

National Surgical, Obstetric, and Anesthesia Planning Intervention Toolkit

A Resource from the Program in Global Surgery and Social Change, Harvard Medical School

Domain: Interventions to improve supply of blood in LMIC

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Brief Synopsis

There is a medium body of evidence to support various methods of blood procurement, storage, hemovigilance, and transfusion. Establishment of repeat blood donor systems have shown to be cost effective and culturally appropriate for low resource settings. Other interventions include innovative methods of blood delivery to facilities such as “blood bikes” and drones. However, there is no evidence to evaluate their impact yet. WHO provides extensive guidelines for governments and organizations regarding management and design of blood and blood product supply systems.

Guidelines

1. Design Guidelines for Blood Centers (WHO, 2010)

<http://www.who.int/bloodsafety/publications/DesignGuideBloodCentres.pdf?ua=1>

This document serves as a tool for authorities responsible for developing buildings to house blood transfusion services. It will assist national blood transfusion services (BTS) or ministries of health in determining the likely size and necessary content of blood transfusion facilities and how these facilities might operate.

2. Management of National Blood Programs (WHO, 2010)

http://www.who.int/bloodsafety/transfusion_services/ManagementofNationalBloodProgrammes.pdf?ua=1

Series of three workshops on “Management of National Blood Programmes” was organized by Blood Services Group of the Health Sciences Authority in Singapore and the WHO Regional Office for the Western Pacific, Manila and Regional Office for the Western Pacific, Manila and Regional Office for South-east Asia, New Delhi, supported by the Singapore Government through its Singapore Cooperation Programme. This publication collects the topics covered during the workshops and serves as a useful reference for public officers and professionals involved in the management of national blood services.

3. A guide to establishing a national Hemovigilance System (WHO, 2016)

<http://apps.who.int/iris/bitstream/10665/250233/1/9789241549844-eng.pdf>

The primary aim of this document is to support countries where haemovigilance is not already in place in establishing effective national systems for haemovigilance throughout the transfusion chain.

The specific objectives are to provide:

- policy guidance on establishing a haemovigilance system as part of the national blood and health systems;
- information and technical guidance on the specific measures and actions needed to implement a haemovigilance system.

Interventions

1. Establishment of Iranian Blood Transfusion Organization (IBTO)

Reference: Pourfathollah, A. A., Hosseini Divkolaye, N. S., & Seighali, F. (2015). Four decades of national blood service in Iran: outreach, prospect and challenges. *Transfusion Medicine*, 25(3), 138-143.

Web link: <http://iscdr.ibto.ir/HomePage.aspx?TabID=4689&Site=ibto&Lang=en-US>

Type: National/Policy

Intervention description:

- Established a centralized blood service to be responsible for recruitment of voluntary non-remunerated donors and employment and training of highly qualified staff
- Established regional blood centers in all regions with the responsibility of performing all blood transfusion activities from donor selection to production of blood components.
- IBTO distributes blood and blood components throughout the country, so the most remote areas in Iran have equal and timely access to the same high-quality products as major cities do

Outcome:

Reached over 40 million blood collections since establishment in 1974, Iran is the first country in Eastern Mediterranean Region (EMR) which reached 100% Voluntary Non-remunerated Blood Donation in 2007.

Organization: Iranian Government, IBTO

Cost: Publicly funded

Considerations:

- IBTO is the only legal entity in charge of preparation of blood components in Iran but has no involvement in the downstream chain of blood transfusion including transport and blood usage.
- The most important challenge facing IBTO is that all blood and blood products are provided free of charge to the hospitals in Iran which leads to unnecessary ordering
- It is also necessary to develop guidelines and policies for optimizing the blood ordering by hospitals and educate physicians and surgeons.

- IBTO is not self-sufficient on plasma-derived medicines

2. Establishment of Hemovigilance System

Reference: Dahourou, H., Tapko, J. B., Nébié, Y., Kiénou, K., Sanou, M., Diallo, M., ... & Lefrère, J. J. (2012). Implementation of hemovigilance in sub-Saharan Africa. *Transfusion clinique et biologique: journal de la Societe francaise de transfusion sanguine*, 19(1), 39-45.

