According to the Centers for Disease Control and Prevention (CDC), vaccination efforts have been successful in preventing and eradicating vaccine-preventable diseases in part because of proper vaccine storage and handling practices. Failure to adhere to recommended specifications for storage and handling can adversely affect the antigens, resulting in inadequate immune responses in the recipients and inadequate protection against disease.

Storage and handling errors result in the loss of millions of dollars worth of vaccine each year in the United States. An estimated 17% to 37% of providers expose vaccines to improper storage temperatures. Administration of improperly stored vaccines can affect a large number of patients, causing embarrassment, expense, potential liability, and loss of patient confidence when repeat vaccinations are required.

In order to prevent these errors from occurring, it is important to implement processes to ensure that vaccines are properly stored and handled. Vaccine quality is the shared responsibility of all parties, from the time the vaccine is manufactured to the time it is administered.

Basic Vaccine Storage and Handling

The first step to successfully storing and handling vaccines is to designate a primary and backup Vaccine Coordinator, who will be responsible for routine vaccine storage and handling. For example, daily responsibilities would include maintaining the cold chain, updating logbooks, educating staff on vaccine updates, following refrigeration protocols, etc.

In order to preserve the integrity of the vaccines, refrigeration units should be in good condition and need to be monitored as proper storage temperatures must be maintained throughout the cold chain. Each refrigeration unit should always be kept cold at the correct temperature and plugged into a safe electrical outlet. Do not store food and beverages in these units.

Tips to Ensure Vaccine Security:

- Avoid using power outlets with built-in circuit switches (they have little red reset buttons).
- Avoid outlets activated by a wall switch as these can be tripped or switched off, resulting in loss of electricity to the storage unit.
- Use a safety-lock plug or an outlet cover to reduce the chance of the unit becoming inadvertently unplugged.
- Post a warning sign at the plug and on the refrigerator or freezer alerting staff, janitors, and electricians not to unplug the unit.
- Label the fuses and circuit breakers to alert people not to turn off the power to the vaccine storage unit.
- Finally, consider installing a temperature alarm to alert staff to after-hours emergencies, particularly if large vaccine inventories are maintained.

The Vaccine Coordinator may be assigned to do the daily recordings, but all personnel who administer vaccines and all persons who are responsible for receiving vaccine shipments should be aware of the proper storage conditions for each vaccine as indicated in the package inserts or on the cartons.
Refrigeration units should be kept at the following temperatures:  
- Refrigerator: 35º– 46ºF (2º– 8ºC)  
- Freezer: 5ºF (-15ºC) or colder  
- If needed, place ice packs or water containers in refrigeration units to stabilize temperatures  
- Vaccine shipments should be unpacked immediately upon receipt and placed in the refrigerator or freezer as required.

Refrigerator and freezer temperatures should be monitored and recorded at least twice daily. A continuous recording thermometer is preferred. A thermometer that records the minimum and maximum temperatures may also be utilized.

Vaccines should be organized so they can be reached without prolonged opening of the door. Products should never be stored against a wall of the refrigerator, on the door or in the bins. The door should be closed properly and never left ajar.

Existing inventory should be moved towards the front of the unit, and newer products should be placed towards the back. This practice avoids waste by ensuring that short-dated products are easily accessible and will be used first, therefore limiting the amount of unused and expired vaccines.

Multi-dose vials or other products that were removed from refrigeration, but not administered, should be promptly returned to the refrigerator. Expired products should never be administered. Promptly remove expired vaccines from the refrigerator and/or freezer and label accordingly to avoid accidental use. Vaccine suppliers have different return policies for expired vaccines.

Vaccines that have experienced cold chain deviations should be isolated and tagged in the refrigerator or freezer until determination of the stability of the vaccine can be verified. The temperature and time the vaccines have been out of range should be documented. In order to determine stability, contact the manufacturer of the vaccine or the state health department.

Emergency Plans

During a power outage or disaster, if vaccines cannot be moved to an alternate site, the unit should remain closed. Refrigerators and freezers typically maintain acceptable temperatures for some time after a power loss.

Checklist of Emergency Actions:
- Suspend vaccination activities before the onset of emergency conditions, if possible. This will allow sufficient time for packing and transporting vaccine.
- Notify staff at the alternate vaccine storage facility. Before moving your vaccine, call the alternate storage facility to make them aware of the situation and to ensure that their backup generator is working.
- Conduct an inventory of the vaccines and record the actions taken. Also note if water bottles were in the refrigerator and frozen packs in the freezer at the time of this event.
- Pack and transport the affected vaccines according to your priority list.
- Follow established vaccine transport procedures for moving vaccine.
- Document all emergency plan actions and notify appropriate personnel.

Additional information on vaccine storage is available at:
http://www2a.cdc.gov/nip/isd/shtoolkit/content.html