



Vaccine Storage and Handling during Transport

Introduction

Immunizations help save lives, prevent serious illnesses, and are recognized as one of the most effective public health interventions available. Immunization programs are among the most cost-effective ways to prevent disease. The success of these programs depends heavily upon the high immunization coverage of the target group and vaccine inventory management, including proper storage and handling of vaccines.

By understanding and implementing proper vaccine storage and handling practices, staff involved in cold chain play a critical role in improving the health of their clients by ensuring that the administered vaccines retain their potency and that vaccine wastage is reduced.

Definitions

Cold chain

The “cold chain” includes all of the materials, equipment and procedures used to maintain vaccines in the required temperature range of +2 °C to +8 °C from the time of manufacture until the vaccines are administered to individuals.

Insulated container

An insulated container is a solid walled container with a tight lid. The container must be able to store and transport vaccines at the required temperatures for the necessary duration of time.

Temperature monitoring device

An electronic device that measures temperatures. This can include devices such as a digital maximum-minimum thermometer, data logger or a chart recorder.

Cold chain incident

Occurs when vaccine is exposed to a temperature outside the required temperature range of +2 °C to +8 °C for any period of time and the potency of the vaccine is potentially compromised.

Vaccine Cold Chain Incident Exposure/ Wastage Report form

This report form is used by public health units to document when provincially funded vaccines are exposed to a cold chain incident. This report provides details of the incident and the vaccines that were wasted and/or exposed during the cold chain incident.

Contingency Plan

Each health care provider requires a plan for vaccine storage in the event of refrigerator malfunction and/or electricity disruption.

Importance of the Cold Chain

Vaccines are sensitive biological substances that can lose their potency and effectiveness if they are exposed to temperatures (heat and/or cold) outside the required temperature range of +2 °C to +8 °C or when exposed to light.

Failure to adhere to cold chain requirements may reduce vaccine potency, resulting in lack of protection against vaccine preventable diseases and/or increased local reactions after administration of vaccine.

Insulated Containers

- Solid-walled container with a tight lid. The required temperatures inside the insulated container are maintained by icepack(s) and/or gel pack(s).
- Ensure that vaccines are maintained within the +2 °C to +8 °C temperature range for the maximum length of time that might be required for transport and/or storage by using appropriate packaging material and packing configuration.
- Insulated containers are not adequate for the transport and/or storage of vaccines for prolonged periods as their cold life (the container's ability to maintain the required temperature range) is limited.
- Most insulated containers can maintain the required temperatures for a maximum of 3-4 hours.
 - The amount of time depends on: the external temperature, the number of times the insulated container is opened and closed, the amount of vaccine that is being stored and the type of packaging material used.
- If vaccines will be stored and/or transported for more than 3-4 hours in the insulated container, the icepack(s) and/or gel pack(s) should be removed and replaced with a new set of conditioned frozen and/or refrigerated icepack(s) and/or gel/pack(s).
- When transporting vaccines in an insulated container, the temperatures must be monitored and recorded before, during and after vaccine transport.
- Insulated containers storing vaccines should not be transported in the trunk of a vehicle due to the extreme temperatures that can occur.

Digital Maximum-Minimum Thermometer

- Measures the current min. and max. temperature that has been reached since it was last reset.
- Probe should be glycol - Air probes are accurate at measuring ambient temperature which changes rapidly, they are less reliable when it comes to reflecting the actual temperature of vaccines.
- Current temperature must be between +2 °C to +8 °C for vaccine to be packed in cooler. The ideal current temperature is +5 °C.
- Min and max temperature should be cleared when vaccine is packed to ensure temperature readings reflect what the vaccine has been exposed to for duration of transport.
- Probe is stored inside an empty vaccine box labelled as "empty" and placed with the vaccine.
- Alarm is turned on and set between +2 °C to +8 °C.
- Visually inspect that the current temperature is between +2 °C to +8 °C regularly to ensure the vaccine is in range during transportation.

Steps to prepare an insulated container (and related material) prior to transportation or storage

1. Pre-chill the insulated container by placing icepacks inside the insulated container for at least 1 hour. After the hour, remove all icepacks.
2. Precondition icepacks. Vaccines are vulnerable to freezing when transported in an insulated container if icepacks have not been correctly conditioned. Icepacks come out of the freezer at a temperature of approximately -20 °C. Keeping the icepacks at room temperature for a period of time allows the ice at the core of the icepack to rise to 0 °C. This process is called "conditioning." An icepack is adequately conditioned as soon as beads of water cover its surface. The conditioning process usually takes approximately 20 to 30 minutes.
3. Prepare your temperature monitoring device. Preferably when not in use, it is stored between +2 - +8 °C
4. Ensure that all other items necessary to pack the insulated container are ready and easily accessible.