Web link: [10.1016/j.tracli.2011.11.001](https://doi.org/10.1016/j.tracli.2011.11.001)

Type: National/Policy

Intervention description:

- Training of medical and paramedical personnel of the health facilities provided with blood and blood products by the regional blood transfusion center
- Distribution of post-transfusion and hemovigilance forms
- Creation of a hemovigilance and transfusion committee

Outcome:

34,729 blood products were distributed for 23,478 patients. The rate of traceability raised from 71.6 to 91.6%, and the concordance between the patient for which the blood was delivered and the patient transfused increased from 92.9 to 98.0%.

Organization: National Blood Transfusion Centre of Burkina Faso (CNTS)

Cost: NA

Considerations:

Haemovigilance systems, regardless of how successfully they have been implemented, all face certain limitations. Possible limitations and drawbacks include:

- Low participation;
- Incomplete reporting;
- Variation in terminology and definitions;
- Failure to detect transfusion-association reactions, particularly with events not detected until some time after the transfusion event (e.g. some infections);
- Compliance, process improvement and reporting.

3. Establishment of repeat blood donor system

Reference 1: Allain, J. P., Sarkodie, F., Boateng, P., Asenso, K., Kyeremateng, E., & Owusu-Ofori, S. (2008). A pool of repeat blood donors can be generated with little expense to the blood center in sub-Saharan Africa. *Transfusion*, 48(4), 735-741.

Web link: [10.1111/j.1537-2995.2007.01599.x](https://doi.org/10.1111/j.1537-2995.2007.01599.x)

Type: Public-Private Partnership

Intervention description:

- Developed a partnership calling three times a year for donation at the radio station where music, entertainment, and token gifts were available.
- To assess the program's impact, attendance, deferral, age, sex, identification, and viral test results of donors attending 12 consecutive sessions were compared to types of donors in Kumasi, Ghana.

Outcome:

A total of 3801 donors attended the program and 92% of the potential radio recruited donors were eligible to donate compared to 85.5 and 70.3 percent of other volunteer and replacement donors (a friend or family member of the recipient who donates blood to **replace** the stored blood used in a transfusion, ensuring a consistent supply), respectively. There was a 63.6 percent spontaneous repeat donations from donors responding to the radio appeal compared to 15 to 30 percent in other volunteer donors.

Organization: Kumasi Teaching Hospital Blood Center and a local FM radio station

Cost: FM radio station and local, private sponsor funded

Considerations:

- The donors attracted by this program are additional to and not competing with volunteer donors of other sources such as students or people invited to donate at their place of worship.
- This population of young males provided the safest blood available in Kumasi
- The cost of this intervention, whether for the blood service or for the radio station, is minimal
- Donors are difficult to contact either by post or by telephone. Radio, in contrast, is present everywhere: in the workplace, in the streets as loud broadcast from shops. Second, the public is able to easily interact with the radio media through telephone interviews, discussions, and commentaries invited by the media. As a result, the public tends to consider the local radio as their own, particularly in a society where the potential role of newspaper advertisement is limited.

Reference 2: Mvere, D. A. (2002). Evaluation of the pledge 25 club: a youth donor recruitment programme in Zimbabwe. In *27th International Congress of the ISBT, Vancouver* (Vol. 2002, p. A684).

Web link:

http://www.who.int/worldblooddonorday/campaignkit/WBDD_Club25_English.pdf?ua=1

Type: Red Cross, Government of Zimbabwe

Intervention description:

As part of Club 25 project, students pledge to donate blood 25 times by the time they reach the age of 25. Part of the pledge is to maintain a healthy lifestyle in order to provide the safest blood. Club 25 members are also encouraged to educate their peers (and other members of the community) on safe behaviour, thus adding health promotion to their contribution to the community. Special awards are given to club members when they donate their 25th unit.

Outcome: In 2016, the club annual target for blood collection was 11,811. Through the various blood drives held during 2016 the club managed to collect 9,590 units of blood. A total of 515 peer promoters and 207 teachers were trained in 2016. 238 of the 248 invited schools participated. Certificates for peer promoters were distributed at the workshops. Peer promoters have played a pivotal role in most of the high yielding panels

Cost: Red Cross funded

Considerations:

Experience has shown that successful youth donor clubs require:

- High-level support;
- Adaptation of the concept as appropriate for each country's unique context;
- Careful planning prior to implementation;
- A dedicated budget;
- A dedicated, responsible and committed staff member;
- Support and commitment from youth, who should drive the programme;

4. Establishment of hospital transfusion medicine unit (TMU)

Reference: Opare-Sem, O., Bedu-Addo, G., Karikari, P., Boateng, P., Sarkodie, F., Rahman, R., ... & Mensah-Acheampong, F. (2014). Fourteen-year experience of a tertiary hospital transfusion committee in West Africa. *Transfusion*, 54(11), 2852-2862.

