



# KISS GUIDE TO VACCINE MANAGEMENT



## Education Module One: Introduction to vaccine management

April 2007

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**Keep it Simple and Safe!**

# 1. INTRODUCTION TO THE MODULE

## About this education module

### Purpose

This education module is the first in a series of three which are:

- 1) Introduction to vaccine management
- 2) Cold chain risk management
- 3) Data management

The purpose of this education module is to provide any staff member involved in vaccine management with information and continuing education on the basic principles of effective vaccine storage and handling. Drawing on information from the [National Vaccine Storage Guidelines: Strive for Five](#), it provides an overview of the three essential elements involved in vaccine management and other foundation information about storing and monitoring vaccines. The activities at the end of each section test retention of information and encourage reflection on the way the practice operates.

### Target audience

All clinical and non-clinical staff involved in immunisation and vaccine management including GPs, Practice Nurses, Practice Managers, Aboriginal Health Workers and Practice Staff.

### How to use

#### How to make the best use of this education module

This education module can be used in many different ways including the following:

- Individuals through self-directed learning
- Small group learning
- Part of a local collaborative

Participants are encouraged to complete each of the education modules consecutively however this is mainly dependent on knowledge, experience and time available to the person. Participants are also encouraged to work through each section in the education module successively as this contextualises the content.

On completion of each section, work through the related reflective activities. Refer to the information in the relevant section to assist you in answering the questions as well as the [National Vaccine Storage Guidelines: Strive for Five](#) and [The Australian Immunisation Handbook](#). When you see the 'Strive for Five' image (see below), refer to the stated page(s) in the **National Vaccine Storage Guidelines: Strive for Five** available on [www.immunise.health.gov.au](http://www.immunise.health.gov.au).



### Where to go for more information

For more information or answers to the reflective activities, please contact your local Division of General Practice or Population Health Unit. For contact details, visit [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement).

## Learning objectives

It is anticipated that the following learning objectives will be met by participants who successfully complete this education module:

- Increase in knowledge about the cold chain and appreciate the importance of storing vaccines within the safe temperature range of +2°C and +8°C.
- Increase in understanding of each of the three key elements involved in effective vaccine storage and handling and how this relates to their practice/clinic.
- Increase in knowledge and understanding of the principles of packing a purpose-built vaccine refrigerator and modified domestic refrigerator.
- Ability to appropriately place the external thermometer probe in a modified domestic refrigerator.
- Increase in knowledge and understanding of the principles of monitoring the vaccine refrigerator and monitoring vaccines using an external thermometer and data logger.
- Appreciate the importance of maintaining storage and monitoring equipment.
- Increase in knowledge and understanding of maintaining storage and monitoring equipment.
- Ability to check the accuracy of an external thermometer.

## Source of material

QDGP has sourced material from the following documents to compile this education module:

- [National Vaccine Storage Guidelines: Strive for Five](#), Australian Government: Department of Health and Ageing, 2005, copyright Commonwealth of Australia reproduced by permission.
- [Proceedings of the National Vaccine Storage Workshop](#), Queensland Government: Queensland Health, 2004.
- [The Australian Immunisation Handbook](#), 8th Edition, National Health and Medical Research Council, 2003.

## Acknowledgements

QDGP would like to acknowledge the funding provided by the Queensland Government: Queensland Health for the Queensland Vaccine Management Project.

QDGP receives significant funds from the Australian Government: Department of Health and Ageing.

## Disclaimer

This document is provided as a generic guide and learning information. All organisations or individuals using this material are required to evaluate the contents for its suitability for their requirements prior to use. The Queensland Divisions of General Practice Association Incorporated (“QDGP”) is not responsible for errors or omissions in the content of this material, or the results of any action taken by any person based on the information contained herein. QDGP expressly disclaims all liability to any person(s) in respect of anything and for the consequences of anything done or omitted to be done by any person in reliance, whether in part or in whole, on the contents of this document.

## 2. INTRODUCTION TO VACCINE MANAGEMENT

### Learning objective/s

By the end of this section, participants should have an increase in knowledge about the cold chain and appreciate the importance of storing vaccines within the safe temperature range of +2°C and +8°C.

### About cold chain

The [National Vaccine Storage Guidelines: Strive for Five](#) define the cold chain as the system of transporting and storing vaccines within the safe temperature range of +2°C and +8°C. The cold chain begins from the time the vaccine is manufactured, moves through to the State or Territory vaccine distribution centres and ends when the vaccine is administered. The success of the system involves three key elements: people, processes and equipment (vaccine refrigerator and monitoring equipment).

### Why it is important

Vaccines are delicate biological substances that can become less effective or destroyed if they are frozen, allowed to get too hot and/or exposed to direct sunlight or fluorescent light. The outcome following exposure to any or all of these conditions is dependent on the vaccine itself. For example, for vaccines that are cold or freeze-sensitive such as Pneumococcal and Influenza vaccines, the loss of potency following freezing is immediate and these vaccines must not be administered. When vaccines are exposed to repeated episodes of heat, the loss of vaccine potency is cumulative and cannot be reversed.

