

Vaccine Administration: Minimizing Errors, Reducing Missed Opportunities, Appropriate Storage & Handling

May 9-19, 2011

Anchorage, Fairbanks, Bethel, Juneau
Alaska

Donna L. Weaver, RN, MN
Nurse Educator

Disclosures

- ❑ **Donna Weaver is a federal government employee with no financial interest or conflict with the manufacturer of any product named in this presentation**
- ❑ **The speaker will not discuss the off-label use of vaccines**
- ❑ **The speaker will not discuss a vaccine not currently licensed by the FDA**

Vaccine Administration

Appropriate vaccine administration is a critical component of successful immunization program

Apply the “Rights of Medication Administration”

- ❑ The Right Patient
- ❑ The Right Vaccine
- ❑ The Right Time*
- ❑ The Right Dosage
- ❑ The Right Route
- ❑ The Right Site
- ❑ The Right Technique
- ❑ The Right Documentation

*includes administering at correct age, appropriate interval, and before vaccine/diluent expiration

Staff Training and Education

- ❑ Develop a competency-based education plan for all staff**
- ❑ Orient new and temporary staff and validate their knowledge and skills with a skills checklist**
- ❑ Provide continuing education for all staff on**
 - use and administration of new vaccines
 - new schedules
 - new or revised recommendations

Right Patient

- What is the patient's name? Has the patient received any immunizations under another name?**
- What is the patient's date of birth?**
- Has the patient received any vaccines or shots at another clinic or healthcare facility recently?**
- Do you have a copy of the patient's immunization record?**

Patient Preparation and Care

- ❑ Screen for contraindications and precautions every time a vaccine is administered**
- ❑ Be prepared to discuss benefits and risks of vaccines and risks of VPD using VIS and other reliable resources**
- ❑ Display confidence and establish environment that promotes a sense of security and trust**

Position for Comfort and Safety

□ Children

- encourage parent participation if possible
- children may be less fearful when sitting rather than lying down
- use evidence-based strategies to ease the injection process
 - distraction
 - sweet liquids
 - tactile stimulation
 - topical analgesia

Position for Comfort and Safety

□ **Adolescents and adults**

- have patient seated or lying down for vaccination to prevent syncope (fainting)
- consider observing patient (seated or lying down) for 15 minutes after vaccination
- if syncope develops, patient should receive supportive care and be observed until symptoms resolve

Right Vaccine - check the label at least 3 times

- ❑ DT, DTaP, Td, Tdap, TT
- ❑ Hib
- ❑ HepA, HepB,
- ❑ HPV4
- ❑ IPV
- ❑ LAIV, TIV
- ❑ MCV4, MPSV4
- ❑ MMR
- ❑ PCV13, PPSV23
- ❑ RV5
- ❑ VAR, ZOS

Vaccine Preparation

- ❑ **Follow standard precautions to minimize risks of infection**
 - handwashing between patients and anytime hands are soiled
 - gloves not required unless risk of exposure to body fluids, open lesions on hands, or agency requirement
 - use separate syringe and needle for each injection
- ❑ **Inspect vaccine and diluent vials for damage or contamination prior to use**

Reconstitution

- ❑ **Reconstitute vaccines just prior to administration**
- ❑ **Use only the diluent supplied by manufacturer for the corresponding vaccine; dose is not valid if another diluent is used**
- ❑ **Use all diluent supplied for a single dose and draw up all of the vaccine after thorough reconstitution**
- ❑ **Once reconstituted, administer within the time frame specified by manufacturer or discard vaccine**
- ❑ **Changing the needle between reconstitution and administration not necessary unless needle is contaminated or damaged**

Filling Syringes

- ❑ **Follow standard medication preparation guidelines for drawing vaccine from vial into syringe**
- ❑ **Inspect vaccine visually for particulate matter and/or discoloration**
- ❑ **If problems noted (e.g., vaccine cannot be resuspended), do not administer vaccine**
- ❑ **Administer vaccine as soon as possible after filling syringe**
- ❑ **CDC strongly discourages providers from prefilling large numbers of syringes**