Web link: [10.1111/trf.12690](https://doi.org/10.1111/trf.12690)

Type: Facility-based

Intervention description:

- A transfusion medicine unit (TMU) was created to provide blood transfusion services to health care facilities in Northern Ghana; it also provides clinical support regarding indications for blood products and monitoring adverse transfusion reactions;
- Trained medical and nursing staff on blood-related issues;
- Audited clinical use of blood products;
- Conducted research aiming at the improvement of blood-related therapies in Ghana.

Outcome:

The TMU systematically scrutinized the blood supply, blood safety, donor care, clinical use of blood products, and costs. It operated more as a blood transfusion service supervisory board than the limited function allocated to western TMUs. Clinicians and hospital administration were directly involved in decision-making and directing investigations to support potential changes and advances in the role and function of the blood transfusion service. The close relation with a major UK blood center and university laboratory provided the impetus and support for research and investigations.

Organization: Komfo Anokye Teaching Hospital (KATH) in Kumasi, Ghana

Cost: NA

Considerations: Sustainability of a TMU is important. The project was done in collaboration with

the Department of Haematology at University of Cambridge. Steps should be taken to sustain the project after collaboration is terminated.

5. Using drones to deliver blood products outside of centralized blood bank

Reference: Steven Overly, *Washington Post*, 2016

Web link: https://www.washingtonpost.com/news/innovations/wp/2016/10/13/in-rwanda-life-saving-blood-now-drops-from-the-sky/?utm_term=.56c6bab09fd5

Type: Delivery innovation

Intervention description:

Doctors in remote clinics in Rwanda (and now Tanzania) use a mobile phone to contact the Zipline distribution center and request blood of a certain type. The center's staff loads the blood into an aerial drone that gets flung into the air and flies directly to the medical center where it is needed. When it arrives at the clinic, the drone drops the parachute-equipped package onto a target the size of about three parking spaces. The drone then returns to the distribution center, all without landing or needing to be recharged.

Outcome: No published literature exists yet. <http://www.flyzipline.com/our-impact/> for patient testimonials.

Organization: Zipline, Inc.

Cost: Rwanda's government pays Zipline a fixed price per delivery, with a minimum volume guarantee

Considerations:

Cultural relevance - UAVs [unmanned aerial vehicles] are often times confused with weaponised drones and are perceived by the general public as related to military operations and/or intelligence gathering. Thorough cultural sensitization to UAVs must be a priority of this type of intervention.

Availability – This is a new technology, being rolled out in few countries at this time, and still being piloted, with promising results. It provides an innovative model for centralizing blood banks that may serve outlying medical centers that can be reached by this technology. Lessons learned may extend to other modes of transportation of blood products that may be more feasible in different geographies and landscapes.

6. Blood Bikes

Reference: <http://www.bloodbikes.org.uk/>

Type: Delivery innovation

Intervention description:

In the United Kingdom and Ireland a network of largely independent registered charities, whose members are all unpaid volunteers, provide blood bike courier services in collaboration with

their local healthcare authorities. Many are represented through the Nationwide Association of Blood Bikes (NABB)

Outcome:

- 30 total member groups
- 2700 total volunteers
- 56134 total blood runs in 2016

Organization: Nationwide Association of Blood Bikes (NABB)

Cost: Volunteer-based. Operational cost covered by private donations

Considerations: This intervention is highly dependent on donor support

Additional Resources:

1. McCullough, T. K., & McCullough, J. (2013). Strengthening blood programs in developing countries. *Transfusion and Apheresis Science*, 49(3), 408-415.
2. Roberts, D. J., Field, S., Delaney, M., & Bates, I. (2016). Problems and approaches for blood transfusion in the developing countries. *Hematology/oncology clinics of North America*, 30(2), 477-495.
3. Blood services in South Eastern Europe, Current status and Challenges (WHO, 2007) http://www.euro.who.int/_data/assets/pdf_file/0014/90401/E90300.pdf