How to pack a cooler

Coolers have a limited cold life and are therefore not adequate for vaccine storage over prolonged periods (more than 8 hours) or in extreme conditions. In these circumstances, a specialised cold box should be used for storing and transporting vaccines.

There are three storage options (refer to Strive for 5 2013, 2nd edition, pages 34-38):

<table>
<thead>
<tr>
<th>Option 1 - Cooler</th>
<th>Option 2 - Polystyrene container inside a larger cooler</th>
<th>Option 3 - Specialised vaccine cold box</th>
</tr>
</thead>
</table>

For less than 8 hours storage.

Note: If using a plastic cooler which is not maintaining a stable temperature, consider upgrading to a higher quality cooler with refrigeration-type insulation or a specialised cold box.

For less than 8 hours storage.

Note: Polystyrene coolers provide limited insulation and are suitable only for storing vaccines for short periods of time (up to 4 hours).

Used for over 8 hours of storage.

Conditioning ice and gel packs

Each of the storage options make use of ice or gel packs. Ice and gel packs, when frozen, reach temperatures much lower than 0°C. As a result, they can freeze the vaccines when stored together in a cooler. Freezing episodes occur easily in all coolers, usually in the first 2 hours after packing.

The first step to storing the vaccines is to condition the ice or gel packs. This will reduce the risk of freezing the vaccines.

How to condition ice packs:

**Step 1**
Remove ice packs from the freezer.

**Step 2**
Lay out ice packs in a single row on their sides (where possible) leaving a 5cm space around each ice pack to allow maximum air exposure. This reduces the conditioning time.

**Step 3**
Wait until ice packs begin to sweat. This will take up to one hour at +20°C ambient (room) temperature.
**Step 4**

The ice pack is conditioned as soon as water begins to ‘slosh’ about slightly inside the ice pack.

**How to condition gel packs:**

Follow the manufacturer’s instructions on conditioning the gel packs. Note: Usually gel packs will take longer than ice packs to condition.

There is no ‘one rule fits all’ approach. However, there is an industry standard if the gel packs have been stored in the freezer at \(-20°C\) for a minimum of 36 hours. Conditioning frozen gel packs for the times prescribed below enables the initial chill factor to be removed from the packs:

<table>
<thead>
<tr>
<th>Guide for gel packs weighing LESS than 750 g</th>
<th>Guide for gel packs weighing MORE than 750 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>If ambient (room) temperature is <strong>over</strong> +15°C, condition for <strong>45 minutes</strong> before use.</td>
<td>If ambient (room) temperature is <strong>over</strong> +15°C, condition for <strong>1 hour</strong> before use.</td>
</tr>
<tr>
<td><img src="" alt="Temperature" /></td>
<td><img src="" alt="Temperature" /></td>
</tr>
<tr>
<td>If ambient temperature is <strong>under</strong> +15°C, condition for <strong>1 hour</strong> before use.</td>
<td>If ambient temperature is <strong>under</strong> +15°C, condition for <strong>1½ hours</strong> before use.</td>
</tr>
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<td><img src="" alt="Temperature" /></td>
<td><img src="" alt="Temperature" /></td>
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</tbody>
</table>
**Option 1: Cooler (less than 8 hours)**

**Step 1**
Condition the ice or gel packs as described previously.

**Step 2**
If time permits, chill the inside of the cooler prior to use by placing ice packs/gel packs in it for a few hours and then remove these icepacks.

**Step 3**
Place polystyrene chips, or other suitable insulating material at the bottom of the container. This eliminates ‘hot and cold spots’. Packaging such as polystyrene chips is preferable to bubble-wrap as it promotes air circulation. However, if using bubble-wrap avoid wrapping the vaccines tightly.
Step 4
Place the vaccines into the cooler on top of insulating material. Note: If using bubble-wrap avoid wrapping the vaccines tightly.

Step 5
Place a minimum/maximum thermometer probe in the centre of the vaccine stock.