Single-dose Vials and Manufacturer Filled Syringes

- ❑ **Use or discard that clinic day when**
 - rubber stopper is exposed or vaccine is withdrawn from vial
 - manufacturer-filled syringe is activated (i.e., syringe cap removed or needle attached)



Don'ts of Vaccine Preparation



- ❑ Never combine vaccines into same syringe unless FDA-approved for combination**
- ❑ Never transfer vaccine from one syringe to another**
- ❑ Never combine partial doses from different vials to obtain a complete dose**
- ❑ Displacing volume to be withdrawn with air likely unnecessary and can lead to wasted doses**

Check the Expiration Date of Vaccine and Diluent



- ❑ **If an expired dose of a live virus vaccine is administered, wait at least 4 weeks to repeat the dose**
- ❑ **If an expired dose is not a live vaccine, the dose should be repeated as soon as possible**

Oral (PO) Route

□ **Rotavirus vaccines**

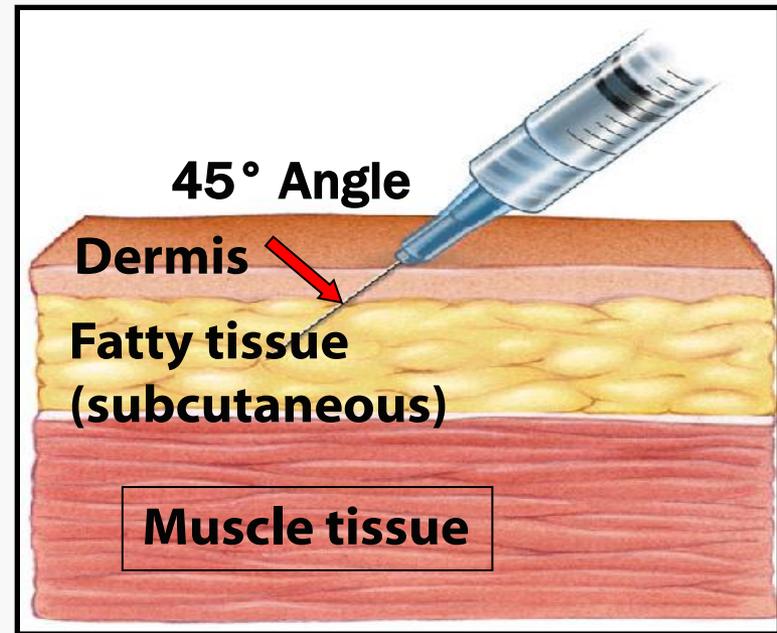
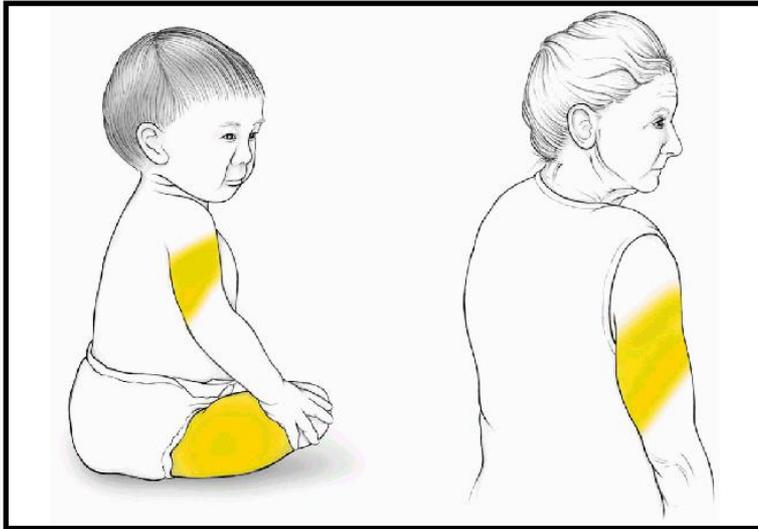
- RV5/RotaTeq
- see detailed administration instructions in manufacturer product information
- do not readminister a dose that is regurgitated, spit out, or vomited, but do continue series