Steps to pack an insulated container (and related material) prior to transportation or storage

Freezing episodes happen very easily in all insulated containers, usually in the first two hours after packing.

To ensure vaccines arrive at the destination safely:

1. Place one or two icepacks at the bottom of the insulated container.
2. Place a pre-conditioned (+2 °C to +8 °C) ice blanket(s) on top of the icepacks.
3. Place the vaccine package on top of the ice blanket(s).
4. Position the temperature monitoring device or the sensor in the centre of the vaccine package.
5. Insulation material (e.g., bubble wrap, newspaper) may be loosely wrapped around the vaccine packages. This allows for cool air circulation around the vaccines and minimizes the risk of “hot” or “cold” spots.
6. Place another pre-conditioned ice blanket(s) over the vaccine.
7. Place one or two pre-conditioned icepacks on top of the ice blanket(s).
8. Add newspaper or bubble wrap as necessary to fill vertical void.
9. Clearly mark all insulated containers storing vaccine with the following label:
“VACCINES – STORE BETWEEN +2 °C to +8 °C”

Detailed instructions on how to pack an insulated container:



Gel pack(s)

- Winter transport may require gel pack(s) to be conditioned from the refrigerator at +2 °C to +8 °C.
- Summer transport may require gel pack(s) to be conditioned from the freezer at -10 °C to -20 °C.
- Place gel packs on top of outer flexible ice blanket.

Outer flexible ice blanket

- Condition in refrigerator at +2 °C to +8 °C.
- Wrap outer flexible ice blanket around vaccines and inner flexible ice blanket.

Vaccine and temperature monitoring device

- Vaccines in refrigerator between +2 °C to +8 °C.
- Position maximum-minimum thermometer sensor inside a vaccine box.

Inner flexible ice blanket

- Conditioned in refrigerator between +2 °C to +8 °C.
- Wrap inner flexible ice blanket around vaccines.

Gel pack(s)

- Winter transport may require gel pack(s) to be conditioned from the refrigerator at +2 °C to +8 °C.
- Summer transport may require gel pack(s) to be conditioned from the freezer at -10 °C to -20 °C.
- Place gel packs on top of outer flexible ice blanket.

Insulated hard sided container

- Pre-chill insulated container with gel packs from the freezer for a few hours or by placing the container in a refrigerator until a temperature between +2 °C to +8°C is reached prior to placing vaccines into the container.

Note: Additional icepacks may be required depending on cold-life needed for the length of transport. Additional insulating material (e.g., bubble wrap, Styrofoam chips, crumpled or shredded newspaper) should be placed inside (bottom, top and sides) the insulated container to allow for cool air circulation.

Responsibilities for all staff handling provincially funded vaccine:

- Review vaccine storage and handling practices - Refer to Ministry of Health Vaccine Storage and Handling Guidelines and Region of Waterloo Cold Chain Presentation available online.
- Follow the 4 R's of vaccine temperature monitoring (see below).
- Know your contingency plan in office and during transportation; ensure that they are in place in the event of office closure during staff vacation, equipment failure and/or electricity disruptions.
- Notify Public Health as soon as possible following incidents or exposures.

THE 4 R'S**Read**

- Visually inspect that the current temperature is between +2 °C to +8 °C regularly to ensure the vaccine is in range during transportation.

Record

- Temperatures are recorded upon departure and arrival.
- At departure: Record current temperature, date, time and initials. (minimum, maximum and current temperatures are all the same as the thermometer is cleared when packed).

- Upon arrival: Record the minimum, maximum and current temperature, date, time and initials.

Reset

- Temperatures are reset when packing vaccine for transport.

React

- Take action if the minimum, maximum, or current temperature falls outside the +2°C to +8°C range and document this action.
- If the temperature is out of range:
 - Upon delivery - The HCP will bag the vaccine, mark DO NOT USE, keep the vaccine in their monitored fridge, sign and write beside their name on the manifest and contact Public Health.
 - During transportation - Remove ice packs or gel packs to bring temperature back into range. Note time of exposure and temperature readings and contact Public Health to discuss next steps. Regular visual inspection during transportation will prevent temperature from going out of range.
 - At the office - Enact your contingency plan and call Public Health.