The latest edition of [The Australian Immunisation Handbook](#) details vaccine vulnerabilities and practices/clinics should become familiar with their storage requirements.

**STRIVE<sub>5</sub>** See pages 2-6

### Reflective activities

**1. What is the recommended storage temperature of all vaccines?**

+2°C to +8°C

**2. What conditions can affect the viability of vaccines?**

Temperature conditions that are too cold or too hot and exposure to direct sunlight

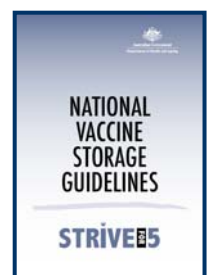
or fluorescent light.

**3. Do you have a copy of the National Vaccine Storage Guidelines: Strive for Five?**

Yes    No

**Do you regularly refer to this publication for vaccine management queries?**

Yes    No



### 3. PEOPLE, PROCESS AND EQUIPMENT

#### Learning objective/s

By the end of this section, participants should have an increase in understanding of each of the three key elements involved in effective vaccine storage and handling and how this relates to their practice/clinic.

#### People

All new staff members who are involved in some or all elements of vaccine management should be provided with a comprehensive orientation program when they start to ensure that they are well-versed in their role and responsibilities. A template orientation program for vaccine management is available on the QDGP website at [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement).

All key staff members should also receive regular updates on immunisation and vaccine management via attendance at education sessions, newsletter articles or receiving practice visits and other methods of support offered by your local Division of General Practice, local Population Health Unit, professional association (e.g. [APNA](#), [AAPM](#), [RACGP](#), [ACRRM](#)), accreditation bodies (e.g. [GPA](#), [QIP/AGPAL](#)) and other like organisations.

**STRIVE**<sup>5</sup> See pages 2-6

#### Processes

It is essential that the practice/clinic establish simple, routine cold chain processes and systems for their particular immunisation service that are easily maintained. The practice/clinic should also establish written protocols on effective vaccine management which reflect the way their systems operate.

Written protocols should include:

- About cold chain and why it is important.
- Key staff members responsible for vaccine management.
- Vaccine refrigerator and monitoring equipment.
- Ordering vaccines.
- Receiving vaccines.
- Appropriate disposal of vaccines.
- Packing the vaccine refrigerator.
- Daily monitoring and recording of the vaccine refrigerator temperature.
- Managing a power failure.
- Action in the event of a cold chain breach.
- Packing a portable cooler.
- Maintenance of the vaccine refrigerator and monitoring equipment.
- Vaccine management audit every 12 months.

The [National Vaccine Storage Guidelines: Strive for Five](#) recommends that practices/clinics conduct a vaccine management audit on an annual basis. This is a great opportunity to review the practices/clinics cold chain processes against their written protocols to make sure that they are up-to-date and meet best practice requirements. A template **vaccine management audit** and **policy and procedure document** is available on the QDGP website at [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement).

**STRIVE**<sup>5</sup> See pages 2-6

## Equipment

All equipment used in the provision of the immunisation service should be reliable, regularly maintained and serviced. This includes the vaccine refrigerator and monitoring equipment.

### Vaccine refrigerator

Refrigerators used for vaccine storage should be clearly labelled as a vaccine refrigerator and should not be used to store items other than vaccines. Providers should ensure that seals work effectively and that the mechanics of the refrigerator are reliable.

#### *Purpose-built vaccine refrigerators*

Purpose-built vaccine refrigerators are recommended for safe storage of vaccines as they are designed and built for vaccine storage. Purpose-built vaccine refrigerators offer the following features:

- Purpose-built vaccine refrigerators have a stable, uniform, and controlled cabinet temperature unaffected by ambient temperature.
- Good temperature recovery will be achieved soon after the door is closed.
- Most have standard alarm and safety features alert.
- Nearly all of the internal space can be used for storing vaccine.
- Purpose-built vaccine refrigerators still require daily monitoring – they do not run themselves!

For more information about choosing a purpose-built vaccine refrigerator, visit the QDGP website at [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement).

#### *Domestic refrigerators*

Domestic refrigerators are designed for food storage and not the specialised needs of vaccines therefore modification of domestic refrigerators is necessary to reduce the risk of adverse storage events.