Intranasal (NAS) Route

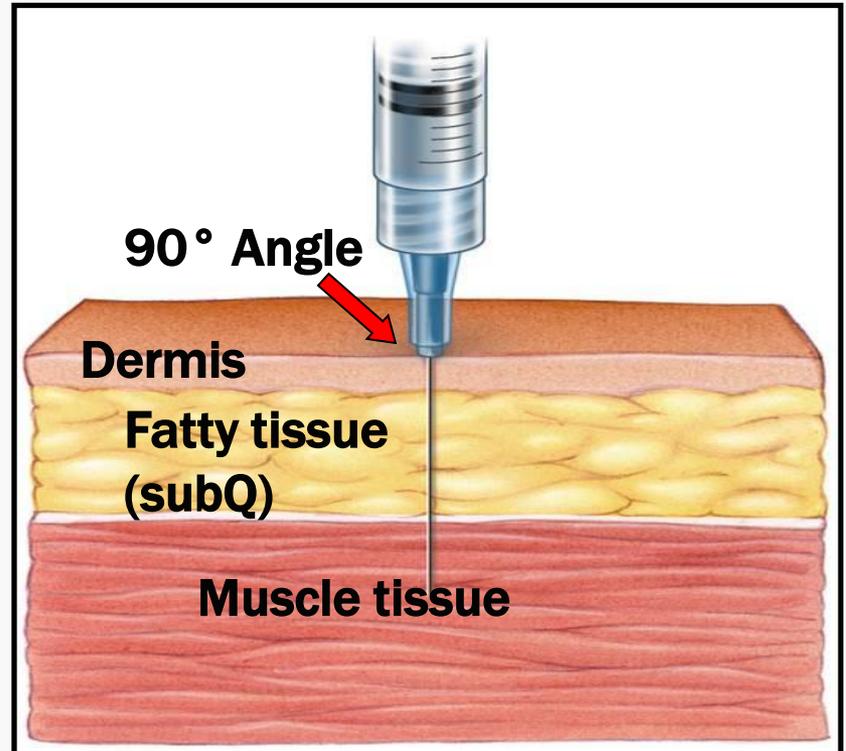
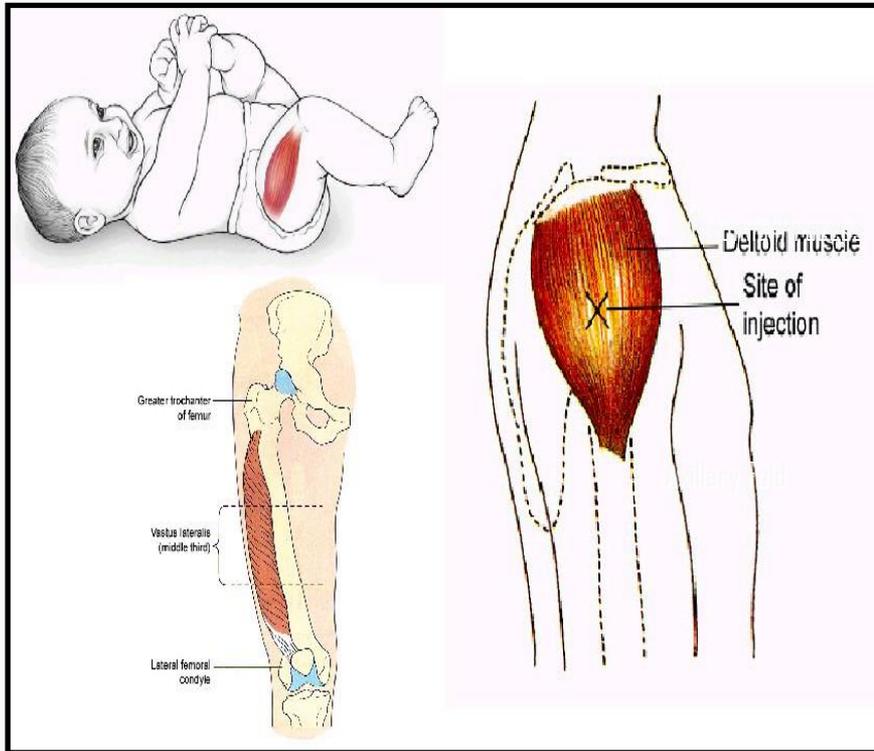
□ **Live attenuated influenza vaccine**

- LAIV/FluMist
- deliver ½ dose in each naris
- do not repeat dose if patient coughs, sneezes, blows nose, etc.

