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

BLOOD SHORTAGES SUBCOMMITTEE

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TABLE OF CONTENTS

BLOOD SHORTAGES SUBCOMMITTEE 2
TABLE OF CONTENTS 3
ABBREVIATIONS 5
ACKNOWLEDGEMENT 6
EXECUTIVE SUMMARY 7
Table 1: Causes of Blood Contingencies* 7
Table 2: Inventory Phases 9
1.0 INTRODUCTION 10
1.1 The Canadian Blood System 10
1.2 Purpose and Scope 10
1.3 Key Participants and Partners 11
1.4 History of Blood Shortages in Canada 11
2.0 ASSUMPTIONS USED IN THE INITIAL DEVELOPMENT OF THE PLAN 13
3.0 PLAN STRUCTURE OVERVIEW 17
3.1 Phases of Inventory Availability 17
Table 3: Inventory Indicators 17
3.1.1 Green Phase 19
3.1.2 Green Phase Advisory 19
3.1.3 Amber Phase 19
3.1.4 Red Phase 20
3.1.5 Recovery Phase 20
3.1.6 CBS Inventory Levels at Green, Amber and Red Phases 20
Table 4: Approximate CBS Inventory Levels 21
3.1.7 Total Inventory Levels 22
3.1.8 Actual Allocation of Blood Components in Times of Shortages 22
3.2 Key Participant Roles and Responsibilities 23
3.2.1 Canadian Blood Services 23
3.2.2 Canadian Blood Services-Provincial/Territorial Blood Liaison Committee 24
3.2.3 Provincial and Territorial Ministries of Health 24
3.2.3.1 Provincial/Territorial Ministry Blood Representatives 24
3.2.3.2 Lead Provincial/Territorial Ministry Blood Representative 24
3.2.4 National Advisory Committee on Blood and Blood Products 25
3.2.5 Hospitals/Regional Health Authorities 25
4.0 EMERGENCY BLOOD MANAGEMENT COMMITTEES 26
4.1 National Emergency Blood Management Committee Terms of Reference 26
4.1.1 Mandate 27
4.1.2 Membership 27
4.1.3 Meetings/Quorum 28
4.1.4 Communications and Support 28
4.1.4.1 Secretariat 28
4.1.4.2 NAC Members 29
4.1.4.3 Provincial/Territorial Ministry Blood Representatives 29
4.2 Provincial/Territorial Emergency Blood Management Committees 29

4.3 Hospital/Regional Health Authority Emergency Blood Management Committee 30
5.0 COMMUNICATIONS 32
6.0 SPECIFIC PARTICIPANT ACTIONS 33
6.1 Green Phase 33
6.1.1 Canadian Blood Services 33
6.1.2 Provincial/Territorial Ministries of Health 34
6.1.3 Hospitals/Regional Health Authorities 34
6.2 Green Phase Advisory 36
6.2.1 Canadian Blood Services 36
6.2.2 Provincial/Territorial Ministries of Health 36
6.2.3 Hospital/Regional Health Authorities 37
6.3 Amber Phase 38
6.3.1 Canadian Blood Services 38
6.3.2 Provincial/Territorial Ministries of Health 38
6.3.3 Hospital/Regional Health Authorities 38
6.4 Red Phase 39
6.4.1 Canadian Blood Services 39
6.4.2 Provincial/Territorial Ministries of Health 39
6.4.3 Hospitals/Regional Health Authorities 40
6.5 Determination of the Allocation of Blood Components from Canadian Blood Services to Hospitals/Regional Health Authorities in Amber and Red Phases 41
6.6 Recovery Phase 42
6.6.1 Canadian Blood Services 42
6.6.2 Provincial/Territorial Ministries of Health 43
6.6.3 Hospitals/Regional Health Authorities 43
Table 5: Guidelines for the use of RBC transfusions in children and adults in shortage situations 44
Table 6: Guidelines for the use of platelet transfusions in children and adults in shortage situations 45
REFERENCES 46
APPENDIX A: PROVINCIAL/TERRITORIAL BLOOD SHORTAGES PLANS 48
APPENDIX B: BLOOD CONTINGENCY ACTIVATION PATHWAYS – PROVINCIAL EXAMPLES 49
APPENDIX C: HIGH LEVEL SUMMARY OF THE PLAN 51
APPENDIX D: COMMUNICATIONS PLAN 57
APPENDIX E: TRIAGE TOOL EXAMPLES 67
APPENDIX F: PATIENT/FAMILY COMMUNICATION TEMPLATE 69
APPENDIX G: INVENTORY INDEX EXAMPLES 70
APPENDIX H: ETHICAL CONSIDERATIONS IN MANAGEMENT OF BLOOD SHORTAGES 79
APPENDIX I: APPROVAL AND REVISION HISTORY 82

ABBREVIATIONS

ADRD	Average Daily Red Cell Demand
BSSC	Blood Shortages Subcommittee
CBS	Canadian Blood Services
CBS-PTBLC	Canadian Blood Services-Provincial/Territorial Blood Liaison Committee
CSA	Canadian Standards Association
DOH	Days on Hand
EBMC	Emergency Blood Management Committee
H/REBMC	Hospital/Regional Emergency Blood Management Committee
HQ	Héma-Québec
H/RTC	Hospital/Regional Health Authority Transfusion Committee
NAC	National Advisory Committee on Blood and Blood Products
NAC-BSSC	National Advisory Committee Blood Shortages Subcommittee
NEBMC	National Emergency Blood Management Committee
P/T	Province/Territory
P/TEBMC	Provincial/Territorial Emergency Blood Management Committee
P/T Ministries	Provincial/Territorial Ministries of Health
PHAC	Public Health Agency of Canada
RBC	Red Blood Cell
RHA	Regional Health Authority[1]
VP	Vice President
WOH	Weeks on Hand

[1] Or alternate service providers/structure within a province/territory. Service providers are responsible for the delivery and administrating the operational aspects of the Plan in specified geographic areas authorized by the province/territory.

ACKNOWLEDGEMENT

The National Advisory Committee on Blood and Blood Products (NAC) and Canadian Blood Services wish to acknowledge the contribution of the members of the NAC Blood Shortage Subcommittee (originally the NAC Blood Shortages Working Group), past and present, who have participated in the initial development and subsequent revisions of The National Plan for Management of Shortages of Labile Blood Components.

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 several 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-Provincial/Territorial Blood Liaison Committee (CBS-PTBLC) 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 Canadian Blood Services (CBS), produced a draft framework document which was then widely circulated among key partners 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.

Table 1: 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)
Component release or testing failures/delays (including testing, technological, or manufacturing)		✓
Product contamination/recall		✓
Labour disruption		✓
Transportation disruption		✓
Seasonal influence: e.g. increase in trauma; decreasing in donations	✓	✓
Changes in donor deferral criteria		✓

*Adapted from the 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, including importations from other blood suppliers such as Héma-Québec, 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 in *The National Plan for Management of Shortages of Immunoglobulin (Ig) Products* found on the blood shortages page of the NAC website. 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 Provincial/Territorial Ministries of Health (P/T Ministries) and hospitals/regional health authorities (RHAs) 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 five phases of inventory availability – Green, Green Phase Advisory, Amber, Red, and Recovery, found in Table 2 below. The roles and responsibilities of the principal participants, namely CBS, the P/T Ministries and 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 key partners in the blood system to work collaboratively to assure that scarce resources are used in a fair and equitable manner. The Plan provides 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 activated. 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 I.

Table 2: Inventory Phases

Green Phase	• Implies that normal blood component inventory levels exist, and supply generally meets demand. • Includes a broad range of inventory levels ranging from an ideal inventory to temporary shortages that occur periodically and can be managed with existing CBS and hospital/RHA actions.
Green Phase Advisory	• Implies that CBS inventory levels are low with respect to a particular blood component or components and further insight into hospital inventory levels is needed. • Will result in review of combined CBS and hospital inventories to determine the likelihood of crossing into Amber or Red Phase. • May act as a warning of a potential shortage if conservation initiatives are not implemented and therefore serves as a signal for provinces/territories (P/Ts) and hospitals/RHAs to consider activating mitigation strategies. • At times when inventory is tenuous, Green Phase Advisory may be prolonged to allow for system visibility. Return to Green Phase will only occur when there is national inventory stability.
Amber Phase	• Implies that the national blood inventory is insufficient to continue with routine transfusion practices. • P/Ts and hospitals/RHAs 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 to Green Phase Advisory, and subsequently to Green Phase.

1.0 INTRODUCTION

1.1 The Canadian Blood System

Canada has two blood operators: Canadian Blood Services (CBS) which serves the provinces and territories (P/Ts) 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 P/Ts that they serve, but the management of the blood supply is entirely CBS 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 immunoglobulin, albumin and coagulation factor concentrates) and related products.

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

The Provincial/Territorial Ministry Blood Representatives, together with selected representatives from the CBS executive and senior management team, form a committee known as the Canadian Blood Services-Provincial/Territorial Blood Liaison Committee (CBS-PTBLC). This committee is co-chaired by a representative from CBS and Lead Province and provides a forum for the timely exchange of information between P/T Ministries and CBS.

CBS solicits advice from various key partners 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. NAC reports to CBS-PTBLC (current NAC membership and its terms of reference are provided on nacblood.ca). As described below, NAC has played a pivotal role in the development of the Plan.

1.2 Purpose and Scope

The purpose of the Plan is to maximize the effectiveness of a response (provincial/territorial, regional, or national) to any crisis that affects the adequacy of the blood supply in Canada. Primary emphasis is on the jurisdictions served by CBS, but also in contemplation and 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 P/T Ministries and hospitals/regional health authorities (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 regular Green Phase activities. The Plan addresses blood components collected, produced and distributed by CBS (i.e. red blood cell (RBC), platelet and frozen plasma components). However, many of the principles would also be applicable to a shortage of fractionated or recombinant

plasma protein products, as seen in *The National Plan for Management of Shortages of Immunoglobulin (Ig) Products*, found on the blood shortages page of the NAC website.

The intent of the Plan is not just to work "top down" from the blood supplier and/or National Emergency Blood Management Committee (NEBMC) to the P/Ts 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/ territorial emergency blood management plans. See Appendix B for potential pathways of contingency plan activations.

1.3 Key Participants and Partners

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 CBS, hospitals/RHAs, the P/T Ministries, and NAC members. Although some P/Ts have Provincial Blood Coordinating Offices, while not referred to specifically in the Plan, it is assumed that they, under the auspices of the corresponding P/T Ministry, will also play a key role in the implementation of the Plan. The Plan delineates roles and responsibilities for each of these participants.

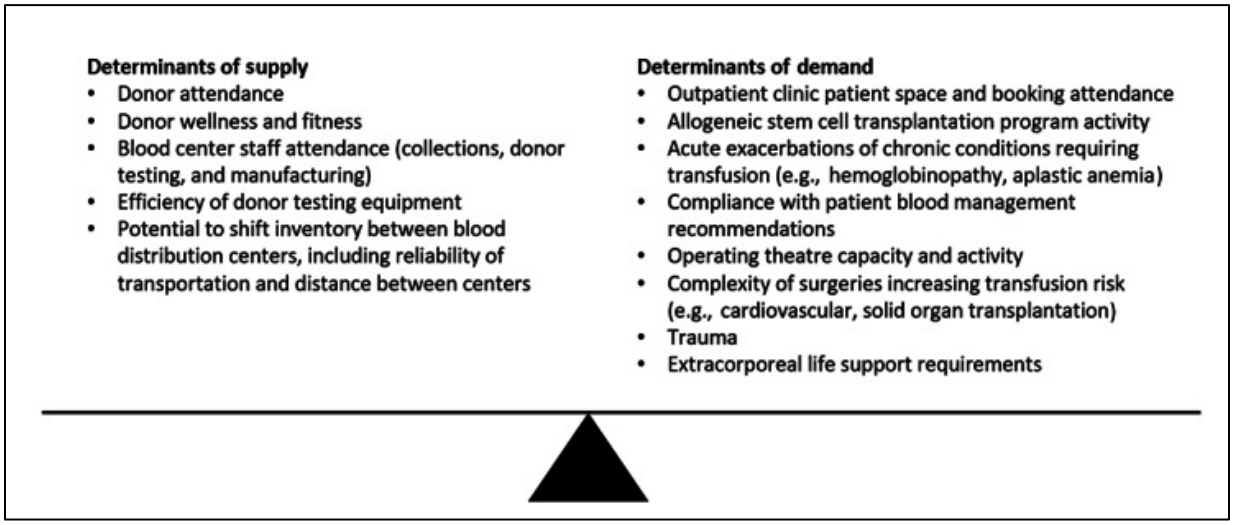
Key partners for the Plan are considered to be these participants, as well as others potentially affected (or representing those potentially affected) by the Plan such as patient/blood recipient societies, healthcare professional societies, HQ, Health Canada and others.

1.4 History of Blood Shortages in Canada

The number and scale of blood shortages in the Canadian jurisdictions served by the blood supplier, CBS, is documented on the *History of Blood Shortages in Canada* tracker found on the blood shortages page of the NAC website. Since the inception of the Plan, the majority of activations have been called 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. To facilitate this type of activation, a subcategory within the Green Phase, Green Phase Advisory, was created in 2015 and subsequently made its own phase, separate from Green Phase, in 2025.

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 medicine 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 or 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.

Figure 1: Balance of blood component supply and demand determinants in Canada during the COVID-19 pandemic.[1]



With each future challenge to the blood system, the primary goal of maintaining adequate components to secure supply for acute patient care and chronic transfusion support, if the challenge may be prolonged, will need to be assessed and balanced with the impacts, if any, of each challenge on society and donors. 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 HQ as they have a separate blood system, mentioned in the sections above. However, representatives from Québec are observers on NAC and the 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.

2.0 ASSUMPTIONS USED IN THE INITIAL DEVELOPMENT OF THE PLAN

Assumptions which were foundational in the initial development of the Plan and may have evolved as the Plan has undergone revisions are as follows:

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

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

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

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

- Provincial/territorial authority and responsibility for the delivery of the Canadian healthcare system, pursuant to the principles of the *Canada Health Act*: each P/T Ministry has a role in the management of blood delivery and blood utilization in its jurisdiction, including its role in hospital oversight;
- CBS' 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*"; and,
- 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 at risk of being 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, 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 H.