There are various types of domestic refrigerators on the market. All types have some positive and negative features that will need to be considered when using a refrigerator to store vaccines:

- **Frost-free refrigerators** do not have heating cycles but have low level warming cycles. They usually have several temperature zones to meet the requirements of different foods. In these refrigerators, the top shelf is not necessarily the coldest part of the unit. Refer to **page 47** of the [National Vaccine Storage Guidelines: Strive for Five](#) for further information.
- **Cyclic defrost refrigerators** are not recommended because they produce wide fluctuations in the internal temperatures with regular internal heating. Refer to **page 48** of the [National Vaccine Storage Guidelines: Strive for Five](#) for further information.
- **Bar refrigerators** are not recommended because of the risk of freezing, temperature instability and susceptibility to ambient temperatures. Refer to **page 7** in the [National Vaccine Storage Guidelines: Strive for Five](#) for further information.

Careful monitoring and knowledge of the refrigerator is essential to minimise risk to the vaccine, so it is important that the practice/clinic 'know their vaccine refrigerator' by monitoring and recording temperatures throughout (also called 'mapping') and pack the refrigerator accordingly.

The [National Vaccine Storage Guidelines: Strive for Five](#) provide clear instructions on how to record temperatures throughout the vaccine refrigerator under **Step 5** on **page 11**.

Once the temperatures have been 'mapped', it is important that the practice/clinic pack the refrigerator accordingly or make modifications. The [National Vaccine Storage Guidelines: Strive for Five](#) provides a case study on modifying a domestic refrigerator on **pages 41 to 43**.

**STRIVE 5** See pages 2-6, 7-18 and 19-21

## Monitoring equipment

Appropriate temperature monitoring equipment is essential to effectively maintain the cold chain. Monitoring equipment may be an external thermometer probe, external/built-in data logger and/or external built-in temperature chart recording system.

It is important the practice/clinic follows these principles in relation to their monitoring equipment:

- Appropriate monitoring device(s) is used that accurately records at least the minimum and maximum temperature.
- Staff have the knowledge and skills to read the monitoring device(s) including accessing the minimum and maximum temperatures.
- The temperature monitoring device is reset each time temperature is read and recorded.
- The correct placement of the monitoring device(s) if not built into the vaccine refrigerator.
- Staff have the knowledge and skills to appropriately interpret the temperature recordings, recognising:
  - exceptions (e.g. when the refrigerator is being restocked the air temperature is higher than the vaccine temperature), and
  - breaches (e.g. when the temperature has been outside the acceptable range for an extended period).
- Recognition that ongoing temperature monitoring is needed.
- Maintenance program is in place.

**STRIVE 5** See pages 13-14 and 22-23

## Reflective activities

4. **Write the names or roles of the staff members in your practice who look after the different areas of vaccine management.**

Activity	Person
Primary person responsible for vaccine management	
Secondary person responsible for vaccine management	
Recording the temperature in the morning	
Recording the temperature in the evening	
Ordering vaccines	
Receiving vaccines	
Checking vaccine expiry dates and rotating stock	

5. **What training has each staff member received and when was it provided?** This could be training provided by a staff member in the practice, at an external training session or a person coming to your practice.

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6. **Are new staff members involved in vaccine management oriented to the practices/clinics policies and procedures when they start?**

Yes    No

**Hint!** Visit [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement) for a template orientation checklist.

7. **Do you have the following written processes in place?**

- Vaccine refrigerator and monitoring equipment.
- Ordering vaccines.
- Receiving vaccines.
- Appropriate disposal of vaccines.
- Packing the vaccine refrigerator.
- Daily monitoring and recording of the vaccine refrigerator temperature.
- Managing a power failure.
- Action in the event of a cold chain breach.
- Packing a portable cooler.
- Maintenance of the vaccine refrigerator and monitoring equipment.

8. **When were your policies and procedures last reviewed?**

\_\_\_\_/\_\_\_\_/\_\_\_\_

9. **Do you conduct a vaccine management on an annual basis?**

Yes    No

If **no**, it is recommended that a vaccine management audit of people, processes and equipment is conducted every 12 months.

**Hint!** Visit [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement) for a **policy and procedure template** and **audit** on vaccine management.

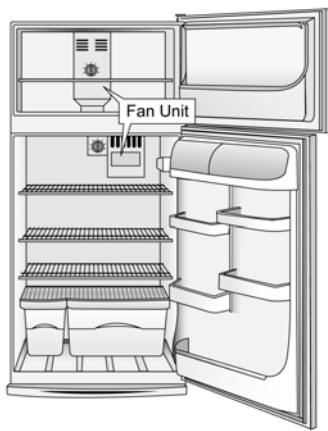
10. **What type of refrigerator does your practice/clinic use to store vaccines?**

- Purpose-built vaccine refrigerator.
- Modified domestic refrigerator.
- Bar refrigerator (**NOTE:** Bar refrigerators are not recommended because of the risk of freezing, temperature instability and susceptibility to ambient temperatures. Refer to **page 7** in the [National Vaccine Storage Guidelines: Strive for Five](#) for further information).

