on blood.ca

3.3 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).

3.3.1 Red Phase Communications Approach

The declaration of a Red Phase means that patient care is being impacted, and that all medical/surgical procedures requiring the affected components with the exception of emergency surgical procedures be deferred or canceled. Emergency surgical procedures are those that need to be performed within 24 hours in order to prevent the patient's death or major morbidity. Canada has not experienced a shortage of this nature in recent history. In a Red Phase clear, consistent and coordinated communication will be essential towards maintaining the trust of key stakeholders and informing how the situation is being managed.

3.3.2 Determination of a Red Phase

As indicated in the operational 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 co-Chairs would be required to convene a meeting of the NEBMC. Final determination of the phase would be made by the CBS with counsel from the NEBMC being the primary consideration.

3.3.3 Convening the NEMBC

The co-Chairs of the NEBMC will call a meeting of the members of the NEBMC and their designates to happen as quickly as appropriate to the severity and time-sensitivity of the situation– within approximately 4 hours for a Red Phase.

3.3.4 Frequency of NEBMC Meetings during Red Phase

During the Red Phase, the NEBMC will ideally hold daily meetings but at the minimum will convene twice weekly unless there is consensus of the NEBMC to delegate meetings to a smaller subset of the NEBMC which must at a minimum include the NEBMC co-Chairs.

3.3.5 Communications Between Meetings

For updates and information sharing that does not require a decision by the NEBMC, electronic memoranda will be distributed to the members from the NEBMC secretariat. Additionally, hospitals will continue to receive inventory bulletins. (Annex 3)

3.3.6 Approval of Key Messages

At the end of each teleconference, the NEBMC co-Chairs will summarize the key decisions of the meeting and formulate key messages that will be used for cascading communication. Key messages from CBS should focus on the state of the inventory, a confirmation of the phase, mitigation efforts being made to address the situation and when the group can expect further communication. Key messages from the NEBMC should focus on the impact on clinical practice and transfusion protocols, and the counsel being made to the Provinces, RHAs and hospitals on how to best triage the limited supply of blood they have available through in-hospital supplies, and what they can expect from CBS.