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, HQ 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 A. 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 (NAC-BSSC) will review the Plan annually as well as after each activation (real or simulated) for approval by NAC and the CBS-PTBLC.

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 and 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-BSSC 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 key partner 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, NAC has recommended that the *Synopsis for Triage Teams* be incorporated verbatim into provincial/ territorial/regional/hospital blood shortage contingency plans. Referencing the full framework and adding the synopsis document as a section or appendix in those provincial/territorial and hospital plans was also recommended. Both documents are available on the Blood Shortages tab of the NAC website (nacblood.ca). The P/T 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 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 E provides examples of documentation tools. These forms may be adapted by hospitals or RHAs 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/territorial 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/territorial 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.

3.0 PLAN STRUCTURE OVERVIEW

In keeping with other plans to manage blood shortages, the Plan considers five phases of inventory availability, defined below. Roles and responsibilities for the participants (CBS, P/T Ministries, and hospitals/RHAs) are described in this section in general terms and then specifically for each of the participants for each of the phases in section 6.0.

3.1 Phases of Inventory Availability

The Plan considers five phases of inventory availability – Green, Green Phase Advisory, 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 RBCs) or could involve multiple blood components. Additionally, different components could be in different phases (e.g. at one given time inventory availability for RBCs 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 standardized data elements are necessary for the Plan to function effectively during normal operations and during shortages. Ongoing work to develop this in Green Phase is still underway.

The availability of data in real time is essential for the National Emergency Blood Management Committee (NEBMC) to make informed decisions during a blood shortage. Therefore, the Plan supports ongoing development and monitoring of the blood system by the red cell demand-based inventory indicators in Table 3 below to be the most reliable method for monitoring and forecast of utilization.

Table 3: Inventory Indicators

	Definition	Details	Data Source
Days on Hand	Descriptive of blood supplier inventory levels.	Snapshot of availability of blood component inventory provided as a function of the average daily issues by CBS assuming utilization is stable.	CBS
Inventory Index	Descriptive of national, provincial/territorial and/or hospital inventory levels.	Inventory Index = Group specific or total inventory/ADRD*	Hospitals
Shipment Index	Descriptive of national, provincial/territorial and/or hospital inventory levels**	Shipment Index = Group specific or total inventory/ADRS***	CBS

* 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 Shipment Index in the absence of transparent blood inventory sharing can be a surrogate marker for the Inventory Index. Although these measures are expressed in days on hand, each is derived from a separate formula with different influences. Caution is advised when comparing Shipment Index to Inventory Index figures.
*** Average daily red cell shipments (ADRS) = group specific or total inventory/Daily CBS shipments based on 52-week average.

The provincial/territorial Inventory Index provides a mechanism for the NEBMC to compare P/Ts to one another in the time of activation of the Plan to facilitate distribution of RBC units.

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-RBC components.

The Provincial/Territorial Emergency Blood Management Committees (P/TEBMCs) can then use the hospital-based Inventory Indices 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 P/T or hospital/RHA. It is a recommendation that both the outdate and wastage rates be conditioned to the amount of P/T or hospital/RHA inventory being held and be actively monitored and decreased if necessary during Green Phase.

RBC Inventory Indices are also challenging to evaluate in small stock holding facilities. Data modeling in facilities that have average daily red cell demands (ADRD) of one or less indicate that there would be a very low likelihood of having demand exceed the ADRD. Overstocking for rare event contingency may contribute to harm for patients in other jurisdictions.

Currently, the hospitals that have capabilities to do so enter inventory levels into the CBS Inventory Level webpage within the Blood Component and Product Disposition System to allow rolling ADRD and Inventory Indices to be regularly established. During a blood shortage, the mandatory reporting of daily hospital 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.

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 ADRD. Hospitals and P/Ts 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. To ensure optimal inventory management and accurate ADRD calculations, it is essential that hospitals work towards the capability to readily share disposition data by blood group. 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.

Since these challenges have led to limitations with the Inventory Indices being useful by the NEBMC for decision making, the Shipment Index was introduced to the NEBMC in 2023 as a surrogate for the provincial/territorial Inventory Index. There are limitations to the Shipment Index when P/Ts, hospitals or RHAs have large redistribution of components but those caveats should be declared during NEBMC determinations.

During a phase activation, the reports for the NEBMC are generated using all available inventory data. National and/or provincial/territorial multi-level inventory reports are used during a shortage; they should also be leveraged for national, provincial/territorial and hospital shortage exercises. These reports contain all hospital submitted RBC inventory, including ADRD, Inventory Index and Shipment Index calculations; as well as the CBS inventory, including the days on hand (DOH) calculations. Excel-based, hospital inventory trend reports are also

prepared by CBS on a routine basis for hospital reference. This report contains daily hospital inventory data, ADRD and Inventory Index calculations. 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. However, it is likely appropriate and achievable to have a rolled up provincial/territorial recommendation for each blood group's target Inventory Index. The last Green Phase Advisory advised target provincial/territorial Inventory Indices of 10 and 15 for Rh positive and Rh negative blood groups, excluding blood group AB, respectively but there are hospitals with leaner Inventory Indices (e.g. 6-8) who have best practices that could be leveraged and shared with other hospitals. See Appendix G for Inventory Index examples.

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 CBS and hospital/RHA actions.

3.1.2 Green Phase Advisory

Green Phase Advisory implies that blood inventory levels are low with respect to a particular blood component or components and further insight into hospital inventory levels is needed to determine potential risk of entering Amber or Red Phase. These inventory limitations will be communicated to CBS's hospital customers and CBS will communicate any temporary inventory adjustments to hospitals through "business-as-usual" channels. This will be done prior to going to a public media appeal for donors or requesting hospital customers to initiate blood conservation strategies.

Hospitals/RHAs will 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 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 hospital 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, mass public/media appeals may be undertaken to avert a blood shortage. Refer to Appendix D, section 3.1 for details.

3.1.3 Amber Phase

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

3.1.4 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).

3.1.5 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, Amber, Green Phase Advisory and subsequently to the Green Phase, or from Amber, Green Phase Advisory to Green Phase.

3.1.6 CBS Inventory Levels at Green, Amber and Red Phases

It is not possible, a priori, to concisely define national inventory levels which would automatically trigger the declaration of an Amber Phase or Red Phase. Critical levels vary according to component (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).

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 DOH (defined as the available inventory in comparison to average daily issues of RBCs from CBS) which, as shown in Table 4 below, correspond approximately to inventory levels that could represent Green Phase, Green Phase Advisory, Amber Phase 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 RBC 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 decrease in inventory levels. Critical levels vary according to component, to blood group and to the anticipated length of a given shortage.

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.

Hospitals are encouraged to 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 entry is updated and modified to meet local needs, see section 3.1.7 for the inventory criteria around the phases that include total inventory numbers.

Table 4: Approximate CBS Inventory Levels

These are general guidelines that are taken into consideration, but not definitive thresholds for triggering a call of the NEBMC.

Phase	RBCs	Transfusable Plasma (O, A, B)	Transfusable Plasma (AB)	Platelets***
Green Phase	>3.5 DOH* for O Rh positive and A Rh positive blood groups, and, >3 DOH for all Rh negative blood groups.	>2 WOH**	>3 WOH	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.
Green Phase Advisory	>3 successive days of 3-3.5 DOH for either O Rh positive or A Rh positive blood groups. >3 successive days of 2-3 DOH for O Rh negative **or** multiple other Rh negative groups.	1-2 WOH	2-3 WOH	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.
Amber Phase	****	3-7 days	6-14 days	25-79% of daily national requirement, recovery **NOT** expected within 12-24 hours
Red Phase	****	<3 days	<6 days	<25% of daily national requirement, recovery **NOT** expected within 12-24 hours

* Days on hand, defined as the available inventory in comparison to the average daily red cell issues from CBS.
** Weeks on hand, defined as the available inventory in comparison to the average weekly issues of plasma from CBS.
*** 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 DOH.
**** National RBC inventory levels that would automatically trigger an Amber or Red Phase have not been developed.

3.1.7 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 DOH 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, hospitals and the NAC-BSSC Inventory Working Group such that total blood inventory levels can be reliably obtained, inventory criteria phase declaration is continually adjusted and updated.

The NAC-BSSC Inventory Working Group recommended that hospitals conduct inventory submission exercises to CBS on a quarterly basis. This allows a rolling 12 month disposition reporting period to be available for calculating ADRD and aid in determining the Inventory Indices that correspond to the phases of inventory availability for that hospital/RHA. This data will facilitate increased accuracy for the provincial/territorial Inventory Indices on the NEBMC reports when the Plan requires activation.

Examples of how inventory indices can be correlated to hospital inventory data and corresponding phases of the Plan are provided in Appendix G.

3.1.8 Actual Allocation of Blood Components in Times of Shortages

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 inventory level of blood components at hospitals, P/T Ministries and CBS. In consultation with the NEBMC and Provincial/Territorial Emergency Blood Management Committees (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 as described in section 4.0. 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 6.5.

The “red line” inventory in small rural sites will require ongoing risk management discussions at the hospital/RHA transfusion committees (H/RTC) and P/TEBMCs. While the NEBMC may provide general recommendations for rural facilities that are holding inventory for the purposes of emergency stock, they may need to be managed in Green Phase Advisory, Amber Phase and Red Phase scenarios differently. With each activation, especially in Amber or Red Phase, each P/TEMBC should share their approach to these facilities with the NEBMC. In a Red Phase, it is assumed that there would be no holding of RBC inventory in hospitals for hypothetical rare scenarios and that allocation decisions would be made on the basis of actual daily assessment of needs across all programs that support rural and remote facilities, including prehospital transport.

Although they may have been implemented during normal Green Phase periods, it is important that blood conservation strategies be reinforced at the hospital/RHA level to mitigate more serious blood component inventory situations whenever the Plan is activated. 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.

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 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 via email to the NEBMC Secretariat (NEBMCSecretariat@blood.ca).

3.2.1 Canadian Blood Services

CBS manages the blood supply in all P/Ts 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 HQ 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 the NEBMC (described in section 4.1).

CBS will also have a key role in coordinating communications as detailed in section 5.0 and will provide the secretariat for the NEBMC (section 4.1).

3.2.2 Canadian Blood Services-Provincial/Territorial Blood Liaison Committee

The general mandate of the CBS-PTBLC 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 the Plan, the CBS-PTBLC is responsible for establishing the NEBMC and maintaining its terms of reference (section 4.1), 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-PTBLC is also responsible for ensuring that NAC updates the Plan as required.

3.2.3 Provincial and Territorial Ministries of Health

Given that the provision of healthcare and essential services falls under P/T Ministries 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 P/T Ministry is responsible for the development of detailed provincial/territorial plans to manage blood component shortages, including the establishment in each P/T of a 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 P/T's other emergency preparedness plans. It is strongly recommended that a standardized phasing system of inventory availability (Green, Green Phase Advisory, Amber, Red and Recovery as defined in the Plan) be adopted by all P/Ts. Finally, the P/T Ministries should play a leadership role in encouraging hospitals/RHAs to comply with their provincial/territorial 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 Ministry Blood Representatives

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

All Provincial/Territorial Ministry 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 4.0). In this capacity, Provincial/Territorial Ministry 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/Ts, hospitals/RHAs and the blood operators.

3.2.3.2 Lead Provincial/Territorial Ministry Blood Representative

The Provincial/Territorial Ministry Blood Representative of the Lead Province will play a leadership role in facilitating and ensuring Provincial/Territorial Ministry Blood Representatives understand and participate as outlined in section 3.2.3.1.

3.2.4 National Advisory Committee on Blood and Blood Products

The NAC mandate is to provide medical and technical advice on the utilization management of blood and blood products to the P/T Ministries and CBS. In light of this mandate, and given NAC's expertise, NAC was requested by CBS-PTBLC to develop the Plan. For this work NAC initially convened the NAC-BSSC in September 2007, which subsequently established working groups to evaluate communication, inventory management and allocation guidelines. The allocation working group 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 2.0, part F).

The NAC-BSSC 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 NAC and CBS-PTBLC.

NAC members will also play a key role on the NEBMC; the Chair of 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

While some P/Ts may have the structure, authority, and capacity to deal with blood shortages for their entire jurisdiction, this is not true in every region served by CBS. If this is not the case and the Provincial/Territorial blood shortage management plan and/or that jurisdiction's P/TEBMC requires it to do so, 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/RHA blood shortage management plans should be based on, and comply with, the requirements outlined in the Plan. It is strongly recommended that a standardized phasing system of inventory availability (Green, Green Phase Advisory, Amber, Red and Recovery as defined in the Plan) be adopted by all hospital/RHA blood shortage management plans if they are required.

4.0 EMERGENCY BLOOD MANAGEMENT COMMITTEES

This section describes the emergency blood management committees (EBMCs) 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 NEBMC. This does not preclude the activities of the P/TEBMCs or H/REBMCs from occurring to manage a local shortage situation.

It is important for all members of the various levels of EBMCs to be aware that in extreme situations where the Core and/or Full NEBMC cannot be convened to provide advice to CBS, CBS will make decisions on inventory distribution until such time that permits the committee(s) to meet.

4.1 National Emergency Blood Management Committee Terms of Reference

A NEBMC is necessary to ensure the implementation of the Plan. The NAC-BSSC 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 Full NEBMC be convened. The members of the Core NEBMC will include:

- NAC Chair (NEBMC Co-Chair);
- CBS Vice President (VP) responsible for medical and hospital affairs (NEBMC Co-Chair);
- CBS VP responsible for supply chain operations;
- NAC-BSSC Chair; and,
- Co-Chairs of the CBS-PTBLC:
  - Lead Province Ministry of Health Official; and,
  - CBS Director responsible for 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. French translations of NEBMC communications will also be made available in a timely fashion. 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 Full NEBMC meeting summary to all NEBMC members, as soon as possible after a meeting; and,
- Members of NEBMC will further disseminate the information onto their respective P/TEBMC and H/REMBCs, as appropriate.