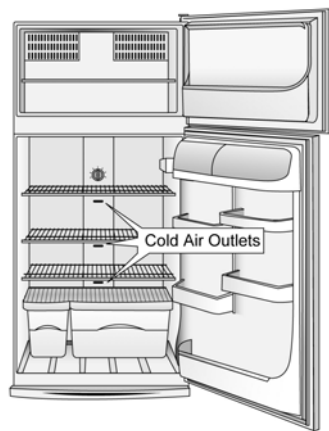
**11. List the details of your vaccine refrigerator:**

<b>Refrigerator model:</b>	
<b>Name of supplier:</b>	
<b>Contact details of supplier:</b>	
<b>Warranty expiry date:</b>	
<b>Name of maintenance service:</b>	
<b>Contact details of maintenance service:</b>	
<b>Next service due:</b>	

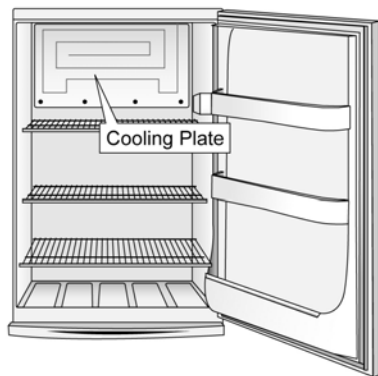
**12. If you have a domestic refrigerator, do you know which type is yours?**



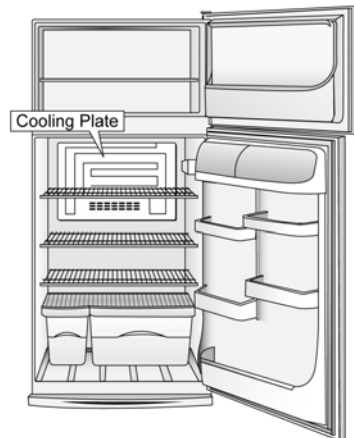
Frost-free refrigerator (type 1)



Frost-free refrigerator (type 2)



Bar refrigerator



Cyclic defrost refrigerator

**13. Have you mapped the temperature zones in your domestic refrigerator using the instructions listed on page 11 of the National Vaccine Storage Guidelines: Strive for Five?**

Yes    No

14. If yes, list the temperature mapping results.

Shelf One	Front, left	_____ °C	Front, right	_____ °C
	Back, left	_____ °C	Back, right	_____ °C
Shelf Two	Front, left	_____ °C	Front, right	_____ °C
	Back, left	_____ °C	Back, right	_____ °C
Shelf Three	Front, left	_____ °C	Front, right	_____ °C
	Back, left	_____ °C	Back, right	_____ °C

15. What type of equipment does your practice use to monitor the vaccine refrigerator?



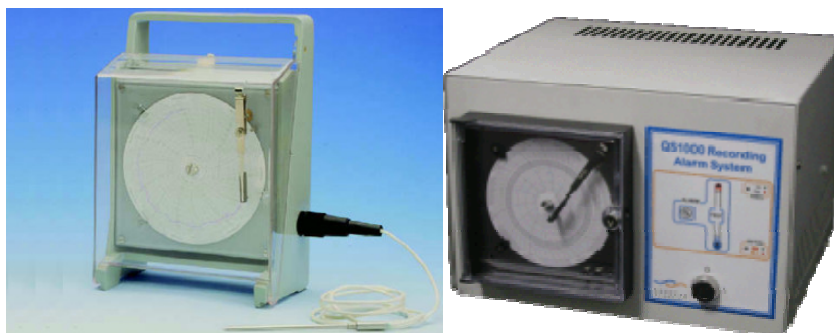
- Minimum and maximum digital thermometer
  - External
  - Built into purpose-built vaccine refrigerator

*Example of an external minimum and maximum digital thermometer*



- Data logger
  - External
  - Built into purpose-built vaccine refrigerator

*Examples of external data loggers*



- Temperature chart recorder (also called temperature graph recorder)
  - External
  - Built into purpose-built vaccine refrigerator

*Examples of temperature chart recorders*

## 4. PACKING A VACCINE REFRIGERATOR

### Learning objective/s

By the end of this section, participants should have an increase in knowledge and understanding of the principles of packing a purpose-built vaccine refrigerator and modified domestic refrigerator, and have the ability to appropriately place the external thermometer probe in a modified domestic refrigerator.

### Principles of packing a vaccine refrigerator

Correct packing of the vaccine refrigerator is essential if vaccines are to remain safe and effective. The vaccine refrigerator needs to have capacity to accommodate the maximum vaccine storage needs including during the influenza vaccination period.

For domestic refrigerators, careful monitoring and knowledge of the refrigerator is essential to minimise risk to the vaccine, so it is important that the practice/clinic 'know their vaccine refrigerator' by monitoring and recording temperatures throughout (also called 'mapping') and pack the refrigerator accordingly. The [National Vaccine Storage Guidelines: Strive for Five](#) provide clear instructions on how to record temperatures throughout the vaccine refrigerator under **Step 5** on **page 11**.

