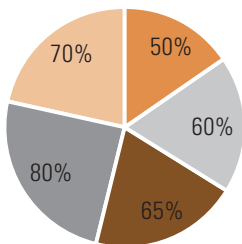


BLOOD COLD CHAIN

Survey on the status of national blood cold chains shows poor information and resources as major constraints



- BCC not coordinated 50%
- Domestic equipment in use 60%
- No preventive maintenance in place 65%
- Picnic cooler boxes in use 80%
- Scarce information on BCC 70%

Blood transfusion is an essential therapeutic intervention. We all may need blood in an emergency, and some of us need regular transfusions. Safe blood, used correctly, saves lives.

The blood cold chain is a series of interconnected activities involving equipment, personnel and processes that are critical for the safe storage and transportation of blood from collection to transfusion. Like any process, the chain is only as strong as its weakest link, and a failure of a link will result in the collapse of the chain. This has potentially fatal consequences for the recipient of the blood, and is why each link must be carefully maintained.

Blood is collected at body temperature, i.e. 37°C. But in order to maintain its vital properties, it must be cooled to below 10°C to be transported, and stored at refrigeration temperatures of around 4°C until use. Hence the term, *blood cold chain*. If blood is stored or transported outside of these temperatures for long, it loses its ability to transport oxygen or carbon dioxide to and from tissues respectively upon transfusion. Other factors of serious concern are the risk of bacterial contamination if blood is exposed to warm temperatures. Conversely, blood exposed to temperatures before freezing may be damaged, and the transfusion of such blood can be fatal.

There are many health workers involved in the establishment and maintenance of the blood cold chain, each playing a vital role to protect the safety of the blood. They include the managers responsible for procuring the equipment, implementing quality control systems and the training of all staff. They also include the many users of the blood cold chain. Among these are blood donor collection staff, clerks packing the blood bags, drivers transporting the batches, laboratory technical staff assuring quality control of the product, engineers and technicians maintaining the equipment, staff trainers, and hospital clinic staff operating blood warmers and ensuring safe blood transfusion to the patient.

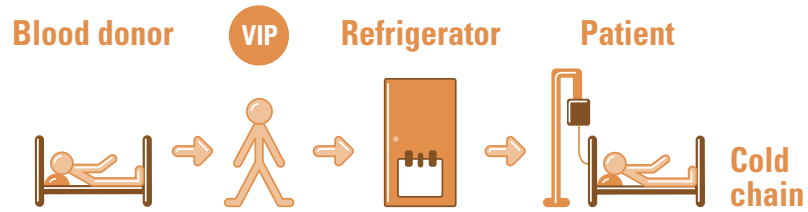
The major items of blood cold chain equipment for whole blood are refrigerators and transport boxes. Freezers are also essential for transfusion centres that store plasma. Other vital devices and accessories include standby generators and temperature monitors that can be fitted in refrigerators to warn health personnel as soon as the blood stock approaches unacceptable temperatures.

Breaks in the cold chain happen for many reasons. Far too often, the equipment does not meet standards of quality and safety, is unsuitable for blood storage – common examples are domestic refrigerators and picnic



boxes, both in wide use in developing countries – or is not properly maintained or repaired. Preventive maintenance prolongs the life of the equipment and significantly decreases safety risks, yet many countries still do not have a cost-effective equipment maintenance programme.

It is estimated that 2% of donated blood is discarded because of a poor blood cold chain. If a unit of safe blood costs US\$40, this means a waste of US\$80 for every 100 blood bags donated. Preventive maintenance and more appropriate use of the equipment will reduce replacement costs by 50%.



Domestic refrigerators and picnic boxes – unsuitable for storing blood – are still in common use in developing countries

Bridging the Gap:

An effective blood cold chain makes blood safer for patients, and reduces the unnecessary waste of donated blood and scarce financial resources.

EHT TOOLKIT

A selection of tools developed by the WHO Department of Essential Technologies to address country needs for a safe blood cold chain include:

- Guidelines on management and maintenance systems for cost-effective blood cold chain programmes
- International quality standards for all essential equipment in different environmental settings through collaboration with global organizations and industry
- Selection and procurement guidelines on blood cold chain equipment and accessories, including WHO performance specifications
- Development of new technologies, such as a carrier especially designed to transport blood
- Toolkit for preventive maintenance and care of blood cold chain equipment
- Training materials for the appropriate use and preventive maintenance of equipment
- Technology transfer where feasible to improve access to essential equipment and spare parts