4.1.1 Mandate

The NEBMC will develop recommendations and provide advice to P/T Ministries, hospitals/ RHAs, and CBS to support a consistent and coordinated response to critical blood shortages in Canada. In the event that neither the Core nor Full NEBMC can be convened, CBS can activate the Plan if required and convene the Committee as soon as possible.

To this end, the Core/Full NEBMC will:

- Provide advice to CBS with respect to determining the appropriateness of declaring a national blood shortage phase, including a Green Phase Advisory, Amber Phase or Red Phase activation, and subsequent Recovery Phase from these situations;
- Provide recommendations on the distribution of blood components in Amber and Red Phases;
- Provide recommendations as to whether or not to implement 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 shortages to key partners;
- Ensure the necessary communication between the NEBMC and the P/TEBMCs occurs;
- Task the NAC-BSSC to review and report upon the implementation of the Plan and subsequent outcomes after each simulation exercise and live activation; and,
- Ensure ongoing refinement and improvements to the Plan.

4.1.2 Membership

The NEBMC will be co-chaired by the current chair of NAC and the CBS VP responsible for medical and hospital affairs. Both Co-Chairs are to name an appropriate designate to act in their absence as required. The membership of the NEBMC will include the following:

- CBS officials as determined by CBS and including the following:
  - VP responsible for medical and hospital affairs;
  - VP responsible for supply chain operations;
  - Directors responsible for integrated supply chain planning;
  - Director responsible for plasma protein and related products;
  - Medical Director responsible for plasma protein and related products;
  - Medical Director responsible for medical services and hospital relations;
  - Director responsible for governmental affairs; and,
  - Director responsible for communications.
- All NAC members;
- All Provincial/Territorial Ministry Blood Representatives (i.e., Provincial/Territorial Blood Liaison Committee);
- When available and appropriate, the Core/Full NEBMC may also consider ad-hoc representation of the following groups:
  - Héma-Québec;
  - Québec Ministry of Health;
  - Health Canada Biologics and Genetics Therapies Directorate;
  - Blood transfusion recipient groups – recommendations indicate that at least one should be an actual blood transfusion recipient (present or past) while others could

be representatives of applicable patient societies;
- Key partners from other national societies that may be impacted by the blood shortage; and,
- Additional experts as required to provide expertise on the subject matter being discussed.

Every member of the NEBMC is responsible for naming a designate to attend NEBMC meetings if they are unavailable. Members are responsible for ensuring that the NEBMC Secretariat has up-to-date contact information for both the NEBMC member and their designate. Contact information must be reviewed by NEBMC members each year, generally in the spring. The term of any member will be determined by the body that appointed them.

4.1.3 Meetings/Quorum

The 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 NEBCM Co-Chairs twice per year.

If required, the first regular meeting of each year could 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. As a living document, the Plan may undergo revision at any time at the discretion of the NAC-BSSC, based on lessons learned from real shortage situations.

Appendix C: High Level Summary of the Plan was developed by the NAC-BSSC to support NEBMC members during an actual blood shortage. It summarizes the five phases and their implications for transfusion, the NEBMC mandate, convening EBMCs, and the communication activities for each phase of the Plan.

Attendance of NEBMC membership (or their designates) at meetings is expected. 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, CBS 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 NEBMC Co-Chairs, including planned and unplanned simulation meetings;

- Reporting all proceedings and recommendations of the NEBMC to all members of the NEBMC and their designates; and,
- 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 P/Ts to the NEBMC. In conjunction with their Provincial/Territorial Ministry Blood Representatives, they will facilitate dissemination and implementation of NEBMC recommendations to their P/TEBMC and H/REBMC.

4.1.4.3 Provincial/Territorial Ministry Blood Representatives

In their NEBMC role, Provincial/Territorial Ministry Blood Representatives will facilitate the dissemination and implementation of NEBMC recommendations within their respective Ministries and to their P/TEBMC.

4.2 Provincial/Territorial Emergency Blood Management Committees

It is the responsibility of the P/T Ministries to establish a 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 the 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;
- Provide demand intelligence as requested (e.g. during a national inventory shortage), or signal concerns of a local or provincial/territorial shortage, which may impact blood collection and/or blood delivery to hospitals (e.g. during periods of prolonged severe weather);
- 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; and,
- Ensure a clear communication pathway from the P/TEBMC to the NEBMC via provincial/ territorial NAC or Ministry Representatives to:
    - Provide demand intelligence as requested (e.g. during a national inventory shortage); or,
    - Signal concerns of a local or provincial/territorial shortage, which may impact blood collection and/or blood delivery to hospitals (e.g. during periods of prolonged severe weather).

Thus, each P/TEBMC will work collaboratively as required with the NEBMC and its jurisdiction's H/REBMCs. P/Ts may wish to consider having a core or an executive P/TEBMC and then an expanded membership depending upon the extent of the crisis.

P/TEBMC Core team members **must include**:

- Provincial/Territorial Ministry Blood Representatives ; and,
- Provincial NAC member(s).

P/TEBMC 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; and,
- CBS representatives including Hospital Liaison Specialist(s).

In the event the situation warrants, the P/TEMBC members could be expanded to include:

- District/RHAs and/or tertiary care centre Chief Executive Officers;
- District/RHAs and/or tertiary care centre designates for:
  - Transfusion Service Medical Directors;
  - Laboratory Managers;
  - Hospital/RHA Risk Managers;
  - Medical Ethicists;
  - Transfusion Safety Officers;
  - Quality Specialists;
  - Nursing administrators;
  - Executive management representatives;
  - Physician user group representatives;
  - Chairs of transfusion committees; and,
  - Communication Specialists
- Blood recipient representative(s);
- CBS representatives including CBS' Medical Officer; and,
- Other individuals as designated by the group.

4.3 Hospital/Regional Health Authority Emergency Blood Management Committee

As indicated in section 4.2, the P/T Ministries are responsible for forming a P/TEMBC. Depending on the provincial/territorial structure there may be a need to further develop additional H/REBMCs to provide or facilitate bidirectional communication and implementation of blood contingency activities. In some P/Ts, 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/territorial plans. They are to ensure that these plans are appropriately communicated and adhered to in times of blood shortages and should serve as the bidirectional 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 H/RTC may act as the H/REBMC. The following outlines potential membership:

- Representative of hospital/RHA senior or executive management;
- Medical Director, Transfusion Services;
- 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; and,
- Other members as deemed appropriate by the H/RTC.

5.0 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 CBS, the P/T Ministries, and hospitals/RHAs. Each organization is independent, and has its own communications infrastructure, procedures, and complexities. A common course of action is required by these partners, however different they may be, to promote alignment, consistency and collaboration during a shortage or potential shortage.

The communications plan (Appendix D) proposes a framework to support strong collaboration, allowing all parties to provide timely, accurate and credible information to various internal and external key partners for the purposes of operational and informational communication.

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

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

6.0 SPECIFIC PARTICIPANT ACTIONS

This section of the Plan provides recommendations for specific actions for blood system participants during the five 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 CBS and hospital/RHA actions.

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

6.1.1 Canadian Blood Services

- Ensure ongoing support for the Plan including the policy, legal and ethical implications of the Plan;
- Develop, implement and maintain comprehensive business continuity plans;
- Manage the inventory nationally, including daily monitoring and distribution of the inventory across the country as appropriate;
- Ensure that mechanisms are in place for rapid sharing of inventory between CBS and Héma-Québec;
- Develop, implement and maintain internal strategies to respond to periodic requirements to increase blood donations;
- Coordinate the functioning of internal emergency response committees with the NEBMC activities/recommendations;
- Hold mock drills to evaluate internal and external responses to blood shortages;
- Provide leadership for the use of the Blood Component Disposition Report to monitor component outdates and to implement measures to decrease such outdates;
- Assist hospitals/RHAs in determining their Green Phase (i.e. optimal), Green Phase Advisory (i.e. suboptimal), Amber Phase (i.e. serious), and Red Phase (i.e. critical) inventory levels;
- Assist hospitals/RHAs and liaise with provincial/territorial partners in “leveling” Inventory Indices across the country by facilitating sharing of best practices;
- Develop, implement and maintain communication strategies and plans to inform hospitals, Health Canada, and P/T Ministries of changes in national inventory levels, including both decreases below optimum levels and recovery to normal levels; and,
- 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 information among hospitals/RHAs and with CBS.

6.1.2 Provincial/Territorial Ministries of Health

- Ensure ongoing support of the Plan including the policy, legal and ethical implications;
- Identify and empower a government program/agency or committee (e.g. provincial/ territorial blood coordinating office) charged with the development and maintenance of provincial/territorial blood component shortage management plans;
- Establish and maintain P/TEBMCs responsible for enacting the provincial/territorial plan;
- Actively direct all hospitals/RHAs to follow the Plan's guidelines and monitor their compliance in doing so:
  - Development of transfusion committees as per the *CSA Blood and Blood components standard Z902*;
  - Implementation of transfusion guidelines;
  - 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 hospital inventory reporting to CBS;
  - Development of blood redistribution programs and other methods/programs to minimize blood component outdating; and,
  - Activation of H/REBMC if required for simulations.
- Develop, implement and maintain 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 a 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, implemented and maintained in hospitals/ RHAs;
- Determine the "red line" inventory in small rural sites and risk mitigation strategies; and,
- 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/Regional Health Authorities

- Ensure ongoing support of the Plan including the policy, legal, and ethical implications;
- Ensure that there is a functional and maintained H/RTC and communication plan capable of reaching all clinical groups that use blood components and/or products (in most hospitals/RHAs the H/RTC will oversee the activities listed below);
- Develop, implement and maintain transfusion guidelines that 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;
- Exercise scrutiny of transfusion orders that are outside hospital/RHA guidelines;
- Ensure application of available blood alternatives and conservation methodologies;
- Develop, implement and maintain a strategy for perioperative blood inventory management, such as a maximum blood ordering schedule or an alternate strategy, to enable improved deferral/cancellation criteria during shortages;
- Develop, implement and maintain processes for hospital inventory management including guidelines for efficient inventory utilization and acceptable levels of outdating blood components;
- Ensure that the 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;
- In collaboration with provincial partners, determine the hospital/RHA inventory levels or Green Phase (i.e. optimal), Green Phase Advisory (i.e. suboptimal), Amber Phase (i.e. serious) and Red Phase (i.e. critical) levels, by blood group and component;
- Develop and maintain a mechanism for the redistribution of components between hospitals/RHAs;
- Establish a H/REBMC with a mandate to develop, implement and maintain a blood shortage plan that encompass all five phases of the Plan;
- Develop and maintain 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;
- Ensure that all hospitals have their ADRD, Inventory Indices, other applicable metrics and minimal inventory level calculations and that this has been communicated to the frontline medical staff;
- Determine, implement and maintain 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 a Green Phase Advisory, Amber Phase, Red Phase and/or Recovery Phase, as requested; and,
- Ensure that information systems are updated to enable receipt of blood components from other blood suppliers, especially Héma-Québec.

6.2 Green Phase Advisory

Green Phase Advisory acts as a signal for ongoing national inventory instability and implies that blood inventory levels are low with respect to a particular blood component or components and further insight into hospital inventory levels is needed to determine potential risk of entering Amber or Red Phase.

Green Phase Advisory may act as a warning of potential shortage if conservation initiatives are not implemented and therefore serves as a signal for P/Ts and hospitals/RHAs to consider activating mitigation strategies. At times when inventory is tenuous, Green Phase Advisory may be prolonged to allow for system visibility. Return to Green Phase will only occur when there is national inventory stability.

If a Green Phase Advisory is declared, the key partner activities are a hybrid of Green Phase (section 6.1) and Amber Phase (section 6.3). NEBMC members should ensure to additionally refer to both sections for a comprehensive understanding of specific key partner actions.

6.2.1 Canadian Blood Services

- Implement predetermined communications plans (see Appendix D);
- Activate internal plans appropriate for Green Phase Advisory;
- In collaboration with the NEBMC and P/TEBMCs decrease blood component issues to hospitals to levels determined appropriate to the situation (see section 6.5);
- Provide P/Ts with the percentage capture of hospital inventory reporting;
- Provide P/Ts with provincial ADRD, Inventory Index and any other applicable metrics;
- Identifying possible instances of non-adherence for follow up to the relevant P/TEBMC and NEBMC;
- Provide any other appropriate/necessary information to P/Ts to assist them to coordinate their communications to hospitals/RHAs and the public;
- If necessary, activate mechanisms for rapid sharing of inventory between CBS and Héma-Québec;
- Coordinate the functioning of internal emergency response committees with the NEBMC activities/recommendations; and,
- Implement and maintain communication strategies and plans to inform hospitals, Health Canada, and P/T Ministries of changes in national inventory levels, including both decreases below optimum levels and recovery to normal levels.

6.2.2 Provincial/Territorial Ministries of Health

- Activate P/TEBMC and/or H/REBMC internal plans appropriate for Green Phase Advisory – local or national;
- In collaboration with CBS, implement the pre-determined communications plan (see Appendix D);
- Actively direct 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 Green Phase Advisory:
  - Activate transfusion committees as per the *CSA Blood and Blood components standards Z902*;

  - Engage in stricter adherence and monitoring of transfusion guidelines;
  - Activate 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;
  - Participate in daily blood component disposition and hospital inventory reporting to CBS;
  - Minimize blood component outdating by utilizing blood redistribution programs/methods.
- Direct P/TEBMCs to monitor hospital compliance with and implementation of the actions required in Green Phase Advisory:
  - This may include the P/TEBMC guiding local CBS distribution centres as to hospital inventory distribution within the P/T.