Once the temperatures have been 'mapped', it is important that the practice/clinic pack the refrigerator accordingly or make modifications. The [National Vaccine Storage Guidelines: Strive for Five](#) provides a case study on modifying a domestic refrigerator on **pages 41 to 43**.

**STRIVE FOR FIVE** See pages 9-15 and 41-43

### Packing a purpose-built vaccine refrigerator

The practice/clinic should follow these principles when packing a purpose-built vaccine refrigerator:

- Vaccines can be stored in shallow plastic baskets/trays clearly labelled with the name(s) of vaccine(s).
- Allow space between baskets/trays for air circulation.
- Some purpose-built vaccine refrigerators have a cooling plate. If this is the case, ensure there is a gap of at least 4cm between the vaccines and the back of the refrigerator.
- Keep the door closed as much as practical.
- Place a sticker on the refrigerator door reminding GPs and staff to only open the door when required.
- Always leave vaccines in their original packaging – do not remove from box to fit more in the refrigerator.
- If the refrigerator is new, wait until it is between +2°C and +8°C before stocking with vaccine.
- Don't overstock the refrigerator with vaccines – allow air to circulate. It is suggested that practices/clinics also check with the vaccine refrigerator manufacturer regarding air circulation requirements as this may vary between brands. For example, recommendations gaps between vaccine packaging, gaps from the sides and back of the refrigerator and stock on the bottom of the refrigerator.
- If there is a small amount of stock in the refrigerator, place bottles of water or refrigerated ice packs/gel packs to help stabilise the temperature.
- The refrigerator is used exclusively for the storage of vaccines. Medications requiring refrigeration may also be stored providing there is sufficient space. It is not used to store food or drink.

- Place a warning sticker above the refrigerator power source stating “DO NOT TURN POWER OFF”. If the power source is exposed, a switch cover may be necessary.

**STRIVE<sup>5</sup>** See pages 19-21

### **Packing a modified domestic refrigerator**

The practice/clinic should follow these principles when packing a modified domestic refrigerator:

- Know the refrigerator by:
  - recording temperatures throughout the refrigerator (this will help you find the “cold spots”),
  - locating the air vents which return cold air from the freezer, and
  - being trained in the adjustment of the thermostat.
- Store vaccines in their original packaging in a set of sliding plastic drawers or enclosed plastic containers. Label drawers/containers clearly with the name(s) of vaccine(s).
- Ensure there is a gap of at least 4cm between the plastic container and all refrigerator walls including the back.
- Do not use any shelf in the refrigerator where the temperature is known to have been unstable or not between +2°C and +8°C. Fill any shelves inappropriate for storing vaccine with water bottles/containers. Leave a small gap between the bottles/containers to allow air circulation.
- Fill the lower drawers and the door with water bottles/containers. Leave a small gap between the bottles/containers to allow air circulation.
- Place water bottles or ice packs/gel packs in the freezer compartment.
- Keep the door closed as much as practical.
- If the refrigerator is new, wait until it is between +2°C and +8°C before stocking with vaccine.
- Don’t overstock the refrigerator with vaccines – allow air to circulate.
- If there is a small amount of stock in the refrigerator, place bottles of water or refrigerated ice packs/gel packs to help stabilise the temperature.
- Place a sticker on the refrigerator door reminding GPs and staff to only open the door when required.
- Place a sticker on or near the thermostat advising staff that only authorised personnel are permitted to adjust.
- The refrigerator is used exclusively for the storage of vaccines. It is not used to store food or drink.
- Place a warning sticker above the refrigerator power source stating “DO NOT TURN POWER OFF”. If the power source is exposed, a switch cover may be necessary.

**STRIVE<sup>5</sup>** See pages 9-18 and 41-43

### **Location of the external thermometer probe**

If a practice/clinic uses an external thermometer (e.g. Queensland Health minimum and maximum temperature thermometer), the probe should be placed inside vaccine packaging (including the box and product information leaflet) so that the probe is able to measure the air temperature closest to where a vaccine vial would be and therefore simulates vaccine temperature. The box and product information leaflet provide some further protection from very short term fluctuations, e.g. after the door is opened and closed.

An empty box with the product information should be used so that the probe does not get misplaced when vials are used. The box should be labelled as “EMPTY” so that the probe isn’t inadvertently moved.

This procedure should be followed in terms of placement of the probe in a modified domestic refrigerator:

1. Locate the probe inside an empty vaccine package with retained product information leaflet.
2. Label the vaccine package “EMPTY”.
3. Place package containing the probe inside and near the back of an enclosed plastic drawer or container.