3.3.7 Cascading Communication

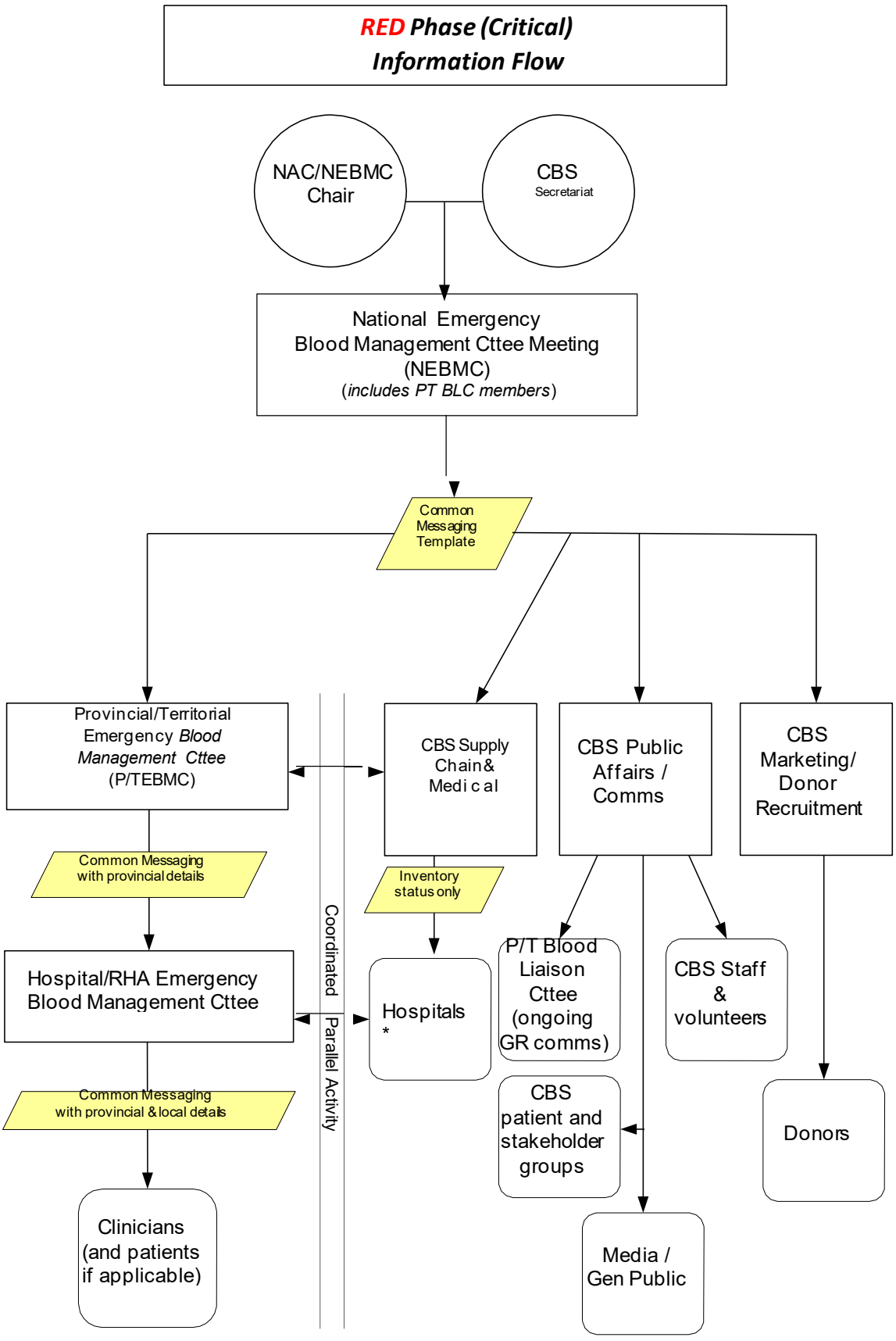
The NEBMC will be the conduit to the P/TEBMC, via Inventory Advisories (or Blood Shortage Advisories). It is imperative that those involved in managing the shortage (i.e. CBS, NEBMC, P/TEBMCs, H/RHA EBMCs) coordinate and align on external outreach to stakeholder groups, media.

Process:

1. NEBMC approved key messages are distributed to the entire NEBMC.

2. In parallel, key messages will be circulated to:
   a. Key divisions and departments at CBS, including its Business Continuity infrastructure (National and Local Emergency Response Teams). CBS will communicate inventory status only (since hospital action is to be communicated by the PEBMC) to hospitals via fax, email and/or text messages.
   b. The Provincial/Territorial Emergency Blood Management Committee via either the P/T Blood Liaison Committee Representative or Provincial NAC representatives.
   c. The Hospital/Regional EBMCs via the P/TEBMCs.

3. The P/TEBMC will be given approximately 8 hours (exact time to be determined by the NEBMC) to cascade information, after which time CBS will begin outreach to external stakeholder groups, donors and the media (as appropriate).



*includes posting on blood.ca

3.4 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.

3.4.1 Recovery from Red to Amber

If the blood component inventory levels show signs of sustained improvement, a meeting of the NEBMC will be called as per established procedure to determine if the situation warrants upgrading to the Amber Phase. Decisions related to that discussion will be communicated to EBMC groups and other stakeholders as outlined in the communication process for the Amber Phase.

3.4.2 Recovery from Amber to Green

If the national inventory shows sustained signs of growth, a meeting of the NEBMC will be called as per established procedure to determine if the situation warrants upgrading to the Green Phase.

Decisions related to that discussion will be communicated to EBMC groups and other stakeholders as outlined in the communication process for the Amber Phase. Subsequent communications will follow the process outlined in the Green Phase of this communications appendix.

Even if the phase is upgraded to Green, it is unlikely that will imply business as usual operations. Though elective procedures will now be permitted to proceed, there is still a strong likelihood that routine orders of some blood components will be reduced. There is also the chance of increased demand for blood products to respond to a backlog of procedures that were postponed by the shortage. Messaging of a return to Green Phase, and yet not operating business as usual may send mixed messaging. Therefore, it will be critical that all those involved in Emergency Blood Management at the national, provincial and regional/hospital level remain engaged and use consistent coordinated communications until the return to business as usual.