6.2.3 Hospital/Regional Health Authorities

- Activate applicable internal plans appropriate for Green Phase Advisory – local or national;
- Convene the H/REBMC to monitor and control utilization of the affected blood components;
- Implement pre-established communications plans;
- Adjust hospital inventory levels of affected components to levels consistent with those previously determined appropriate for Green Phase Advisory;
- Request hospital inventory from CBS based on Green Phase Advisory requirements;
- Exercise scrutiny of transfusion orders that are outside hospital/RHA guidelines;
- Further emphasize and provide education on blood sparing alternatives and conservation strategies;
- Participate in daily Blood Component Disposition reporting by ABO group (versus totals only) to CBS;
- Minimizing blood component outdating by utilizing blood redistribution programs/methods;
- Emphasize risk management strategies so that the front-line medical staff are aware; and,
- Ensure all hospitals have their ADRD, Inventory Indices, other applicable metrics and minimal inventory level calculations complete and that these have been communicated to front-line medical staff.

6.3 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:

6.3.1 Canadian Blood Services

- Implement the predetermined communications plan (see Appendix D);
- 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 6.5);
- Provide P/Ts with the percentage capture of hospital inventory reporting;
- Provide P/Ts with the provincial ADRD and Inventory Index and any other applicable metrics;
- Identifying possible instances of non-adherence for follow up to the relevant P/TEBMC and NEBMC; and,
- Provide any other appropriate/necessary information to P/Ts to assist them to coordinate their communications to hospitals/RHAs and the public.

6.3.2 Provincial/Territorial Ministries of Health

- Activate P/TEBMC internal plans appropriate for Amber Phase – local or national;
- In collaboration with CBS, implement the pre-determined communications plan (see Appendix D);
- Notify senior management of hospitals/RHAs 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 5 and Table 6 for definitions); and,
- Direct P/TEBMCs to monitor hospital compliance with and implementation of the actions required in Amber Phase:
    - This may include the P/TEBMC guiding local CBS distribution centres as to hospital inventory distribution within the P/T.

6.3.3 Hospital/Regional Health Authorities

- Activate applicable internal plans appropriate for Amber Phase – local or national;
- Convene the H/REBMC to monitor and control utilization of the affected blood components;
- Implement pre-established communications plans;
- Adjust hospital inventory levels of affected components to levels consistent with those previously determined appropriate for Amber Phase;
- Request hospital 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 5;
- For platelet transfusions, follow guidelines for Amber Phase as outlined in Table 6;

- For frozen plasma transfusions, ensure strict adherence to guidelines established in Green Phase and consider use of alternatives such as prothrombin complex 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;
    - The blood bank Medical Director may convene the triage committee to help adjudicate competition for limited components.
- 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 A);
- Collect data on total hospital blood inventory on a daily basis and provide it to the P/T and/or P/TEBMC, if requested;
- Collect data on hospital utilization of blood, as necessary; and,
- Report hospital inventory (frequency determined by NEBMC) by blood group and component within a specific timeframe to CBS.

6.4 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 D) remain vitally important. In addition, the following actions will be taken:

6.4.1 Canadian Blood Services

- Implement the predetermined communications plan (see Appendix D);
- 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 6.5);
- 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 Provincial/Territorial Ministry Blood Representative(s); and,
- Provide any other appropriate/necessary information to P/Ts to assist them to coordinate their communications to hospitals/RHAs and the public.

6.4.2 Provincial/Territorial Ministries of Health

- Activate applicable internal plans appropriate for Red Phase – local or national;

- In collaboration with CBS, implement the pre-determined communication plan (see Appendix D);
- 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/RHAs of the requirement to follow the Red Phase Emergency Framework if activated by the NEBMC; and,
- Direct P/TEBMCs to monitor hospital compliance with and implementation of the actions required in Red Phase:
  - This may include the P/TEBMC guiding local CBS distribution centres as to hospital inventory distribution within the P/T.

6.4.3 Hospitals/Regional Health Authorities

- Activate internal plans appropriate for Red Phase – local or national;
- Convene the H/REBMC to monitor and control utilization of the affected blood components;
- Implement pre-established communications plans;
- Adjust hospital inventory levels of affected components to levels consistent with those previously determined appropriate for Red Phase;
- Request hospital inventory from CBS based on Red Phase requirements (see also section 6.5);
- 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 hemoglobinopathy patients, follow the CanHaem *Blood conservation for hemoglobinopathy patients during pandemic blood shortage* recommendations in addition to the guidelines for Red Phase as outlined in Table 5.
- For RBC transfusions, follow guidelines for Red Phase as outlined in Table 5;
- For platelet transfusions, follow guidelines for Red Phase as outlined in Table 6;
- For frozen plasma 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 consideration of the current circulating red cell group, 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;
  - The blood bank Medical Director may convene the triage committee to help adjudicate competition for limited components.
- 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 A);
- Collect data on total hospital 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; and,
- Collect data on hospital utilization of blood as necessary.

6.5 Determination of the Allocation of Blood Components from Canadian Blood Services to Hospitals/Regional Health Authorities in Amber and Red Phases

The way in which decisions for the allocation of blood components from CBS to hospitals/RHAs in Amber or Red Phase 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/RHAs 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 ‘levelled’ by the Inventory Index with NEBMC recommendations across the country. This method of allocation is most suitable when RBC 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.

3) Blood component issues from CBS could be decreased to an equivalent number of units per capita in all P/Ts. This method of allocation would have to be adjusted to consider the number of emergency procedures likely to be performed in more populous P/Ts versus those with smaller populations and less intensive medical or surgical procedures. However, it would have the advantage of not further penalizing P/Ts where extensive efforts had been made to optimize blood utilization.

Each P/T would direct CBS as to the precise distribution of components in its own P/T (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 P/T has not convened, then CBS should liaise with the P/T Ministry and NAC representatives for direction as to how to distribute units for that P/T. 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 Table 5 and Table 6.

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 P/T Ministry, in conjunction with CBS, to monitor the compliance of hospitals/RHAs with the Plan and for the P/T Ministry to intervene, if necessary, in situations where non-compliance is identified.

6.6 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.

Resumption of transfusion activities would likely occur through a graded return from Red, Amber, Green Phase Advisory, and subsequently to Green, or from Amber, Green Phase Advisory, 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.

Recovery Phase has the highest capacity for conflicting messaging, and it is critical that all participants in the 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.

6.6.1 Canadian Blood Services

- Maintain continued contact with national, provincial/territorial and hospital/regional 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; and,
- 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/territorial and hospital/RHA plans as a process of continued improvement.

6.6.2 Provincial/Territorial Ministries of Health

- Maintain continued contact with national, provincial/territorial and hospital/regional 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; and,
- 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/territorial and hospital/RHA plans as a process of continued improvement.

6.6.3 Hospitals/Regional Health Authorities

- Maintain continued contact with national, provincial/territorial and hospital/regional 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 hospital 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; and,
    - 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 hospital inventory numbers to CBS; and,
- 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/territorial and hospital/RHA 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/territorial and hospital/RHA 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 5: Guidelines 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 > 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.	All requests for RBC transfusion in patients with a Hb level > 50 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. Follow the guidance found in the CanHaem *Blood conservation for hemoglobinopathy patients during pandemic blood shortage*.

[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 6: Guidelines 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 (e.g. 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 >20x 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 >30 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 >10 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	**Bone marrow failure/stem cell transplantation/chemotherapy/chronic transfusion recipients**	**Bone marrow failure/stem cell transplantation/chemotherapy/chronic transfusion recipients**
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 outpatient prophylactic transfusions; lower this threshold to 5 x 10^9/L for inpatient prophylactic transfusions. 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 5.
- 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.

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1. Prokopchuk-Gauk O, Petraszko T, Nahirniak S, Doncaster C, Levy I. Blood shortages planning in Canada: The National Emergency Blood Management Committee experience during the first 6 months of the COVID-19 pandemic. Transfusion. 2021 Nov;61(11):3258-3266. Figure 1, Balance of blood component supply and demand determinants in Canada during the COVID-19 pandemic; p. 3260. doi: 10.1111/trf.16661

APPENDICES

Appendix A Provincial/Territorial Blood Shortages Plans

Appendix B Blood Contingency Activation Pathways - Provincial Examples

Appendix C High Level Summary of the Plan

Appendix D Communications Plan

Appendix E Triage Tool Examples

Appendix F Patient/Family Communications Template Example

Appendix G Inventory Index Examples

Appendix H Ethical Considerations in Management of Blood Shortages

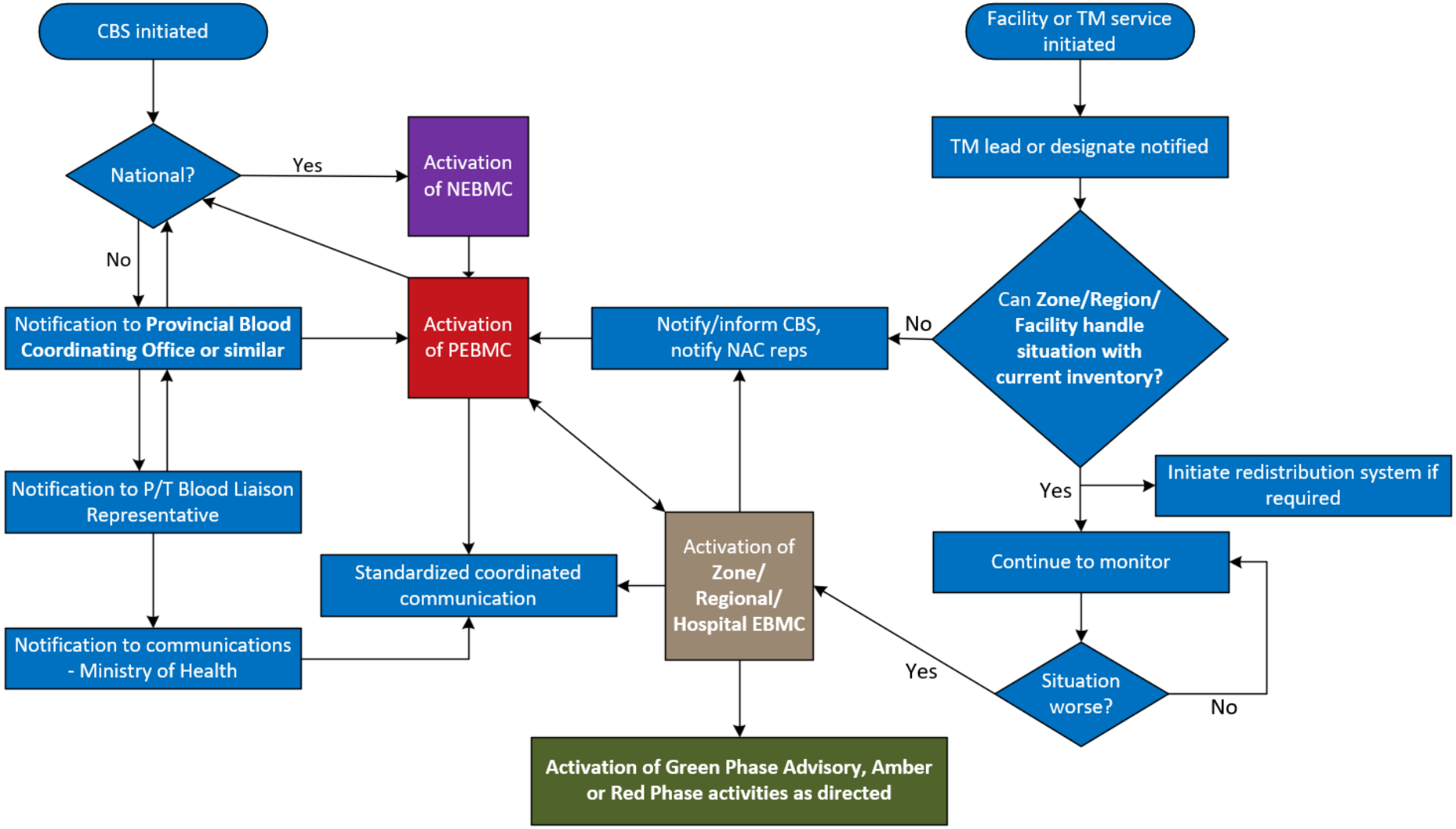
Appendix I Approval and Revision History

APPENDIX A: PROVINCIAL/TERRITORIAL BLOOD SHORTAGES PLANS

British Columbia	British Columbia Blood Contingency Plan
Alberta	Alberta Blood Contingency Plan
Saskatchewan	Saskatchewan Blood Contingency Plan
Manitoba	Manitoba Blood Shortages Plan
Ontario	Ontario Contingency Plan for the Management of Blood Shortages
Newfoundland & Labrador	Emergency Blood Management Plan
Prince Edward Island	PEI Provincial Emergency Blood Contingency Plan
Nova Scotia	Nova Scotia Blood Contingency Plan
New Brunswick	New Brunswick Blood Shortages Management Plan Plan du NB pour la gestion de la penurie de sang