Subcutaneous (subcut) Injections



Intramuscular (IM) Injections



Needle length & Site depend on:

Muscle size, Fatty tissue thickness,

Vaccine volume, Injection technique

Aspiration is NOT required

For obese, vaccine needle size matters



Frederik Joelsing

Mon Feb 8, 2010 10:57 am
EST

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NEW YORK (Reuters Health) - Our ever-expanding waistlines may have outgrown the doctor's needle, researchers say, in what could be another casualty of the obesity epidemic.

HEALTH

In a new study, the researchers report that using a standard 1-inch needle to immunize obese

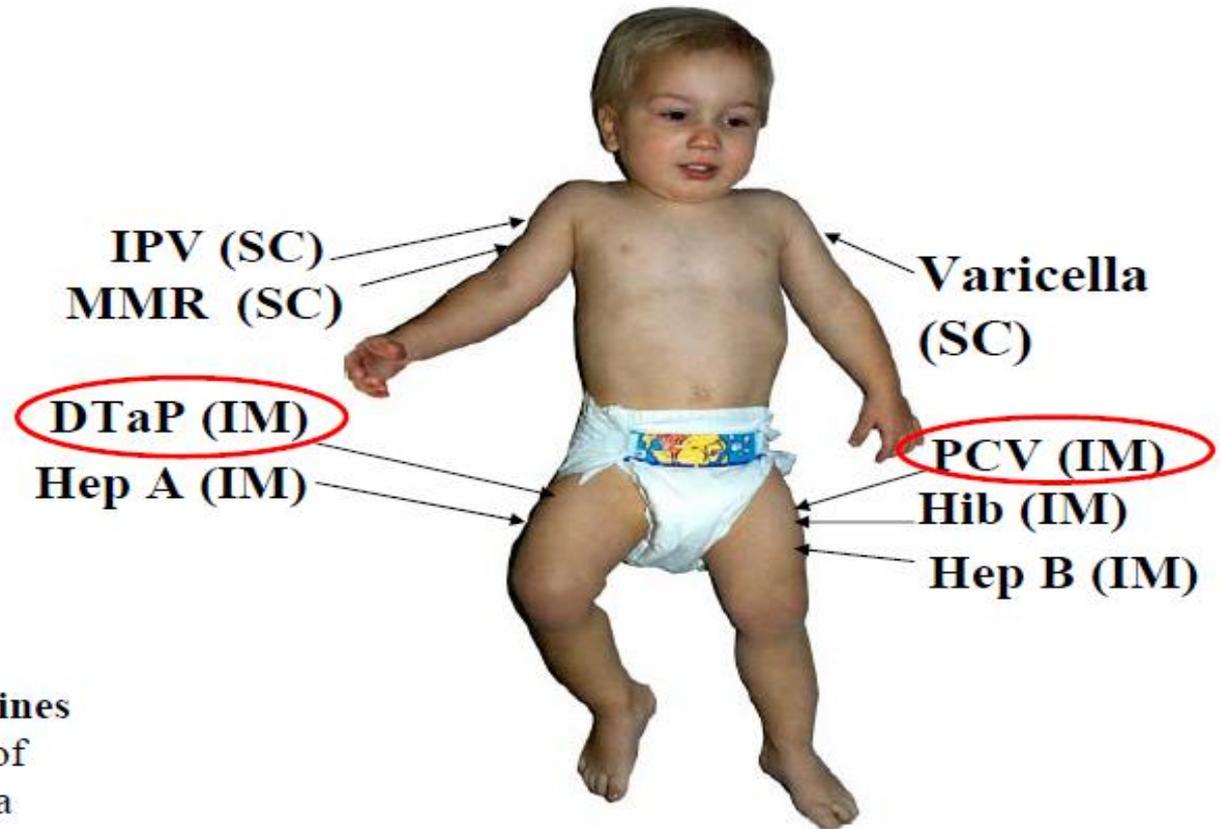
Multiple Vaccinations

- ❑ Use the thigh for multiple IM injections in infants and young children
- ❑ The deltoid muscle can be used for older children and adults
- ❑ Separate each injection by at least 1" if possible
- ❑ Administer most reactive vaccines in separate limbs, (e.g., tetanus-containing & PCV)
- ❑ Administer vaccine and immune globulin at separate sites
- ❑ Combination vaccines can reduce the number of injections needed
- ❑ Use injection site map for consistent site selection