**STRIVE**<sup>1005</sup> See page 14

### Reflective activities

#### 16. Are these statements about vaccine refrigerators true or false?

1. Vaccines must be stored in their original packaging which includes the box and product information leaflet.	True / False
2. If an <u>external thermometer</u> , the probe must be stored in water in the refrigerator to reflect the temperature of a vial.	True / False
3. Vaccines are just like food items – the colder the refrigerator temperature the better.	True / False
4. The door of a <u>modified domestic refrigerator</u> needs to be filled with water bottles/containers.	True / False
5. Water bottles or ice packs/gel packs in the freezer compartment of a <u>modified domestic refrigerator</u> help stabilise the temperature of the refrigerator.	True / False
6. It's okay to keep the milk in the vaccine refrigerator – as long as lunches and drinks aren't stored in there.	True / False
7. <u>Purpose-built vaccine refrigerators</u> have good temperature recovery so it is okay to keep the fridge door open as long as you need to.	True / False
8. Some <u>purpose-built vaccine refrigerators</u> have a cooling plate which means vaccines must be stored at least 4cm from the back.	True / False
9. Because <u>purpose-built vaccine refrigerators</u> are so good, you only need to record the temperatures once a week.	True / False
10. The vaccine refrigerator needs to be packed so that air is allowed to circulate between vaccines.	True / False

#### 17. List two reasons as to why vaccines should not be removed from their original packaging.

1. Packaging provides a degree of protection from temperature fluctuations.
2. Some vaccines are light sensitive and the packaging protects them from exposure.

18. Have you asked your purpose-built vaccine refrigerator company if you can store vaccines at the bottom of the fridge?

Yes    No

If yes, what was their answer?

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19. Have you asked your purpose-built vaccine refrigerator company if you can store vaccines at the very back of the fridge?

Yes    No

If yes, what was their answer?

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20. Have you implemented their recommendations?

Yes    No

## 5. CHECKING AND RECORDING THE VACCINE REFRIGERATOR TEMPERATURE

### Learning objective/s

By the end of this section, participants should have an increase in knowledge and understanding of the principles of monitoring the vaccine refrigerator and monitoring vaccines using an external thermometer and data logger.

### Principles of monitoring the vaccine refrigerator

Checking and recording the minimum and maximum temperature of the vaccine refrigerator is an essential element of ensuring that vaccines remain safe and effective. Checking and recording temperatures before using vaccine enables the identification of problems before vaccine (which may be damaged) is given.

Twice daily checks give a better indication of any problems in the refrigerator's function and temperature fluctuations over the course of the day. However, the temperature needs to be viewed and considered every time the refrigerator is opened.

In addition to daily monitoring and recording the temperature of the vaccine refrigerator, the practice/clinic should ensure safe and effective vaccines by completing the following:

1. Check minimum/maximum temperatures:
  - on receipt of vaccines,
  - every day before vaccination commences and at the end of the working day,
  - last thing Friday afternoon and first thing Monday, if the centre closes over the weekend,
  - hourly during outreach clinics, and
  - every time you open the refrigerator.

2. Plus record comments and any action taken in the temperature chart/log every time the minimum and maximum temperature exceeds the recommended range of +2°C to +8°C, e.g. if restocking or defrosting the refrigerator.
3. Never reset the thermometer unless the temperatures have been recorded.
4. Have a separate temperature chart/log for each vaccine refrigerator in the practice/clinic.

**STRIVE**<sup>15</sup> See page 14

## Monitoring vaccines using an external thermometer and data logger

### Monitoring vaccines using an external thermometer

The practice/clinic should follow this procedure for checking and recording the temperature of the vaccine refrigerator if using an external thermometer:

#### ***At the beginning of the first session (at start of business)...***

1. Check the vaccine refrigerator thermometer.
2. Record the date, time, minimum and maximum temperature and your initials on the temperature chart or log. (Every vaccine refrigerator needs to have its own temperature chart or log book.)
3. **RESET** to clear the temperature memory after recording the temperature (**NOTE:** Resetting depends on the type of monitoring equipment.)

#### ***At the end of the last session (at close of business)...***

1. Check the vaccine refrigerator thermometer.
2. Record the date, time, minimum and maximum temperature and initials of the person in the vaccine refrigerator temperature chart or log book. (Every vaccine refrigerator needs to have its own temperature chart or log book.)
3. **RESET** to clear the temperature memory after recording the temperature (**NOTE:** Resetting depends on the type of monitoring equipment.)

**NOTE:** If vaccine storage temperatures have been outside the recommended range of +2°C to +8°C, isolate the vaccines, notify other staff not to use until further notice and notify the Queensland Health Immunisation Program on **3234 1500** during business hours as soon as possible to inform them of the breach and to seek advice.

**STRIVE**<sup>15</sup> See pages 14 and 22

### Monitoring vaccines using a data logger

The practice/clinic should follow this procedure for checking and recording the temperature of the vaccine refrigerator if using a data logger:

#### ***At the beginning of the first session (at start of business)...***

1. Download the readings of the data logger.
2. Check both the minimum (MIN) and maximum (MAX) temperatures.
3. If using computer software, record in the software the time checked (if not logged automatically) and your initials.