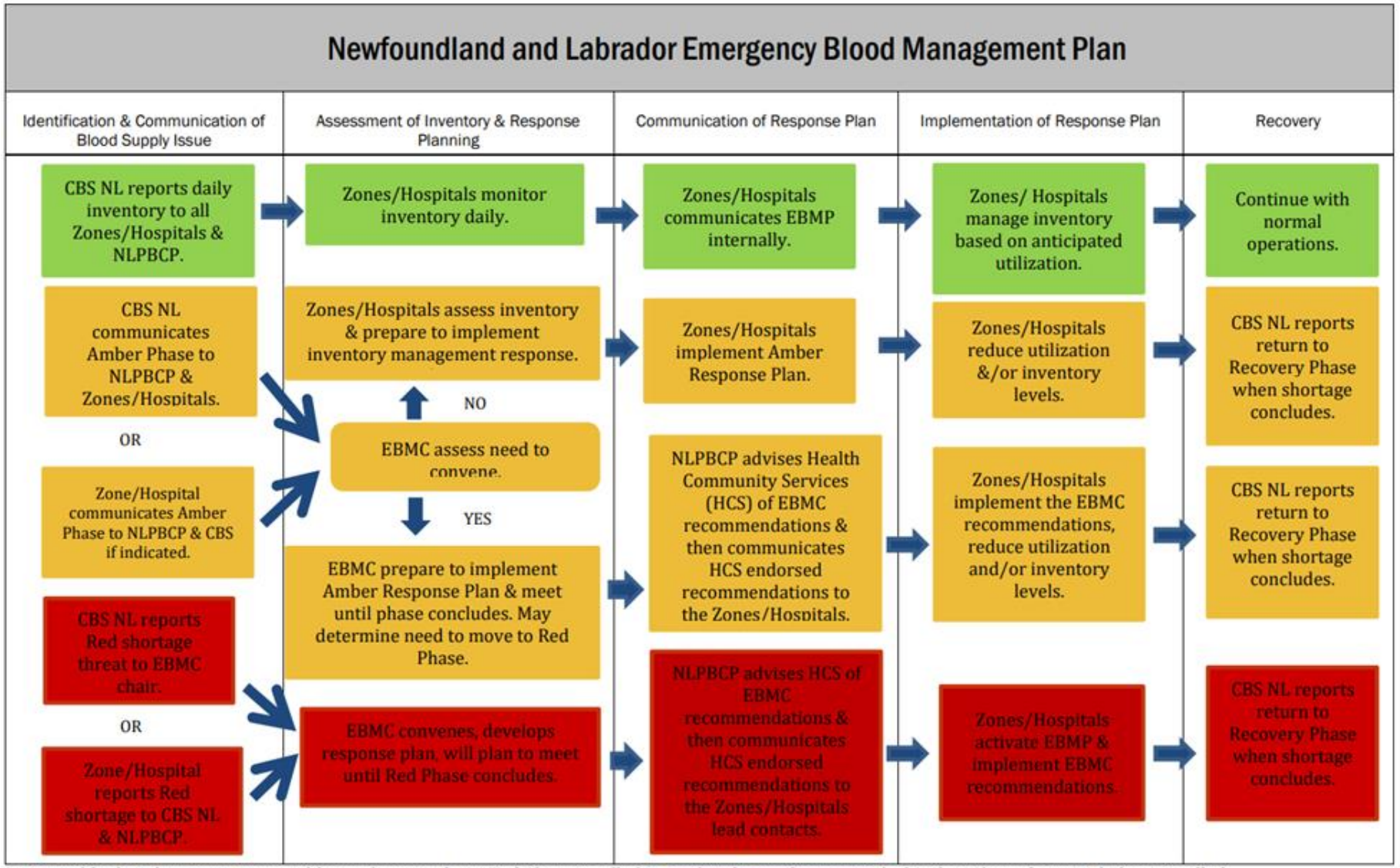
APPENDIX B: BLOOD CONTINGENCY ACTIVATION PATHWAYS – PROVINCIAL EXAMPLES

Example 1: Alberta



Government of Alberta – Health. Alberta Blood Contingency Plan [Internet]. Government of Alberta; 2020 Jul [cited 2025 Apr 29]. Available from: https://open.alberta.ca/dataset/d7674392-1cde-4ffb-95ef-75923e35be50/resource/c3afb972-4091-4a42-9067-be6cfd6c276b/download/health-alberta-blood-contingency-plan-2020.pdf

Example 2: Newfoundland and Labrador



Hayse S, Dawe M. Emergency Blood Management Plan [Internet]. Government of Newfoundland and Labrador; 2024 Feb 16 [cited 2025 Apr 29]. Available from: https://www.gov.nl.ca/hcs/files/Emergency-Blood-Management-Plan-Version-4.0.pdf

APPENDIX C: HIGH LEVEL SUMMARY OF THE PLAN

The specific purpose of the *National Plan for Management of Shortages of Labile Blood Components* (the Plan) is to maximize the effectiveness of a response to any crisis which impacts the adequacy of the blood supply in Canada. This appendix summarizes:

- The five phases and their implications for transfusion;
- The National Emergency Blood Management Committee mandate;
- Convening Emergency Blood Management Committees; and,
- Communication activities for each phase of the Plan.

This is a high level summary of the Plan and should be used as such. NEBMC members are expected to familiarize themselves with the details of the parent Plan.

ABBREVIATIONS:

CBS	Canadian Blood Services
H/REBMC	Hospital/Regional Emergency Blood Management Committee
NAC	National Advisory Committee on Blood and Blood Products
NEBMC	National Emergency Blood Management Committee
P/T	Province/Territory
P/TEBMC	Provincial/Territorial Emergency Blood Management Committee
P/T Ministries	Provincial/Territorial Ministries of Health
RBC	Red Blood Cell
RHA	Regional Health Authority (or equivalent)

1.0 SHORTAGE PHASES AND POTENTIAL IMPLICATIONS FOR TRANSFUSIONS

NOTE: For more detailed information on:

- RBC transfusions, follow guidelines for the relevant phase declared as outlined in Table 5 of the Plan.
- Platelet transfusions, follow guidelines for the relevant phase declared as outlined in Table 6 of the Plan.
- For plasma 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. Low titre group A plasma may also be considered as an alternate to group AB plasma.

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 CBS and hospital/RHA actions.

During the Green Phase there should be no interruption of transfusion services. Actions will focus on ensuring that plans to address potential shortages are developed and that components are used safely and appropriately.

Green Phase Advisory implies that CBS inventory levels are low with respect to a particular blood component or components and further insight into hospital inventory levels is needed to determine potential risk of entering Amber or Red Phase.

Green Phase Advisory acts as a signal for ongoing national inventory instability. When declared, it implies that CBS inventory levels are low with respect to a particular blood component or components and may require CBS to adjust routine hospital orders. Green Phase Advisory may act as a warning of a potential shortage if conservation initiatives are not implemented and therefore serves as a signal for P/Ts and hospitals/RHAs to consider activating mitigation strategies. At times when inventory is tenuous, Green Phase Advisory may be prolonged to allow for system visibility. Return to Green Phase will only occur when there is national inventory stability.

- Activate applicable internal plans appropriate for Green Phase Advisory – local or national;
- Adjust hospital inventory levels of affected components to levels consistent with those previously determined appropriate for Green Phase Advisory (see section 6.5 for details);
- Exercise scrutiny of transfusion orders that are outside hospital/RHA guidelines;
- Report hospital inventory (frequency determined by the NEBMC) by blood group and component within a specified time frame to CBS.

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

- Activate applicable internal plans appropriate for Amber Phase – local or national;
- Adjust hospital inventory levels of affected components to levels consistent with those previously determined appropriate for Amber Phase;
- Defer elective medical/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 hospital inventory (frequency determined by the NEBMC) by blood group and component within a specified timeframe to CBS.

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

- Activate applicable internal plans appropriate for Red Phase – local or national;
- Adjust hospital inventory levels of affected components to levels consistent with those previously determined appropriate for Red Phase;
- 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 hospital inventory (frequency determined by the NEBMC) by blood group and component within a specified timeframe to CBS; and,
- Follow NEBMC recommendations as to whether or not to implement triage and rationing guidelines for massively bleeding patients in a Red Phase (NAC *Emergency framework for rationing of blood for massively bleeding patients during a red phase of a blood shortage*).

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.

Resumption of transfusion activities would likely occur through a graded return from Red to Amber, Green Phase Advisory and subsequently to Green, or from Amber, Green Phase Advisory 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; and,
- Conduct debriefing activities within 4-6 weeks following the event.

2.0 NATIONAL EMERGENCY BLOOD MANAGEMENT COMMITTEE

The NEBMC's role is to develop recommendations and provide advice to the P/T Ministries, hospitals/RHAs and CBS to support a consistent and coordinated response to critical blood shortages in Canada. The Secretariat duties for the NEBMC are provided by CBS. The NEBMC mandate is as follows:

- Provide advice to CBS with respect to determining the appropriateness of declaring a national blood shortage phase;
- Provide recommendations on the distribution of blood components in Amber 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 shortages to key partners;
- Ensure the necessary communication between the NEBMC and P/TEBMCs occurs;
- Task the NAC Blood Shortages Subcommittee to review and report upon the implementation of the Plan and subsequent outcomes after each simulation exercise and live activation; and,
- Ensure ongoing refinement and improvements to the Plan

In extreme situations where the Core and/or Full NEBMC cannot be convened to provide advice to CBS, CBS will make decisions on inventory distribution until such time that permits the committee(s) to meet.

3.0 CONVENING OF EMERGENCY BLOOD MANAGEMENT COMMITTEES

The activities of the various emergency blood management committees (NEBMC, P/TEBMC, H/REBMC) 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 NEBMC. This does not preclude the activities of the P/TEBMCs or H/REBMCs from occurring to manage the local shortage situation.

Members of P/TEBMCs and H/REBMCs must be aware that they can move a provincial/regional shortage up the scale and can notify the NEBMC through their P/T Ministry or NAC representatives on the NEBMC. In other words, the Plan is to work not just top down (CBS to NEBMC to hospitals/RHAs) but bottom up (hospitals/RHAs to Provincial/Territorial Ministry Blood Representative to NEBMC).

The representatives that sit on both the NEBMC and P/TEBMC are the Provincial/Territorial Ministry Blood Representative and the provincial NAC representative(s). These representatives are responsible to ensure communications flow bidirectionally within their jurisdiction.

In advance of activating any part of the Plan there may be consultation between the NEBMC Co-Chairs as part of the Core NEBMC. The Core NEBMC may also meet to discuss a situation prior to convening the Full NEBMC. Updates and information sharing that does **NOT** require a decision by the NEBMC will be distributed to members by the NEBMC Secretariat.

4.0 COMMUNICATION CASCADES

Communications will cascade from the NEBMC to the P/TEBMCs via inventory advisories and/or key messages. It is imperative that those involved in managing the shortage (i.e. CBS, NEBMC, P/TEBMCs, and H/REBMCs) coordinate and align on external outreach to key partners groups and the media. See the Communications Flow diagram in Appendix D, section 2.7 for a detailed outline of the steps to guide the flow of information.

As national blood inventory levels fluctuate, the general principles, strategies and objectives will remain constant. Should inventory decline, specific actions will be required and the need for regular communication to a broad range of key partners will intensify. The following sections outline the communications activities for each phase of the Plan. Details can be found in Appendix D.

Green Phase

When inventory levels are within the optimal range, CBS' communications related to the national blood inventory occur through business-as-usual channels. Consultation with the NEBMC Co-Chairs and other NEBMC members may also be advisable under certain conditions in Green Phase. Communication activities should focus on emergency preparedness including the following:

- Review and update national, provincial and hospital/RHA communications plans by the appropriate EBMCs;

- Confirm and distribute EBMC contact lists (at least annually);
- Tabletop exercises; and,
- Update communications plans based on key learnings identified in exercises or prior activations.

Green Phase Advisory

If a particular blood type or component's inventory levels become limited and require entering Green Phase Advisory CBS may adjust routine hospital orders. At times when inventory is tenuous, Green Phase Advisory may be prolonged to allow for system visibility. CBS will communicate this to hospitals through "business-as-usual" channels (Appendix D, Annex 1 and 2).

Should the situation persist, the NEBMC Co-Chairs will convene the Core or Full NEBMC to determine if there are any changes to hospital inventory management practices that can assist with and/or improve the situation. These inventory updates would be distributed to the P/TEBMC, NEBMC, hospitals and other key partners via CBS' "business-as-usual" channels. If no change in hospital inventory management practices is recommended, CBS will continue to communicate updated information through "business-as-usual" channels.

Amber Phase

A shortage situation is most likely to be identified by CBS, but it may also be identified by a region and/or hospital/RHA and be 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. If Amber Phase was to be declared, meetings will be called weekly at a minimum, and hospitals will continue to receive inventory bulletins (Appendix D, Annex 1 and 2). Updates and information can be shared with the NEBMC between meetings by email via the NEBMC Secretariat. Additionally, hospitals will continue to receive inventory bulletins.

The NEBMC Co-Chairs will ensure key messages are formulated, so that NEBMC members can cascade communication to P/TEBMCs and internal/external key partners.

- Key messages from CBS should include the state of the inventory, a confirmation of the phase, mitigation efforts underway and the timeline for the next updates; and,
- Key messages from the NEBMC should include a confirmation of the phase, the impact on clinical practices and transfusion protocols, and recommendations being made to the P/T Ministries, P/TEBMCs and hospitals/RHAs on how to best triage the limited supply of blood they have available through in-hospital supplies.

Red Phase

A shortage situation is most likely to be identified by CBS, but it may also be identified by a region and/or hospital/RHA 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. If Red Phase was to be declared, meetings will be called twice a week, at a minimum. Updates and information can be shared with NEBMC between meetings by email via the NEBMC Secretariat. Additionally, hospitals will continue to receive inventory bulletins.

The NEBMC Co-Chairs will ensure key messages are formulated, so that NEBMC members can cascade communication to PEBMCs and internal/external key partners.

- Key messages from CBS should include the state of the inventory, a confirmation of the phase, mitigation efforts underway and the timeline for the next update; and,
- Key messages from the NEBMC should include confirmation of the phase, impact on clinical practice and transfusion protocols, and the counsel being made to the P/T Ministries, P/TEBMCs and hospitals/RHAs on how to best triage the limited supply of blood they have available through in-hospital supplies, and what they can expect from CBS.

Recovery Phase

If the blood component inventory levels show signs of sustained improvement, a meeting of the NEBMC will be called to determine if the situation warrants upgrading to Amber Phase. Decisions related to that discussion will be communicated to EBMCs and other key partners as outlined in Appendix D.

If the national inventory shows sustained signs of growth, a meeting of the NEBMC will be called to determine if the situation warrants upgrading to Green Phase. Subsequent communications will follow the process outlined in the Green Phase in Appendix D.

Even if the phase is upgraded to Green, it is unlikely that will imply business as usual operations and 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 EBMCs at the national, provincial/territorial and hospital/RHA level remain engaged and use consistent coordinated communications until the return to business as usual.

APPENDIX D: COMMUNICATIONS PLAN

ABBREVIATIONS

CBS	Canadian Blood Services
EBMC	Emergency Blood Management Committee
H/REBMCs	Hospital/Regional Emergency Blood Management Committees
NAC	National Advisory Committee on Blood and Blood Products
NEBMC	National Emergency Blood Management Committee
P/TEBMC	Provincial/Territorial Emergency Blood Management Committee
P/T Ministries	P/T Ministries of Health
RHAs	Regional Health Authorities

1.0 INTRODUCTION

Effective and timely communication is critical in attempts to mitigate a national blood shortage, both while in a shortage and afterwards during recovery efforts. The principal organizations who are partners to manage a blood shortage are Canadian Blood Services (CBS), P/T Ministries of Health (P/T Ministries) and hospitals/regional health authorities (RHAs). Each organization is independent, and has its own communications infrastructure, procedures and complexities. However, alignment of all partners is required to support a coordinated response during a shortage or potential shortage.