Muscle	Volume Injected	
	Average	Range
Deltoid	0.5 mL	0.5 - 2 mL
Vastus lateralis (anterolateral thigh)	1 - 4 mL	1 - 5 mL

Giving All the Doses 12 Months and Older

- Needle Lengths
 - IM=1 to 1.5 inches
 - SC=5/8 inch
- Separate injection sites by 1-2 inches
- Anterolateral thigh is the preferred site for multiple IM injections
- Deltoid (upper arm) is an option for IM in children ≥ 18 mo with adequate muscle mass
- Using **combination vaccines** will decrease the number of injections needed to keep a child up-to-date



Managing Acute Vaccine Reactions

- ❑ **Anaphylaxis following vaccination is rare**
- ❑ **Thorough screening for contraindications and precautions can often prevent reactions**
- ❑ **Have procedures in place for emergencies**
- ❑ **Staff should be familiar with signs and symptoms of anaphylaxis**
 - flushing, facial edema, urticaria, itching, swelling of the mouth or throat, wheezing, and difficulty breathing
- ❑ **All staff should know their role in an emergency**
- ❑ **Vaccinators should be trained in CPR**
- ❑ **At a minimum, have epinephrine and equipment to maintain airway on hand**
- ❑ **Stabilize patient and transfer to emergency facility for further evaluation and treatment**

Right Documentation

- ❑ **Required documentation in permanent medical record for vaccines covered by National Childhood Vaccine Injury Act**
 - 1) date of administration
 - 2) vaccine manufacturer
 - 3) vaccine lot number
 - 4) name and title of person who administered vaccine and address of clinic or facility where permanent record will reside
 - 5) vaccine information statement (VIS)
 - date printed on the VIS
 - date VIS given to patient or parent/guardian

Right Documentation

- ❑ **Best practice guidelines for documentation also include**
 - vaccine type
 - vaccine route
 - vaccine site
 - adverse events
 - serologic test results
- ❑ **Participation in immunization information system is encouraged**
- ❑ **Documentation of vaccine refusal is recommended**

Prevent Vaccine Administration Errors

- All vaccine administration errors are human errors and all are preventable**

Vaccine Administration Errors

- ❑ **Administration of the wrong vaccine formulation**
 - DTaP and Tdap
 - Varicella and zoster
 - MCV4 and MPSV4
 - PCV and PPSV

- ❑ **Generally need to repeat with correct vaccine except DTaP given to an adult and zoster given to a child**

Vaccine Administration Errors

- ❑ **Wrong diluent or reconstitution error**
- ❑ **CDC always recommends repeating the dose if the wrong diluent is used (except Merck sterile water diluent can be used for MMR, MMRV, VAR and ZOS)**

Vaccine Administration Errors

❑ Wrong route of administration

- IM vaccines given SC
 - Repeat if rabies or hepatitis B
- SC vaccines given IM
 - Do not repeat
- Oral or intranasal vaccines (RV, LAIV) vaccines given IM or SC
 - Always repeat

Reporting Vaccine Administration Errors

- ❑ CDC currently has no mechanism for reporting vaccine administration errors**
- ❑ If an adverse event occurs it should be reported to VAERS**
- ❑ Discussions are underway to develop a reporting mechanism**

Strategies to Prevent Administration Errors

- ❑ Strict adherence to “Rights of Medication Administration”**
- ❑ Ongoing training and education of staff**
- ❑ Involve staff in selection of vaccine products**
- ❑ Keep current reference materials available on each vaccine**
- ❑ Rotate vaccines with the shortest expiration dates in the front and remove and discard any expired vaccine**

Strategies to Prevent Administration Errors

- ❑ Label vaccines clearly and do not store look-alike and sound-alike vaccines next to each other**
- ❑ Administer only vaccines you have prepared**
- ❑ Triple check your work BEFORE administering vaccine**
- ❑ Counsel parents and patients on vaccines to be administered and importance of maintaining immunization records for family members**