4.0 COMMUNICATIONS EVALUATIONS

Evaluation of the communications functions will improve program delivery and determine if communications are effective in meeting objectives at all stages of a shortage. This includes the development of evaluation tools to confirm CBS, hospitals and governments have successfully coordinated to ensure an equitable and ethical approach to blood shortages and have responded appropriately to various needs as they arise. Evaluation tools will be used to gauge changes in attitudes, behaviours, knowledge, status or levels of functions for each shortage phase.

Evaluation activities will include ongoing monitoring of:

- Media relations – daily monitoring and analysis of media coverage will determine if strategy is working and if improvements and/or corrections are required
- Stakeholder feedback
- Health Hotline inquiries (if applicable)
- Requests for information
- Public opinion polling and attitudinal market research (during shortage if issue is prolonged, or part of post-mortem analysis)
- Post-mortem surveying of EBMC members at the national, provincial and local levels.

ANNEX: NATIONAL INVENTORY SHORTAGE ALERT TEMPLATE

URGENT: IMMEDIATE ACTION REQUIRED

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

National Inventory Advisory

Date and time of issue	*<Date and Time>* (EST)
Inventory Availability Phase	***<appropriate colour or recovery>*** **PHASE**
Product(s)	*<product type, ABO and Rh as required>*
Description	*<Include the following in this section:* • *what has contributed/caused this shortage* • *what corrective actions are being taken* • *how long the shortage is expected to last>*
Impact on hospitals	*<In this section provide direction for hospitals>* *<for advisory activation>* Follow directives in the *<<insert phase here>>* section of The National / Provincial / RHA or Hospital blood shortage plan. **Action required:** All hospitals are to provide inventory levels by Noon EST *<<indicate frequency here>>* until further notice. 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 or in accordance with usual provincial practices (British Columbia and Manitoba). Hospitals are still encouraged to provide inventory levels on a regular basis to Canadian Blood Services/ responsible party per routine process.
For more information	For additional info, contact: 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/RHAs 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 on:

- RBC transfusions, follow guidelines for relevant phase declared as outlined in Table 1 of the 'Plan'.
- Platelet transfusions, follow guidelines for relevant phase declared as outlined in Table 2 of the 'Plan'.
- For frozen plasma and/or cryoprecipitate transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of alternatives such as prothrombin complex concentrate and/or fibrinogen concentrate in Amber Phase or Red Phase. Group A plasma may also be considered as an alternate to group AB plasma if appropriate mitigation and monitoring can be put in place. (Examples of mitigation strategies include measurement of isohemagglutinin titres, determination of maximal allowable volume, patient weight considerations),

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.
- **Green Phase Advisory** is a subcategory within Green Phase. When declared it implies that CBS inventory levels are low with respect to a particular blood component or blood components but the lack of information regarding the hospital inventories does not allow for an accurate assessment of Amber or Red Phase risk. It

will result in review combined CBS plus hospital inventories to determine the likelihood of crossing into Amber or Red Phase. It may act as a warning of a potential shortage if potential conservation initiatives are not implemented so serves as a signal for hospitals and provinces to consider activating mitigation strategies.

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, including transfusions, 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.
    - 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 from Amber to Green. 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 have communicated with hospitals and P/T departments of health while still in Green Phase 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/Territorial or Hospital/RHA Emergency Blood Management Committees from occurring to manage the local shortage situation.

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

The representatives that site on both the National and Provincial/Territorial Emergency Blood Management Committee are the P/T representative and the provincial NAC representative(s). These representatives are responsible to ensure communications flow bidirectionally within their jurisdiction.

The Secretariat duties for NEBMC are the provided by 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 as part of the Core NEBMC. 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

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 requiring CBS to communicate these limitations to their hospital customers. 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, or if more information regarding hospital inventories is required to accurately assess the risk of entering an Amber Phase or Red Phase, prior to going to a public media appeal for donors or requesting hospital customers to initiate blood conservation strategies, the CBS VP Medical Affairs and Innovation will consult with the NAC Chair to convene either the Core or the full NEBMC within 24-48 hours and institute a Green Phase Advisory.