This communications appendix proposes a communications framework to support strong collaboration, allowing all parties to provide timely and accurate information to various internal and external key partners.

Note: *This appendix provides overarching and general principles, key messages, and high-level communication processes. It is imperative that each jurisdiction produces its own communications plan based on their specific needs while keeping consistent with direction from this document. It is also recommended that Provincial/Territorial Emergency Blood Management Committee (P/TEBMC) communications include CBS, where possible.*

2.0 GENERAL APPROACH

2.1 Communications Guiding Principles

In order to maintain trust, build confidence, and meet the needs of the diverse key partners across the broader blood system, all partners will commit to uphold and demonstrate the following guiding communications principles:

- Practice openness, honesty and transparency;
- Provide a quick and timely responses;
- Use frank, clear and direct communications;
- Strive to inform relevant audiences and key partners before the public;
- Be consistent and align with key messages;
- Communicate regularly;
- Ensure collaboration and coordination of communications between partners;
- Avoid assigning blame;

- Include the “why” and “how” when explaining decision or action; and,
- Provide opportunities where possible for relevant education that inspires understanding and participation among key audiences and key partners.

2.2 Overarching Communications Objectives

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

- Maintain and build the trust and confidence of Canadians in the safety, security and reliability of the national blood system;
- Ensure health providers can make informed decisions about patient care during a shortage;
- Demonstrate system resilience and strong collaboration between CBS, the P/T Ministries and hospitals/RHAs to mitigate and/or manage a shortage as effectively as possible; and,
- Reassure and engage key partners, including engaging Canadians as part of mitigation/ recovery efforts.

2.3 Core Key Messages

- CBS, P/T Ministries and hospitals/RHAs have an effective plan in place to ensure patients across the country continue to have access to a safe, reliable and equitable supply of blood products in the event of a blood shortage in Canada.
- Through the national inventory and inter-provincial/territorial collaboration, the Plan ensures that critical patient need for blood products is the priority.

Beyond the above key messages, additional national, provincial/territorial or local messages may be needed and will be developed by the appropriate Emergency Blood Management Committee (EBMC) according to inventory availability and the specific needs of CBS, P/T Ministries and hospitals/RHAs.

2.4 Key Audiences

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

Internal

- CBS;
- Federal and P/T Ministries;
- Hospitals/RHAs;
- Héma-Québec;
- Public Health Agency of Canada; and/or,
- Jurisdiction-specific internal audiences to be determined by local provincial/territorial plans.

External

- Health system clinicians, nurses and allied healthcare workers;
- Transfusion medicine and outpatient procedure clinics;
- Individual patients requiring blood;
- Patient groups;
- Donors;

- Volunteers;
- Media; and/or,
- Public.

2.5 Recommended Spokespersons

Appropriate spokespersons, and their designates will be identified based on factors such as the shortage situation, the phase, and the jurisdiction. Examples of possible spokespeople are included below but final decisions/nominations will be made by the appropriate EBMC:

National

- CBS Chief Executive Officer/designate;
- CBS Co-Chair of National Emergency Blood Management Committee (NEBMC);
- National Advisory Committee on Blood and Blood Products (NAC) Co-Chair of NEBMC; and/or,
- Health Minister/designate.

Provincial

- P/T Ministers of Health/designate;
- Provincial/Territorial Chief Medical Officer of Health;
- Provincial NAC representatives; and/or,
- CBS medical representatives, if applicable.

Regional

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

- Chairs of Hospital/Regional Emergency Blood Management Committees (H/REBMC);
- Hospital/RHA Transfusion Medicine Medical Directors; and/or,
- CBS medical representatives, if applicable.

Other Key Partners

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

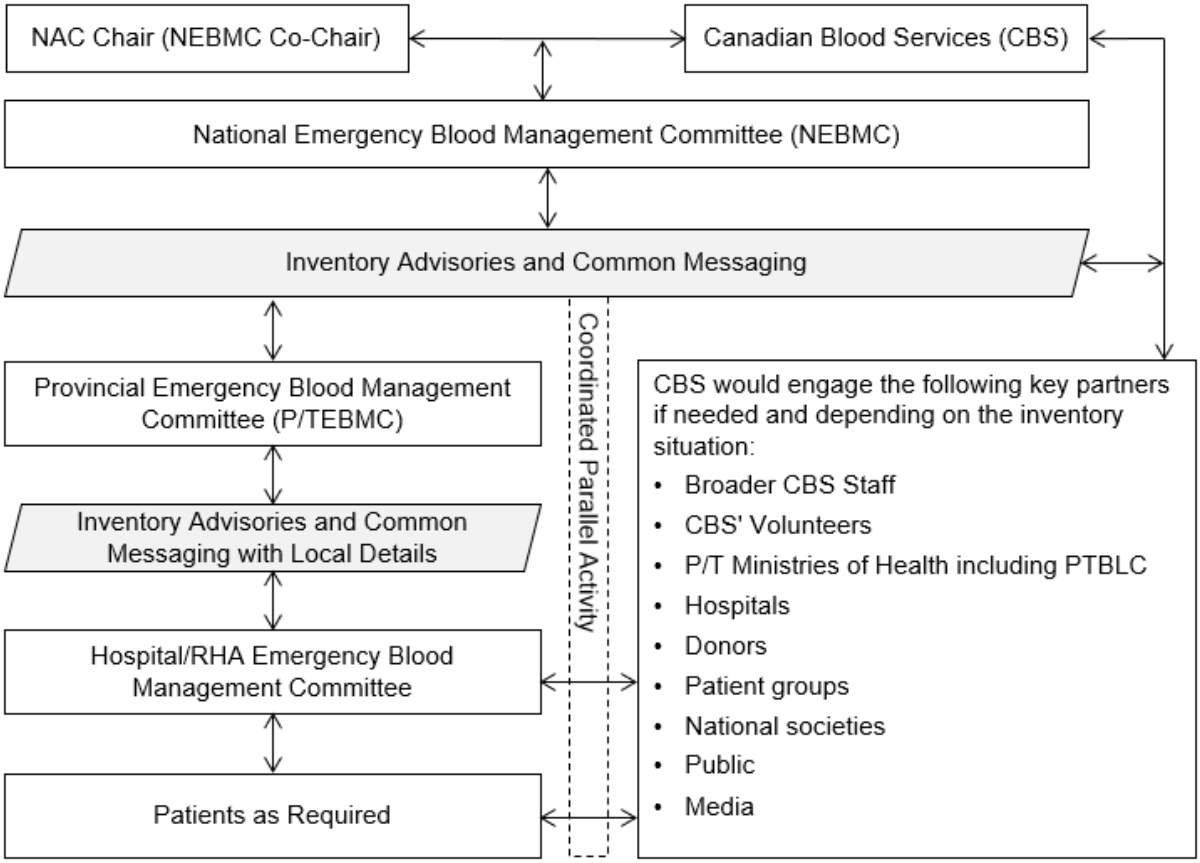
2.6 Tactics

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, and each partner will speak to its area of responsibility and expertise. However, the main message communicated by all partners must reflect the core national key messages, developed and endorsed by CBS and the NEBMC.

2.7 Cascading Communications

Communications will cascade from the NEBMC to the P/TEBMCs via inventory advisories and/or key messages. It is imperative that those involved in managing the shortage (i.e. CBS, NEBMC, P/TEBMCs, and H/REBMCs) coordinate and align on external outreach to key partners groups and the media. The diagram below outlines steps to guide the flow of information.

COMMUNICATIONS FLOW



Notes:

1. These communication steps may not be required for Green Phase when inventory is optimal.
2. The NEBMC Co-Chairs may convene the Core or Full NEBMC. If the Core NEBMC is convened, any discussions, decisions or communications will be shared with the Full NEBMC.
3. If available and appropriate, the NEBMC may also consider ad-hoc representation by additional experts, patient groups, national societies, etc.

3.0 PHASE SPECIFIC INVENTORY COMMUNICATIONS PLANNING

As national blood inventory levels fluctuate, the general principles, strategies and objectives will remain constant. Should inventory decline, specific actions will be required and the need for regular communication to a broad range of key partners will intensify. The following sections outline the communications activities for each phase of the Plan.

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 CBS and hospital/RHA actions, as required.

When inventory levels are within the optimal range, CBS' communications related to the national blood inventory occur through business-as-usual channels. Consultation with the

NEBMC Co-Chairs and other NEBMC members may also be advisable under certain conditions in Green Phase.

While inventory levels are optimal during Green Phase, communication activities should focus on emergency preparedness including the following:

- Review and update national, provincial and hospital/RHA communications plans by the appropriate EBMCs;
- Confirm and distribute EBMC contact lists (at least annually);
- Tabletop exercises; and,
- Update communications plans based on key learnings identified in exercises or prior activations.

3.2 Green Phase Advisory

3.2.1 Temporary Reduction of Hospital Order Fill Rates during Green Phase Advisory

Green Phase Advisory acts as a signal for national inventory instability and implies that blood inventory levels are low with respect to a particular blood type or component and may require CBS to adjust routine hospital orders. At times when inventory is tenuous, Green Phase Advisory may be prolonged to allow for system visibility. CBS will communicate this to hospitals through “business-as-usual” channels (Annex 1 and 2).

Should the situation persist, the NEBMC Co-Chairs will convene the Core or Full NEBMC to determine if there are any changes to hospital inventory management practices that can assist with and/or improve the situation internally. These inventory updates would be distributed to P/TEBMC, NEBMC, hospitals/RHAs and other key partners via CBS’ “business-as-usual” channels.

If no change in hospital inventory management practices is recommended, CBS will continue to communicate updated information through “business-as-usual” channels. See Annex 1 and 2 examples.

3.2.2 Increased Communications for Donations during Green Phase Advisory

Changes in regular donor behavior for various reasons (e.g., peak travel times, statutory holidays, changing demographics, etc.) weather events, public health crises and/or increases in hospital demand can lead to lower donor attendance and begin to erode the national inventory. When the distribution of blood products outpaces the number of donations being made, CBS will increase its donor recruitment activities, which may include the implementation of donor or public campaigns or the adjustment of existing campaigns. NEBMC members and networks may be asked to help support donor recruitment activities but this function is a core responsibility of CBS and the organization has subject matter expertise in the area as the national blood authority.

3.3 Amber Phase

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

An Amber Phase needs clear, consistent and coordinated communication to maintain the trust of key partners and inform them of how the situation is being managed so that optimal care decisions can be made for patients.

3.3.1 Convening the NEBMC and Determination of Amber Phase

A shortage is most likely to be identified by CBS, but it may also be identified by a region and/or hospital/RHA and be escalated accordingly. In either case, contact with the NEBMC Co-Chairs would be required to convene a meeting of the NEBMC.

The Co-Chairs of the NEBMC will call a meeting of the NEBMC as quickly as appropriate to the severity of the situation, typically within 24 hours for an Amber Phase. The NEBMC would discuss if the shortage could be managed internally. The final determination of the phase would be made by CBS, in close consultation with the NEBMC.

3.3.2 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. Updates and information can be shared with the NEBMC between meetings by email via the NEBMC Secretariat. Additionally, hospitals will continue to receive inventory bulletins (Annex 1 and 2).

3.3.3 Key Messages

The NEBMC Co-Chairs will ensure key messages are formulated, so that NEBMC members can cascade communication to P/TEBMCs and internal/external key partners.

- Key messages from CBS should include the state of the inventory, a confirmation of the phase, mitigation efforts underway and the timeline for the next updates; and,
- Key messages from the NEBMC should include a confirmation of the phase, the impact on clinical practices and transfusion protocols, and recommendations being made to the P/T Ministries, P/TEBMCs and hospitals/RHAs on how to best triage the limited supply of blood they have available through in-hospital supplies.

3.4 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).

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 major morbidity or death. Canada has not experienced a shortage of this nature under CBS' stewardship of the national blood system.

In a Red Phase clear, consistent and coordinated communication will be essential to restabilize national inventory levels, disseminate information effectively and to maintain the trust of key partners and Canadians.

3.4.1 Convening the NEBMC and Determination of a Red Phase

A shortage is most likely to be identified by CBS, but it may also be identified by a region and/or hospital/RHA and escalated accordingly. In either case, contact with the NEBMC Co-Chairs would be required to convene a meeting of the NEBMC.

The Co-Chairs of the NEBMC will call a meeting of the NEBMC as quickly as appropriate to the severity of the situation, typically within 4 hours for a Red Phase. The NEBMC would discuss if the shortage could be managed internally. The final determination of the phase would be made by CBS, in close consultation with the NEBMC.

3.4.2 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 designate meetings to a smaller subset of the NEBMC which must at a minimum include the NEBMC Co-Chairs.

Updates and information can be shared with the NEBMC between meetings by email via the NEBMC Secretariat. Additionally, hospitals will continue to receive inventory bulletins (Annex 1 and 2).

3.4.3 Key Messages

The NEBMC Co-Chairs will ensure key messages are formulated, so that NEBMC members can cascade communication to P/TEBMCs and internal/external key partners.

- Key messages from CBS should include the state of the inventory, a confirmation of the phase, mitigation efforts underway and the timeline for the next update; and,
- Key messages from the NEBMC should include confirmation of the phase, impact on clinical practice and transfusion protocols, and the counsel being made to the P/T Ministries and hospitals/RHAs on how to best triage the limited supply of blood they have available through in-hospital supplies, and what they can expect from CBS.

3.5 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, Amber, Green Phase Advisory, and subsequently to Green Phase, or from Amber, Green Phase Advisory, then Green Phase.

3.5.1 Recovery from Red to Amber to Green Phase Advisory to Green

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 Amber Phase. Decisions related to that discussion will be communicated to EBMCs and other key partners as outlined in the communication process for Amber Phase.