Don't Miss Opportunities to Vaccinate

□ Reasons for Missed Opportunities

- Physician or patient unaware of need
- Visits for mild illness, injury & follow-up
- Need for multiple vaccines
- Invalid contraindications

□ Standing orders can decrease missed opportunities and increase immunization rates

Vaccine Storage and Handling

- ❑ **Vaccines are fragile and prevent serious, sometimes fatal diseases**
- ❑ **Improper S&H**
 - reduced vaccine effectiveness
 - inadequate protection against disease

It is better to NOT VACCINATE than to administer a dose of vaccine that has been mishandled

Consequences of Vaccine Mismanagement

- ❑ **Clinic patient care, risk and liability**
 - No data on the safety or efficacy of compromised vaccine
- ❑ **Loss of trust/confidence in healthcare decisions/care can effect future patient encounters**
- ❑ **Misperceptions of vaccine failure**
- ❑ **Financial consequences**
 - Replace vaccine stock in the storage unit
 - Revaccinate clients who received compromised vaccine
 - Vaccine cost and staff time

Vaccine Management Plans

- ❑ **Assign S&H responsibilities to one person**
- ❑ **Designate a back-up person**
- ❑ **Provide training on vaccine storage and handling for other staff regarding their responsibilities**
- ❑ **Develop and maintain detailed written S&H protocols**
 - Routine
 - Emergency

Store All Vaccines Appropriately

Store in Freezer
(stand-alone unit preferred)
Between -58°F and +5°F (-50°C to -15°C) or colder if only VAR

VAR*
ZOS*
MMRV*
MMR*†

Store in Refrigerator
(stand-alone unit preferred)
Between 35°F and 46°F (2°C-8°C)

MMR*†
HepA HepB HepA-HepB
Hib* Hib-HepB
Human papillomavirus (HPV2 & HPV4)
Influenza (LAIV & TIV*)
IPV
Meningococcal (MCV4* & MPSV4)
Pneumococcal (PCV13 & PPSV23)
Rotavirus* (RV1 & RV5)
Vaccines containing Diphtheria, Tetanus, and Pertussis (DT, DTaP, DTaP/Hib, DTaP-HepB-IPV, DTaP-IPV/Hib, Tdap, Td, TT)

*Protect from light (Varivax, Zostavax, ProQuad, Afluria, Agriflu, Fluorix, FluLaval, Fluvirin, Menvevax)
†Unreconstituted lyophilized (freeze-dried) MMR may be frozen or refrigerated

Maintain freezer temp between -58°F and +5°F (-50°C to -15°C)

Maintain refrigerator temp between 35°F-46°F (2°C-8°C)

❑ Live attenuated vaccines

- Tolerate freezing (except LAIV and rotavirus)
- Live viruses deteriorate rapidly after removal from proper storage conditions

❑ Inactivated vaccines

- Inactivated by freezing
- Tolerate short times out of the refrigerator

Vaccine Storage Unit

□ Vaccine storage units should

- Be in good working order
- Be able to maintain required temperatures year round
- Have enough room to store the year's largest inventory with crowding
- Be dedicated to storage of vaccines

Vaccine Storage Equipment

- ❑ **Stand-alone freezer and refrigerator units are recommended**

- ❑ **Combination freezer and refrigerator units can be used**
 - Must have separate, sealed exterior compartment doors
 - There should be separate temperature controls for the refrigerator and freezer
 - Frost free or automatic defrost units are preferred



Stand-alone Unit



Combination Unit

Vaccine Storage Equipment

- ❑ **Do NOT use a “dormitory” unit for permanent storage of vaccines**
 - Small combination freezer/refrigerator unit with one exterior door
 - an icemaker compartment (freezer) within the refrigerator

Keep the Storage Unit Working

Take Preventive Measures

- ❑ Use a plug guard or safety-lock plug
- ❑ Post a warning sign at the plug and on the refrigerator
- ❑ Label fuses and circuit breakers
- ❑ Install a temperature alarm
- ❑ Notify building management not to interrupt power