4. If unable to edit computer software:
  - Print the log, circle the minimum and maximum temperatures and sign.  
OR
  - Record the date, time, the minimum and maximum temperature and your initials on the temperature chart or log.

***At the end of the last session (at close of business)...***

1. Download the readings of the data logger.
2. Check both the minimum (MIN) and maximum (MAX) temperatures.
3. If using computer software, record in the software the time checked (if not logged automatically) and your initials.
4. If unable to edit computer software:
  - Print the log, circle the minimum and maximum temperatures and sign.  
OR
  - Record the date, time, the minimum and maximum temperature and your initials on the temperature chart or log.

**NOTE:** If vaccine storage temperatures have been outside the recommended range of +2°C to +8°C, isolate the vaccines, notify other staff not to use until further notice and notify the Queensland Health Immunisation Program on **3234 1500** during business hours as soon as possible to inform them of the breach and to seek advice.

**STRIVE5** See pages 14 and 22

**Reflective activities**

**21. There are at least six possible times when the minimum and maximum temperature should be checked. Can you list them all?**

1. On receipt of vaccines.
2. At the beginning of each working day before vaccination commences.
3. At the end of each working day.
4. Last thing Friday afternoon and first thing Monday.
5. Hourly during outreach clinics.
6. Every time the refrigerator is opened.

The following questions are multiple-choice and are about monitoring using a data logger and thermometer.

**22. If a data logger is the primary method of monitoring the vaccine refrigerator temperatures, the results need to be downloaded and checked:**

- (a) Once per day
- (b) Once per week
- (c) Once per month
- (d) All of the above

**23. If the practice/clinic uses a thermometer, it needs to be reset:**

- (a) Several times per day
- (b) Whenever the temperature is checked
- (c) **Whenever the temperature is checked and recorded**
- (d) Whenever the temperature is outside of the +2°C to +8°C range

**24. Number from 1 to 5 the order by which the temperature needs to be checked and recorded:**

- 4. Record your initials.
- 2. Record the temperature.
- 5. RESET the thermometer.
- 1. Access the minimum and maximum temperature.
- 3. Record the date and time.

## **6. MAINTAINING EQUIPMENT**

### **Learning objective/s**

By the end of this section, participants should appreciate the importance of maintaining storage and monitoring equipment, have an increase in knowledge and understanding of maintaining storage and monitoring equipment, and have the ability to check the accuracy of an external thermometer.

### **Importance of maintaining equipment**

A well maintained vaccine refrigerator and monitoring equipment is essential if vaccines are to remain safe and effective. For vaccine refrigerators, it involves having a maintenance program in place, positioning the refrigerator in a suitable location and defrosting a domestic refrigerator (if not frost-free).

Ensuring monitoring equipment is effective involves changing the battery every year plus an annual check to know the degree of accuracy and to identify potentially faulty equipment, flat batteries or a damaged probe or cable which can affect readings.

### **Equipment to store vaccines**

#### **Maintaining the vaccine refrigerator**

The practice/clinic should maintain the vaccine refrigerator via the following ways:

- Conduct a vaccine management audit (including people, processes and equipment) at least every 12 months.
- Report refrigerator problems immediately to the nominated person in the practice/clinic (such as the Practice Manager) so that repairs can be made.

- Check the rubber seal around the door. If brittle or torn, arrange for replacement.
- Refrigerators requiring defrosting are not recommended. However if the refrigerator is not frost-free, defrosting should be done on a monthly basis. Transfer the vaccines to a portable cooler and monitor the temperature.
- If there are exposed coils on the back of the refrigerator, keep them clean and dust free to improve operating efficiency.

**STRIVE**<sup>1005</sup> See pages 16-18

### Location of the vaccine refrigerator

The practice/clinic should position the vaccine refrigerator according to these principles:

- Place the vaccine refrigerator away from warm external walls and out of direct sunlight.
- Ensure that the refrigerator is in a secure area only accessible to staff.
- Follow the manufacturer's instructions about positioning the refrigerator to enable sufficient air circulation around the back and sides.
- Ensure the power source is labelled clearly to prevent the refrigerator from being accidentally unplugged or turned off. If the power source is exposed, a switch cover may be necessary.

**STRIVE**<sup>1005</sup> See pages 9-10

### Defrosting a domestic refrigerator

A refrigerator works well only if it is properly installed, cleaned and defrosted regularly. Thick ice in the freezer compartment does not keep a refrigerator cool. Instead, it makes the refrigerator work harder and uses more power.

Refrigerators requiring defrosting are not recommended. However if the refrigerator is not a frost-free, the [World Health Organization](#) recommends defrosting the refrigerator when ice becomes more than 0.5cm thick, or once a month, whichever comes first.