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 Green Phase Advisory or Green Phase. Subsequent communications will follow the process outlined in the Green Phase Advisory and Green Phase sections of this communications appendix.

Even if the phase is upgraded to Green Phase, 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 EBMCs at the national, provincial/territorial and hospital/RHA 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 evaluating whether 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 activities will include ongoing monitoring of:

- Media coverage – daily monitoring and analysis;
- Key partner feedback;
- Health Hotline inquiries (if applicable); and,
- Requests for information.

ANNEX 1: NATIONAL INVENTORY SHORTAGE ALERT TEMPLATE

URGENT: IMMEDIATE ACTION REQUIRED

To: **ALL HOSPITAL SITES**
From: **National Emergency Blood Management Committee (NEBMC)***
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	**<appropriate colour or recovery> PHASE: <product type, ABO and Rh as required>** The French translation of the advisory will be shared as soon as it becomes available. For information about the National Blood Shortages Plan, please see: http://www.nacblood.ca/resources/shortages-plan/index.html For additional info, contact: 1. Your representative to the Provincial Emergency Blood Management Committee; 2. Your representative to your Hospital Emergency Blood Management Committee; 3. Your Hospital Liaison Specialist, Canadian Blood Services.	**PHASE <couleur appropriée> OU PHASE de retour à la normale : <type de produit, ABO et Rh, selon les besoins>** La version française de cet avertissement vous sera communiquée dès qu'elle sera disponible. Pour en savoir plus sur le Plan national de gestion en cas de pénuries de composants sanguins labiles, consultez le site suivant: nacblood.ca/fr/penurie-de-produits-sanguins Pour plus d'informations, veuillez communiquer avec: 1. votre représentant(e) au Comité provincial d'urgence pour la gestion du sang; 2. votre représentant(e) au comité hospitalier d'urgence pour la gestion du sang; 3. votre agent(e) de liaison de la Société canadienne du sang.

*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.

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

ANNEXE 2 : MODÈLE D'AVIS DE PÉNURIE NATIONALE

URGENT : MESURES IMMÉDIATES NÉCESSAIRES

À : TOUS LES ÉTABLISSEMENTS HOSPITALIERS
De : Comité national d'urgence pour la gestion des réserves de sang (CNUGRS)*
Objet : PHASE <couleur appropriée>

Avis sur l'état des réserves nationales

Date et heure d'émission de l'avis	*<Date et heure> (HNE)*	
Phase	**PHASE <*couleur appropriée*> OU PHASE de retour à la normale**	
Produit(s)	*<type de produit, ABO et Rh, selon les besoins>*	
Description	*<Inclure les éléments suivants dans cette section :* • *ce qui a entraîné ou cause cette pénurie* • *quelles mesures correctives sont prises* • *la durée anticipée de la pénurie>*	
Conséquences pour les hôpitaux	*<Dans cette section, donnez des directives aux hôpitaux>* *<pour l'activation de l'avis>* Suivez les directives de la section de la *<<insérer la phase concernée ici>>* du plan national / provincial / hospitalier / régional en cas de pénurie de sang. **Mesure requise :** Tous les hôpitaux doivent communiquer les niveaux de réserves avant midi, HNE, <<indiquer la fréquence ici>> jusqu'à nouvel ordre. Les niveaux de réserves des hôpitaux doivent être saisis dans le Système de rapports sur les composants et les produits sanguins : https://www.blood.ca/fr/hopitaux/commandes-de-produits/systeme-de-rapports-sur-les-composants-et-produits-sanguins ou déclarés conformément aux pratiques provinciales habituelles (Colombie-Britannique et Manitoba). Les hôpitaux sont encouragés à fournir régulièrement leurs niveaux de réserves à la Société canadienne du sang ou à l'entité responsable selon la procédure habituelle.	
Complément d'information	**<appropriate colour or recovery> PHASE: <product type, ABO and Rh as required>** For information about the National Blood Shortages Plan, please see: http://www.nacblood.ca/resources/shortages-plan/index.html. For additional info, contact: 1. Your representative to the Provincial Emergency Blood Management Committee 2. Your representative to your Hospital Emergency Blood Management Committee 3. Your Hospital Liaison Specialist, Canadian Blood Services	**PHASE <couleur appropriée> OU PHASE de retour à la normale : <type de produit, ABO et Rh, selon les besoins>** Pour en savoir plus sur le Plan national de gestion en cas de pénuries de composants sanguins labiles, consultez le site suivant : nacblood.ca/fr/penurie-de-produits-sanguins Pour plus d'informations, veuillez communiquer avec : 1. votre représentant(e) au Comité provincial d'urgence pour la gestion du sang; 2. votre représentant(e) au comité hospitalier d'urgence pour la gestion du sang; 3. votre agent(e) de liaison de la Société canadienne du sang.

* Le Comité national d'urgence pour la gestion des réserves de sang est constitué de représentants du Comité consultatif national sur le sang et les produits sanguins et du Comité de liaison provincial-territorial ainsi que de membres du personnel clés de la Société canadienne du sang. Ce groupe élaborera des recommandations et conseillera les ministères de la Santé des provinces et des territoires, les hôpitaux et les autorités régionales de la santé, de même que la Société canadienne du sang pour favoriser une réponse uniforme et coordonnée en cas de grave pénurie de sang au Canada.

Si vous souhaitez obtenir le présent avis dans un format accessible, communiquez avec l'agent de liaison avec les hôpitaux de la Société canadienne du sang de votre région.

APPENDIX E: TRIAGE TOOL EXAMPLES

Patient Records (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:	

Triage Tracking Log – Emergency Disposition of Blood (Sample Only)

Is Patient needing or predicted to need massive transfusion? ☐ **Yes** ☐ **No**
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? ☐ Yes ☐ No 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? ☐ Yes ☐ No 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? ☐ Yes ☐ No 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 F: PATIENT/FAMILY COMMUNICATION TEMPLATE

Patient/Family Notification of Blood Shortages

We, [*enter name of province/territory, 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, 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 be available on:

- [*Enter name of province, health authority or hospital and your website(s)*]; and,
- Canadian Blood Service's website: www.blood.ca

APPENDIX G: INVENTORY INDEX EXAMPLES

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 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 tables, figures and order forms that follow demonstrate the actual implementation of this example and the tenets of the Plan by the Royal University Hospital in Saskatoon.

RUH RBC Stock Levels	68-84 (incl e,C,K neg)	22-24 (incl 2 trauma)	41-51	12-15	11-14	4-6	4-6	2-4	
Jan-Dec 2024	O+	O-	A+	A-	B+	B-	AB+	AB-	Total
Tot RC Units by Group	3075	832	1885	443	522	143	203	83	7186
ADRD 2024	8.42	2.28	5.16	1.21	1.43	0.39	0.56	0.23	19.69
Inventory Low Limit	68	22	41	12	11	4	4	2	
Inventory High Limit	84	24	51	15	14	6	6	4	
Inventory Index MIN	8.07	9.65	7.94	9.89	7.69	10.21	7.19	8.80	
Inventory Index MAX	9.97	10.53	9.88	12.36	9.79	15.31	10.79	17.59	
Monthly Min RBC Units	185.00	51.00	103.00	9.00	21.00	5.00	10.00	2.00	
Monthly Max RBC Units	319.00	95.00	190.00	63.00	76.00	27.00	28.00	13.00	
ADRD (Monthly Min)	6.17	1.70	3.43	0.30	0.70	0.17	0.33	0.07	
ADRD (Monthly Max)	10.63	3.17	6.33	2.10	2.53	0.90	0.93	0.43	

Saskatchewan Blood Contingency Plan: Inventory Index Recommendations

Green Phase	Green Phase Advisory	Amber Phase	Red Phase
Greater than 8.0	7.0-8.0	6.0-7.0	Less than 6.0

RBC Unit # in Inventory	O+	O-	A+	A-	B+	B-	AB+	AB-
1	0.1	0.4	0.2	0.8	0.7	2.6	1.8	4.4
2	0.2	0.9	0.4	1.6	1.4	5.1	3.6	8.8
3	0.4	1.3	0.6	2.5	2.1	7.7	5.4	13.2
4	0.5	1.8	0.8	3.3	2.8	10.2	7.2	17.6
5	0.6	2.2	1.0	4.1	3.5	12.8	9.0	22.0
6	0.7	2.6	1.2	4.9	4.2	15.3	10.8	26.4
7	0.8	3.1	1.4	5.8	4.9	17.9	12.6	30.8
8	0.9	3.5	1.5	6.6	5.6	20.4	14.4	35.2
9	1.1	3.9	1.7	7.4	6.3	23.0	16.2	39.6
10	1.2	4.4	1.9	8.2	7.0	25.5	18.0	44.0
11	1.3	4.8	2.1	9.1	7.7	28.1	19.8	48.4
12	1.4	5.3	2.3	9.9	8.4	30.6	21.6	52.8
13	1.5	5.7	2.5	10.7	9.1	33.2	23.4	57.2
14	1.7	6.1	2.7	11.5	9.8	35.7	25.2	61.6
15	1.8	6.6	2.9	12.4	10.5	38.3	27.0	66.0
16	1.9	7.0	3.1	13.2	11.2	40.8	28.8	70.4
17	2.0	7.5	3.3	14.0	11.9	43.4	30.6	74.8
18	2.1	7.9	3.5	14.8	12.6	45.9	32.4	79.2
19	2.3	8.3	3.7	15.7	13.3	48.5	34.2	83.6
20	2.4	8.8	3.9	16.5	14.0	51.0	36.0	88.0
21	2.5	9.2	4.1	17.3	14.7	53.6	37.8	92.3
22	2.6	9.7	4.3	18.1	15.4	56.2	39.6	96.7
23	2.7	10.1	4.5	19.0	16.1	58.7	41.4	101.1
24	2.8	10.5	4.6	19.8	16.8	61.3	43.2	105.5
25	3.0	11.0	4.8	20.6	17.5	63.8	45.0	109.9
26	3.1	11.4	5.0	21.4	18.2	66.4	46.7	114.3
27	3.2	11.8	5.2	22.2	18.9	68.9	48.5	118.7
28	3.3	12.3	5.4	23.1	19.6	71.5	50.3	123.1
29	3.4	12.7	5.6	23.9	20.3	74.0	52.1	127.5
30	3.6	13.2	5.8	24.7	21.0	76.6	53.9	131.9
31	3.7	13.6	6.0	25.5	21.7	79.1	55.7	136.3
32	3.8	14.0	6.2	26.4	22.4	81.7	57.5	140.7
33	3.9	14.5	6.4	27.2	23.1	84.2	59.3	145.1
34	4.0	14.9	6.6	28.0	23.8	86.8	61.1	149.5
35	4.2	15.4	6.8	28.8	24.5	89.3	62.9	153.9
36	4.3	15.8	7.0	29.7	25.2	91.9	64.7	158.3
37	4.4	16.2	7.2	30.5	25.9	94.4	66.5	162.7
38	4.5	16.7	7.4	31.3	26.6	97.0	68.3	167.1
39	4.6	17.1	7.6	32.1	27.3	99.5	70.1	171.5
40	4.7	17.5	7.7	33.0	28.0	102.1	71.9	175.9
41	4.9	18.0	7.9	33.8	28.7	104.7	73.7	180.3
42	5.0	18.4	8.1	34.6	29.4	107.2	75.5	184.7
43	5.1	18.9	8.3	35.4	30.1	109.8	77.3	189.1
44	5.2	19.3	8.5	36.3	30.8	112.3	79.1	193.5
45	5.3	19.7	8.7	37.1	31.5	114.9	80.9	197.9
46	5.5	20.2	8.9	37.9	32.2	117.4	82.7	202.3
47	5.6	20.6	9.1	38.7	32.9	120.0	84.5	206.7

48	5.7	21.1	9.3	39.5	33.6	122.5	86.3	211.1
49	5.8	21.5	9.5	40.4	34.3	125.1	88.1	215.5
50	5.9	21.9	9.7	41.2	35.0	127.6	89.9	219.9
51	6.1	22.4	9.9	42.0	35.7	130.2	91.7	224.3
52	6.2	22.8	10.1	42.8	36.4	132.7	93.5	228.7
53	6.3	23.3	10.3	43.7	37.1	135.3	95.3	233.1
54	6.4	23.7	10.5	44.5	37.8	137.8	97.1	237.5
55	6.5	24.1	10.6	45.3	38.5	140.4	98.9	241.9
56	6.6	24.6	10.8	46.1	39.2	142.9	100.7	246.3
57	6.8	25.0	11.0	47.0	39.9	145.5	102.5	250.7
58	6.9	25.4	11.2	47.8	40.6	148.0	104.3	255.1
59	7.0	25.9	11.4	48.6	41.3	150.6	106.1	259.5
60	7.1	26.3	11.6	49.4	42.0	153.1	107.9	263.9
61	7.2	26.8	11.8	50.3	42.7	155.7	109.7	268.3
62	7.4	27.2	12.0	51.1	43.4	158.3	111.5	272.7
63	7.5	27.6	12.2	51.9	44.1	160.8	113.3	277.0
64	7.6	28.1	12.4	52.7	44.8	163.4	115.1	281.4
65	7.7	28.5	12.6	53.6	45.5	165.9	116.9	285.8
66	7.8	29.0	12.8	54.4	46.1	168.5	118.7	290.2
67	8.0	29.4	13.0	55.2	46.8	171.0	120.5	294.6
68	8.1	29.8	13.2	56.0	47.5	173.6	122.3	299.0
69	8.2	30.3	13.4	56.9	48.2	176.1	124.1	303.4
70	8.3	30.7	13.6	57.7	48.9	178.7	125.9	307.8
71	8.4	31.1	13.7	58.5	49.6	181.2	127.7	312.2
72	8.5	31.6	13.9	59.3	50.3	183.8	129.5	316.6
73	8.7	32.0	14.1	60.1	51.0	186.3	131.3	321.0
74	8.8	32.5	14.3	61.0	51.7	188.9	133.1	325.4
75	8.9	32.9	14.5	61.8	52.4	191.4	134.9	329.8
76	9.0	33.3	14.7	62.6	53.1	194.0	136.7	334.2
77	9.1	33.8	14.9	63.4	53.8	196.5	138.4	338.6
78	9.3	34.2	15.1	64.3	54.5	199.1	140.2	343.0
79	9.4	34.7	15.3	65.1	55.2	201.6	142.0	347.4
80	9.5	35.1	15.5	65.9	55.9	204.2	143.8	351.8

Saskatchewan Health Authority – TML Blood Component Count Form

TML Blood Component Count Form		
Date:	Time:	Checked By:

Platelets (Excluding HLA Matched)

Group	Stock Levels	In Stock (Does **not** include platelets that outdate at 2359)	Order	Comments
O Pos	3			
O Neg	1			
A Pos	4			
A Neg	1			
AB Pos	1			

Note: 4 unallocated adult doses must be kept available at all times. If inventory levels are at (or below) 4 between 0000 and 0800, platelets shall be ordered STAT from Canadian Blood Services.