Storage Unit Best Practices

- ❑ Remove all the bins and drawers**
- ❑ Put water bottles along the wall and floor of the refrigerator**
- ❑ Place the unit in front of the electrical outlet if possible**
- ❑ Keep frozen pack or ice cubes in the freezer**

Vaccine Storage DON'Ts

- ❑ **Don't store vaccine in the doors**
 - Temperature is not stable

- ❑ **Don't store vaccine in the bins or drawers**
 - Inadequate air circulation

- ❑ **Don't let doors stand open**
 - Can affect temperature
 - Can expose vaccine to light

Store ONLY Vaccines in the Unit

- ❑ NEVER store food in the same unit**
- ❑ If you must store other biologics in the same unit, store them BELOW the vaccines to avoid contamination**

Thermometer Basics

- ❑ **Your thermometers (and any other monitoring equipment) should be:**
 - Designed for refrigerators or freezers
 - Calibrated with a certificate of Traceability and Calibration
 - In good working order
- ❑ **Place a calibrated thermometer in the refrigerator & freezer units/compartments**
- ❑ **Keep the thermometer away from coils, vents, walls, and floor of unit**
- ❑ **Place thermometer next to or with the vaccine**

Temperature Monitoring

- ❑ **Post a refrigerator and freezer temperature log**
- ❑ **Record the temperature twice daily**
- ❑ **Store temperature logs for at least 3 years unless state statutes or rules require a longer period**

Take IMMEDIATE Action for Out-of-range Temperature

Temperature Log for Vaccines (Fahrenheit)

Month/Year: January 2008 Days 1-15

***Instructions:** Place an "X" in the box that corresponds with the temperature. The hatched areas represent unacceptable temperature ranges. If the temperature recorded is in the hatched zone: 1. Move the vaccine under proper conditions as quickly as possible. 2. Call the vaccine manufacturer to determine whether the potency of the vaccine(s) has been affected. 3. Call the immunization program at your local health department for further assistance: (909) 557-8812, and 4. Document the action taken on the reverse side of this log.

Day of Month	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15			
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM		
Refrigerator temperature	Take immediate action if temperature is in shaded section*																															
Freezer temp	Take immediate action if temperature is in shaded section*																															
Room temp	Take immediate action if temperature is in shaded section*																															
Staff Initials																																

Note: In the original image, 'X' marks are present in the Refrigerator and Freezer sections. A red arrow points to an 'X' in the Freezer section at Day 6, 10 AM.

Managing Your Vaccine Inventory

- ❑ **Order vaccine responsibly**
- ❑ **Store vaccine in the original box until it is time to use it**
 - Exposure to light can affect the potency of some vaccines
 - Decreases the potential for medication errors
- ❑ **Store diluent as directed in the product information**
- ❑ **Never store diluent in the freezer**

Isolate Questionable Vaccines

- ❑ Isolate questionable vaccine**
- ❑ Then follow your state health department immunization program policy and contact either the manufacturer's quality control office or the immunization program for guidance**

Vaccine Handling after Opening

Multidose Vials

- ❑ **Contain a bacteriostatic**
- ❑ **Good until expiration date unless contaminated or manufacturer's product information states otherwise**

Single-dose Vials

- ❑ **Do NOT contain a bacteriostatic**
- ❑ **Once opened vial should be used or discarded at the end of the clinic day**

Handle Vaccines with Care

- ❑ **Do NOT refreeze vaccines after thawing**
 - Unreconstituted varicella-containing vaccines may be stored for up to 72 hours between 35°F and 46°F (2°C to 8° C)

Immunization S&H and Administration Resources

❑ **CDC**

- 12th edition of Pink Book,
<http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm>

❑ **Immunization Action Coalition**

- <http://www.immunize.org/handouts/>
- <http://www.immunize.org/shop/dvd-immunization-techniques.asp>

❑ **CA EZIZ interactive online training**

- <http://www.eziz.org/>

❑ **Michigan AIM Toolkit**

- <http://www.aimtoolkit.org/>

CDC Vaccines and Immunization Contact Information

- Telephone** **800.CDC.INFO**
(for patients and parents)
- Email** **nipinfo@cdc.gov**
(for providers)
- Website** **www.cdc.gov/vaccines/**
- Vaccine Safety**
www.cdc.gov/od/science/iso/