The practice/clinic should follow this procedure to defrost and clean the vaccine refrigerator which is not a frost-free unit:

1. Take out all vaccines and transfer them to:
  - a second refrigerator which must be monitored during this time,  
OR
  - a correctly packed portable cooler.
2. Turn off the power supply to the refrigerator.
3. Leave the door open and wait for the ice to melt. Do not try to remove the ice with a knife or ice pick, since doing so can permanently damage the refrigerator. You can place a pan of boiling water inside and close the door.
4. Clean the inside of the refrigerator and door seal with a clean wet cloth.
5. Turn the refrigerator on again.
6. When the temperature in the main section falls to +8°C or lower (but not less than +2°C), pack the refrigerator according to best practice guidelines.

**STRIVE**<sup>1005</sup> See page 17

## Equipment to monitor vaccines

### Maintaining monitoring equipment

It is essential that the practice/clinic maintain their monitoring equipment by doing the following:

- Conduct an accuracy check of the external thermometer (also called “slush” test). An accuracy check should be conducted after receiving a new thermometer, after changing the battery and at least every 12 months or sooner if having thermometer or cold chain problems. Record the results on the temperature chart or log for future reference.
- Replace the battery of the thermometer or data logger at least every 12 months or sooner if having thermometer or data logger problems.
- Arrange for the data logger or temperature chart recorder to be calibrated at a frequency and method according to the manufacturer (i.e. may need to be calibrated by the manufacturer).

**STRIVE**<sup>5</sup> See page 22

### Knowing the accuracy of the external thermometer

The practice/clinic should follow this procedure to know the accuracy of the external thermometer (“slush” test):

1. Two-thirds fill a polystyrene or plastic cup with cold water.
2. Place cup in the refrigerator freezer until a fine layer of ice forms on the top and small sections of ice form within the fluid. This may take up to 2 ½ hours.
3. Using this method, the mixture is 0°C if ice is present.
4. Place the temperature probe into the middle of the container. Be careful not to let the probe touch the container.
5. Observe the temperature on the display screen at 2 minutes.
6. The temperature will drop quickly at first and then more slowly, however the temperature should drop to 0°C within 2 minutes.

### Interpreting the results

- The results should be within one degree above or below 0°C, therefore the display screen may show three possible readings: +1°C, 0°C, -1°C.
- If the temperature reading is more than one degree above or below 0°C at 2 minutes, replace the battery and test again.
- If still not within range, contact Queensland Health on **3234 1500** for further advice.
- If the temperature reading is 0°C this demonstrates that the thermometer is accurate and can be used as normal.
- If the temperature reading is either +1°C or -1°C this demonstrates that the accuracy is within acceptable limits and can continue to be used HOWEVER this needs to be:
  - recorded on the temperature chart,
  - taken into account should the thermometer record temperatures outside the +2°C to +8°C range, and
  - included in the details given to Queensland Health when reporting a cold chain breach.

**STRIVE**<sup>5</sup> See page 22

## Reflective activities

**25. How does your practice/clinic maintain your purpose-built vaccine refrigerator or modified domestic vaccine refrigerator?**

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**26. Has your practice/clinic implemented the following measures to safely and securely store the vaccine refrigerator?**

- Vaccine refrigerator is away from warm external walls and out of direct sunlight.
- Sufficient ventilation around the back and sides of the vaccine refrigerator.
- Power source is clearly labelled or secured.
- Vaccine refrigerator is in a secure location only accessible to staff.

**Has your practice/clinic implemented other safety measures that are not listed?**

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**27. If you have an external thermometer, perform an accuracy check using the above procedure. Then tick the outcome that reflects your results and follow the instructions provided.**

- 0°C      Perfect!
- +1°C      Okay, but you need to:
  1. record on the temperature chart,
  2. take into account should the thermometer record temperatures outside the +2°C to +8°C range, and
  3. include in the details given to Queensland Health when reporting a cold chain breach.
- 1°C      Okay, but you need to:
  1. record on the temperature chart,
  2. take into account should the thermometer record temperatures outside the +2°C to +8°C range, and
  3. include in the details given to Queensland Health when reporting a cold chain breach.

More than 1°C above or below 0°C:

1. Replace the battery and check the accuracy again.
2. If still not within range, contact Queensland Health on **3234 1500** for further advice.

**28. When was the last time you replaced the battery of the thermometer or data logger?**

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**Congratulations on completing Education Module 1: Introduction to vaccine management!**

For answers to the reflective activities or for support in implementing the recommendations in the [National Vaccine Storage Guidelines: Strive for Five](#), please contact your local Division of General Practice or Population Health Unit. To locate their contact details, visit [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement).

There are also two more Education Modules available for you to complete: **Education Module 2: Cold chain risk management** and **Education Module 3: Data management**. Both are both available on [www.qdgp.org.au/vaccinemanagement](http://www.qdgp.org.au/vaccinemanagement).