Red Blood Cells (Homologous)

Group	Stock Levels	Available	Selected/Held	Total	Order	Comments
O Pos	68-84					
O Pos e, C Kell Neg	4					
A Pos	41-51					
B Pos	11-14					
AB Pos	4-6					
O Neg Kell Positive	6-8					**Note**: 75% of the total O Negative inventory should be Kell negative.
O Neg Kell Negative	14 + 2 Trauma					
A Neg	12-15					
B Neg	4-6					
AB Neg	2-4					

Group	Green Phase Stock Level	Green Advisory Phase Stock Level	Amber Phase Stock Level	Red Phase Stock Level
O Pos	68-84	56-68	48-55*	<48
A Pos	41-51	36-40	31-35*	<31
B Pos	11-14	10	8-9**	<8
AB Pos	4-6	4	3**	<3
O Neg	20-24	16-18	14-15*	<14
A Neg	12-15	9	8**	<8
B Neg	4-6	2	N/A	<2
AB Neg	2-4	N/A	N/A	<2

* When stock levels for O Pos, A Pos and O Neg are in the Amber Phase, place a STAT order to CBS and notify the TMP on-call.

** When stock levels for all other blood groups are in the Amber Phase, notify the TMP on-call prior to placing a STAT order to CBS.

S/D Plasma – Single Units				
Group	**Stock Levels**	**In Stock**	**Order**	**Comments**
O	23-34			
A	24-36			
B	23-34			
AB	24-36			
Frozen Plasma (FP) – Single Units				
Group	**Stock Levels**	**In Stock**	**Order**	**Comments**
AB	8			
Frozen Plasma Divided (FP) – Pediatric Packs				
Group	**Stock Levels**	**In Stock**	**Order**	**Comments**
AB	9-12			
Cryoprecipitate				
Group	**Stock Levels**	**In Stock**	**Order**	**Comment**
AB	10			

Saskatchewan Health Authority – TML Blood Component and Plasma Protein Stock and Order Form

SPH TML Blood Component and Product Stock and Order Form							
Date:		Time:		Checked By:			
Product	**Volume**	**LIS Code**	**Stock Levels**	**In Stock**			**Order**
Albumin 25%	100 mL	AX25M; AL25M; PB25M	50-80				
Albumin 5%	250 mL	AX05L; PB05L	10				
	500 mL	AX05X; AL05X	30-50				
C1 Esterase Inhibitor	500	BRT50	8				
CMV	2.5	CMV25	4				
Gammunex/IGIVnex (total)				GMX	IGX	Total	
	5 g	GMX05; IGX05	4-8				
	10 g	GMX10; IGX10	8-12				
	20 g	GMX20; IGX20	12-16				
	2.5 g	GMX25	4				
Hep B Vaccine	1 mL	HBVLG	1				
Hep B IG	5 mL	HGMBL; HYPBL	2				
Niastase	1 mg	NIA1	2				
Octaplex or Beriplex	1000 units	OPX10	5				
	500 units	OPX5; BER50	2				
RiaSTAP	1 g	RIA1	20				
Surgiflo		SFLO	8-12				
Tisseel	4 mL	TIS4	2				
Vistaseal	2 mL	VS2	2				
	4 mL	VS4	4				
	10 mL	VS10	4				
WinRho	120 µg	W120	1				
	300 µg	W300	2				

SPH TML Blood Component and Product Stock and Order Form						
Red Blood Cells						
Group	**Stock Levels**	**Available**	**Selected**	**Total**	**Order**	**Comments**
O Pos	32-39					
A Pos	25-31					
B Pos	6-8					
AB Pos	2					
O Neg	8-10					
A Neg	5-6					
B Neg	**as needed**					
AB Neg	**as needed**					

Group	Green Phase Stock Level	Green Advisory Phase Stock Level	Amber Phase Stock Level	Red Phase Stock Level
O Pos	32-39	28-31	24-27*	<24
A Pos	25-31	22-24	19-21*	<19
B Pos	6-8	N/A	5**	<5
AB Pos	2	N/A	N/A	1
O Neg	8-10	7	6*	<6
A Neg	5-6	N/A	4	<4

* When stock levels for O Pos, A Pos and O Neg are in the Amber Phase, contact RUH for additional inventory (to be delivered STAT) and notify the TMP on-call.

** When stock levels for all other blood groups are in the Amber Phase, notify the TMP on-call prior to placing a STAT order to CBS (or RUH).

S/D Plasma – Single Units			
Group	**Stock Levels**	**In Stock**	**Order**
O	18-23		
A	18-23		
B	14-18		
AB	14-18		
Frozen Plasma (FP) – Single Units			
Group	**Stock Levels**	**In Stock**	**Order**
AB	8		

Platelets		
Stock	**Available**	**Order (from RUH)**
1		

Saskatchewan Health Authority – Blood Component and Fractionated Stock Order Form

SCH TML Blood Component and Product Stock and Order Form								
Date:	Time:	Checked By:		Faxed to RUH at:				
Product	**Volume**	**LIS Code**	**Stock Levels**	**In Stock**				**Order**
Albumin 25%	100 mL	AX25M; AL25M; PB25M	4					
Albumin 5%	250 mL	AX05L; PB05L	2					
	500 mL	AX05X; AL05X	1-2					
C1 Esterase (Berinert)	500	BRT50	3					
Gammunex/IGIVnex (total)				GMX	IGX	Total		
	5 g	GMX05; IGX05	4					
	10 g	GMX10; IGX10	6					
	20 g	GMX20; IGX20	20					
	2.5 g	GMX25	4					
Gammagard Liquid	5 g	GRD05	4-6					
	10 g	GRD10	8-10					
	20 g	GRD20	15-20					
	2.5 g	GRD25	4-6					
	30 g	GRD30	15-20					
Gammagard S/D	5 g	GRDSD	16					
Hep B Vaccine	1 mL	HBVLG	2					
Hep B IG	5 mL	HGMBL; HYPBL	2					
Octaplex	1000 units	OPX10	2					
Privigen	5 g	PRV05	3-4					
	10 g	PRV10	4					
	20 g	PRV20	4-6					
	2.5 g	PRV25	2					
	40 g	PRV40	4					
RiaSTAP	1 g	RIA1	4					
Surgiflo		SFLO	6					
Tisseel	2 mL	TIS2	2					
	4 mL	TIS4	1					
Vistaseal	2 mL	VS2	1					
	4 mL	VS4	1					
WinRho	120 µg	W120	4-6					
	300 µg	W300	8-12					

Red Blood Cells						
Group	**Stock Levels**	**Available**	**Selected**	**Total**	**Order**	**Comments**
O Pos	5-8					
A Pos	4-6					
B Pos	2					
AB Pos	**as needed**					
O Neg	3-4					
A Neg	2					
B Neg	**as needed**					
AB Neg	**as needed**					

Group	Green Phase Stock Level	Green Advisory Phase Stock Level	Amber Phase Stock Level	Red Phase Stock Level
O Pos	5-8	4	N/A	<4
A Pos	4-6	N/A	2*	<2
B Pos	2	N/A	N/A	<2
O Neg	3-4	N/A	2*	1
A Neg	2	N/A	N/A	<2

* When stock levels for O Pos, A Pos and O Neg are in the Amber Phase, contact RUH for additional inventory (to be delivered STAT) and notify the TMP on-call.

S/D Plasma – Single Units				
Group	**Stock Levels**	**Available**	**Order**	**Comments**
AB	5			

Tissue					
Type	**Size**	**LIS Code**	**Stock Levels**	**Available**	**Order**
Amniotic Membrane	1.5 cm x 1.5 cm	PAMM	2-3		
	3 cm x 3 cm		2-3		
	5 cm x 5 cm		2-3		
Achilles Tendon		ATE	3-4		
Posterior Tibialis Tendon		PPTTN	2-3		
Anterior Tibialis Tendon		PATTN	2-3		
Corticocancellous Dust	15 cc; 1-4 mm	PCH15	1-2		
Corticocancellous Chips/Cubes	15 cc; 4-10 mm	PCH15; PCU15	4-5		
	30 cc	PCH30; PCU30	4-5		
	60 cc	PCH60; PCU60	4-5		

APPENDIX H: ETHICAL CONSIDERATIONS IN MANAGEMENT OF BLOOD SHORTAGES

The following are the ethical considerations used when developing the Plan.

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 key partners 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 key partners 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 key partners agree are relevant to meeting health needs in crisis.
2. **Open and transparent** – decision-making process must be open to scrutiny.
3. **Inclusive** – key partners should be engaged in the decision-making process. Decisions should be made with key partners' 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 key partners 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 key partners to bring forward any new information, to appeal or raise concerns about particular decisions and to resolve disputes; and,
- 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 key partners.

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.
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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.
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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 I: APPROVAL AND REVISION HISTORY

Version 2025-11-07

Edits made to Table 3 to correct errors in the 'Details' column and '**', '***' notes for the Shipment Index.

Version 2025-07-14

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

a. Formatting updates made throughout the document.
b. Updates made to improve consistency of language, abbreviations, etc., throughout.
c. Green Phase Advisory pulled out as separate from Green Phase throughout.
d. Title pages:
   - BSSC membership, NAC Chair, PT Lead and NAC Coordinator updated.
   - List of abbreviations updated.
e. Executive summary:
   - Addition of statement regarding importing components from other suppliers such as Héma-Québec.
   - Table 1 and Table 2 visuals updated.
   - Link to the *Interim Ig Shortages Plan* changed to *The National Plan for Management of Shortages of Immunoglobulin (Ig) Products*.
f. Removed history of shortages in Canada and replaced with link to shortage history tracker on NAC website.
g. Section 3.0: Plan Structure Overview:
   - Major revisions to section 3.1 Phases of Inventory Availability to update the Inventory Indices and add appropriate definitions and caveats.
   - Approximate Inventory Levels at CBS tables (two) combined into one table and caveat included to indicate that the numbers in the table do not mean a phase will be triggered but will trigger an NEBMC discussion.
     i. 'Frozen Plasma' changed to 'Transfusible Plasma'.
     ii. Removed reference to changing cryoprecipitate inventory levels.
   - Clarification that Recovery Phase can occur from Green Phase Advisory up to Green Phase.
   - Reference to inventory levels posted on the NAC website removed.
   - Example Inventory Index table moved to appendices (Appendix G) and real-world examples added.
   - Additional information added regarding inventory levels at small, rural and remote hospitals.
h. Any reference to autologous blood donations removed.
i. NEBMC Secretariate contact information added.
j. Removed information regarding exact titles of CBS positions throughout.
k. Language strengthened to address that all hospitals are responsible for developing and updating their documents in relation to shortages.
l. Section 4.0 EBMCs:
   - Statement added to indicate that CBS can declare a phase in exceptional circumstances without NEBMC convening.
   - Member titles of Core and Full NEBMC updated.
   - Addition of "French translations of NEBMC communications will also be made available in a timely fashion" statement.
   - References of where NEBMC members and Secretariate sit within CBS' organizational structure removed.
   - Clarification that section 4.1.1 is the NEBMC terms of reference.
   - Statement added that contact information for NEBMC members must be reviewed each year in the spring.
   - Clarification of roles and responsibilities of EBMCs with a focus on communications.
m. Section 5.0: Communications updated.
n. Section 6.0: Specific Participant Actions:
   - Language changes regarding ongoing work needed for disaster preparedness.
   - Stronger language changes regarding ongoing work needed and jurisdictional/hospital responsibility to follow the Plan.
   - Reference to cryoprecipitate and fibrinogen concentrate removed.
o. Table 5: Hb levels updated for 'Non-Surgical/Medical Procedures' for Amber and Red Phase.

p. Table 6: maximum PC thresholds changed for 'Invasive procedures/surgery/ECMO' for both Green and Amber Phases.
q. Order of the appendices changed.
   Appendix A: Provincial/Territorial Blood Shortages Plans (previously Appendix B) – links to provincial shortages plans updated.
r. Appendix B: Blood Contingency Activation Pathways – Provincial Examples (previously Appendix C) – blood contingency activation pathway examples updated.
s. Appendix C: High Level Summary of the Plan (previously Appendix F: Job Aid) – completely updated to reflect changes made throughout the document.
t. Appendix D: Communications Plan (previously Appendix E) - fully updated and communication flows condensed to one figure.
   - Annex 1 and 2: NEBMC National Inventory Shortage Alert Template updated and French translation added.
u. Appendix E: Triage Tool Examples (previously Appendix G).
v. Appendix F: Patient/Family Communications Template Example (previously Appendix H).
w. Appendix G: Inventory Index Examples – New, simulated and real Inventory Index examples.
x. Appendix H: Ethical Considerations in Management of Blood Shortages (previously Appendix D).
y. Appendix H: Approval and Revision History (previously Appendix A) – updated.

Version 2022

Changes throughout the body of the text to change Blood Shortage Working group (BSWG) to Blood Shortage Subcommittee (BSSC) 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' 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 designates, 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 BSSC 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.
s. 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
t. 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:

a. 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 BSSC Chair'

b. 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)

c. 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;

d. 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-PTBLC 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-PTBLC 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 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.