Step 6
Surround the vaccines with packing material such as polystyrene chips, or other suitable insulating material e.g. a layer of bubble wrap). This material will allow cold air to circulate.
Step 7
Place the conditioned ice pack/gel pack(s) on top, close and seal the lid of the cooler. If using a larger cooler, place conditioned ice packs/gel packs around the sides of the cooler as well as on top. Experiment to find the best combination. Ensure the contents of the cooler are packed securely so they cannot move around during transport.

Note: Ensure vaccine stock is not in direct contact with the ice packs/gel packs to minimise risk of freezing.

Step 8
Secure the minimum/maximum thermometer on outside of cooler and monitor the temperature every hour.

Then record the current, minimum and maximum on the reverse of the NSW Health Vaccine Refrigerator Temperature Chart (NH700227) or on a locally developed cooler temperature monitoring chart.

Note: During an immunisation session - Monitor the temperature before leaving for the session, upon arrival, prior to administering vaccine and at least hourly throughout the immunisation session. Keep the cooler out of the direct sun. Check the temperature has remained within +2°C to +8°C prior to administering the vaccine.

Note: This type of cooler can only be used for up to 8 hours.
Option 2: Polystyrene container inside a cooler (less than 8 hours)

Step 1
Condition the ice or gel packs as described previously.

Step 2
Choose a suitably sized polystyrene container. If time permits, chill the inside by placing ice packs/gel packs inside for a few hours. Then, remove the ice packs/gel packs.
Step 3
Place the vaccines, a minimum/maximum thermometer inside the polystyrene container and secure the lid. Ensure the minimum/maximum thermometer probe is placed in the centre of the vaccine stock.

Step 4
Pack the polystyrene container inside a large cooler and surround it with ice packs/gel packs. Secure the lid.

Step 5
Secure the minimum/maximum thermometer on outside of cooler and monitor.
Then record the temperature every hour on the reverse of the NSW Health Vaccine Refrigerator Temperature Chart (NH700227) or on a locally developed cooler temperature monitoring chart.

Note: During an immunisation session - Monitor the temperature before leaving for the session, upon arrival, prior to administering vaccine and at least hourly throughout the immunisation session.

Keep the cooler out of the direct sun. Check the temperature has remained within +2°C to +8°C prior to administering the vaccine.

Note: This type of cooler can only be used for up to 8 hours.
Option 3: Specialised vaccine cold box (over 8 hours)

A vaccine cold box is a purpose-built product. It has thick walls and is significantly more expensive than a cooler. The cold box insulation should be at least 30 mm thick and, if possible, 80 mm thick in the walls and lid. Fibreglass cold boxes with 50 mm refrigeration grade insulation are available.

For long-term storage (more than 8 hours) or extreme conditions (where storage environment is <0°C or >40°C) a specialised cold box is needed. Specialised cold boxes are available that meet World Health Organization (WHO) recommendations.

A large cold box should have a minimum cold life of **120 hours** when exposed to temperature up to **43°C** without any openings.

The [WHO](http://www.who.int/immunization_standards/vaccine_quality/pqs_e04_insulated_containers/en/index.html) has a list of specifications at:

When the power returns

Note: During a power failure glass fronted refrigerators become heated quickly. Contact the Power Company to see how long power will be out for, if prolonged then recommend to place in cooler.

**Step 1**

All vaccines that have been continuously stored between +2°C to +8°C can be returned to the refrigerator when the power resumes and the refrigerator temperature has returned to between +2°C to +8°C and has been stable for one hour. Reset the refrigerator minimum/maximum thermometer once the refrigerator temperature is stable between +2°C to +8°C.

**Step 2**

Reset the refrigerator minimum/maximum thermometer after the refrigerator has been restocked and the temperature has returned to +2°C and +8°C.

**Step 3**

Document all activity on the on the reverse of the NSW Health Vaccine Refrigerator Temperature Chart (NH700227).