Hospitals/RHA will then need to submit their inventory numbers, by blood group and components as directed by the NEBMC to CBS to compile so that an accurate assessment of what the additional phase declarations and actions may be required. These combined CBS and Hospital inventory reports along with the NEBMC member's jurisdictional information regarding anticipated daily demand over the upcoming week(s) will facilitate NEBMC decision making and potential inventory reallocation. The NEBMC will also determine if there are any changes to hospital inventory management practices that 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.

1. CBS CSCO or VP Medical Affairs and Innovation contacts NAC Chair
2. CBS produces Inventory Advisories for Core NEBMC / NEBMC
3. NEBMC Secretariat shares info with NEBMC members
4. CBS forwards messaging to its Stakeholders (P/T liaison committee, hospitals, patient groups and donors)
5. The P/T representative of the NEBMC or Provincial NAC representative(s) will share information with their respective P/TEBMC
6. P/TEBMC 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, the NEBMC Co-Chairs 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.

1. CBS produces Inventory Alerts/Key Messaging based upon agreed decisions at the NEBMC meeting.
2. NEBMC Secretariat shares info with NEBMC members.
3. In parallel, key messaging will be distributed as follows:
• The PT representative of the NEBMC, or provincial NAC representative to provide information to their respective P/TEBMC.
• CBS to provide information to: ○ Key divisions and departments at CBS including Business Continuity infrastructure ○ Hospitals (inventory status only information as hospital actions will be communicated by the P/TEBMC)
• The P/TEBMC to provide information to their respective Hospital/RHA EBMC who in turn would then evoke their internal communication plan/s.

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, the NEBMC Co-Chairs 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:
• The P/T representative of the NEBMC or provincial NAC representative to provide information to their respective P/TEBMC.
• CBS to provide information to: ○ Key divisions and departments at CBS including Business Continuity infrastructure ○ Hospitals (inventory status only information as hospital actions will be communicated by the P/TEBMC)
• The P/TEBMC to provide information to their respective Hospital/RHA EBMC who in turn would then evoke their internal communication plan/s.

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 □ Yes □ No(if no refer to standard tracking log) Has patient received product in the previous 24 h? □ Yes □ No If yes, list products:	Age:_____ Hemoglobin:_____ Platelet:_____ INR:_____ PTT:_____ Fibrinogen:_____	Blood Group:_____ pH:_____ Lactate:_____ Temp:_____
	Product Requested	
Section B: Forward to TMS Director/Triage Team to complete		
Meets any exclusion criteria □ Yes □ No If yes, which one(s)?	Date/Time of assessment:	SOFA score:
Meets any specific exclusion criteria □ Yes □ No If yes, which one(s)?	Date/Time of assessment:	SOFA score:
Decision made to administer □ Yes □ No □ Yes □ No □ Yes □ No □ Yes □ 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**	**Surgery cancelled?**		**# of units saved by following Protocol**
									Yes	**No**	

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**	**Surgery cancelled?**		**# of units saved by following Protocol**
									Yes	**No**	

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**	**Surgery cancelled?**		**# of units saved by following Protocol**
									Yes	**No**	

Comments:____

APPENDIX H: NATIONAL INVENTORY SHORTAGE ALERT TEMPLATE

URGENT: IMMEDIATE ACTION REQUIRED

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

National Inventory Advisory

Date and time of issue	*<Date and Time>* (EST)
Inventory Availability Phase	***<appropriate colour or recovery>*** **PHASE**
Product(s)	*<product type, ABO and Rh as required>*
Description	*<Include the following in this section:* • *what has contributed/caused this shortage* • *what corrective actions are being taken* • *how long the shortage is expected to last>*
Impact on hospitals	*<In this section provide direction for hospitals>* *<for advisory activation>* Follow directives in the *<<insert phase here>>* section of The National / Provincial / RHA or Hospital blood shortage plan. **Action required:** All hospitals are to provide inventory levels by Noon EST *<<indicate frequency here>>* until further notice. 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 or in accordance with usual provincial practices (British Columbia and Manitoba). Hospitals are still encouraged to provide inventory levels on a regular basis to Canadian Blood Services/ responsible party per routine process.
For more information	For additional info, contact: 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

APPENDIX I: Patient/Family Communication Template Example

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