Integrating Infection Prevention and Control Science into POD-based Planning

Module 5: Product Management Module

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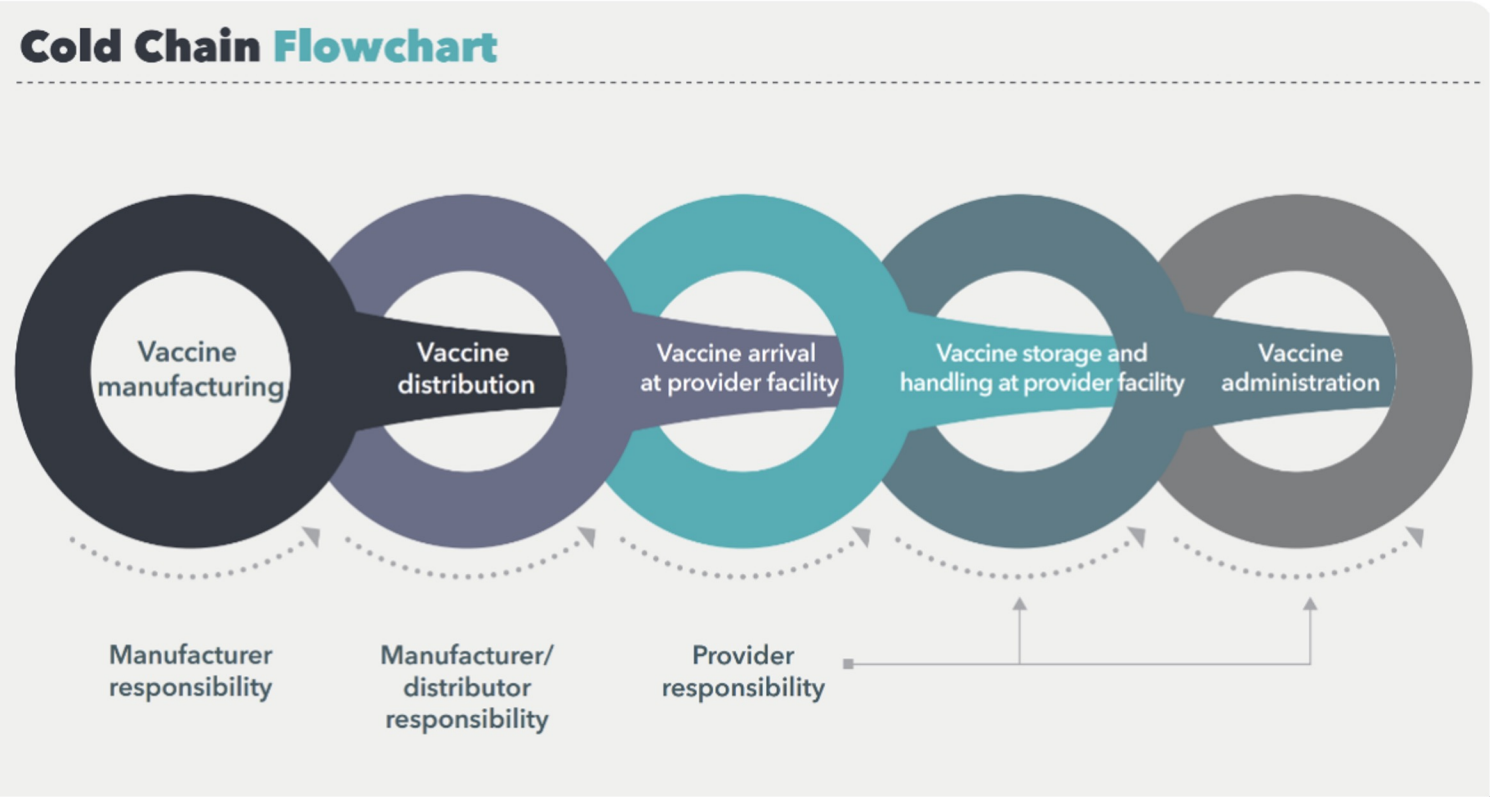
Climate and Crisis Preparedness

Objectives

- Outline typical considerations for storage and handlings of medical countermeasure and vaccines
  - Usage, storage, handling, and cold chain considerations
  - Additional safety considerations and security

Goal: Effectively manage countermeasures

The cold chain is crucial in ensuring vaccines are properly stored and remain useable.



Source: HHS, Vaccine Storage and Handling Toolkit

What is Dry Ice?

- Dry ice is frozen carbon dioxide (CO_2) , usually available as a block or in pellets.
- Frozen CO_2 has a temperature of -79° C (-109° F) and will keep the vaccine frozen.
- CO_2 goes directly from the solid form to gaseous state (sublimes). Since there is no liquid produced as it 'melts', it is well suited for shipping and storage at very low temperatures since it will not give off moisture.
- Dry ice is non-combustible or flammable, which makes safer to transport and store.

Source: Region VI Public Health Training Center / Tulane School of Public Health & Tropical Medicine

Dry Ice? Why was it considered part of the COVID-19 vaccine safety and handling protocol?

- Initially, vaccines being deployed under Emergency Use Authorization (EUA) required a cold chain for proper storage to ensure efficacy. The CDC recommended that the Pfizer vaccine be stored between **-80 ˚C and -60 ˚C**; and the Moderna vaccine be stored between **-25 ˚C and -15 ˚C.**

- Since typical refrigerators and freezers may not maintain these very low temperatures, **dry ice served a convenient way to transport and store the vaccines** at ultra-cold temps to facilitate the mass deployment of vaccines requiring delicate and rigorous cold temperature chain protocols.

- While this recommendation was removed soon after the initial COVID-19 vaccination operations, it is worth noting as an example of challenges we may face in the future. Remain informed through state and federal contacts regardless of countermeasure requirements.

What Do I Need to Know About Storage of Dry Ice?

- NEVER store dry ice in tightly sealed devices such as an ultra-low freezer or plastic/glass container.
  - Store in a Styrofoam chest or insulated cooler designed for dry ice.
  - As dry ice vaporizes, it expands and can lead to an explosion if in a tightly sealed container.

- Always Ventilate Storage Areas
  - Dry Ice sublimes to CO_2 quickly displaces oxygen quickly in an enclosed space. Lack of O_2 in the space may act as a simple asphyxiant. Ventilate before entering a dry ice storage area.
  - CO_2 gas is heavier than air and accumulates in low areas of the surrounding space.

Source: Region VI Public Health Training Center / Tulane School of Public Health & Tropical Medicine

What Do I Need to Know About Storage Of Dry Ice?

- Plan purchases of dry ice as close as possible to the time when needed, and replace dry ice when necessary, for vaccine storage.
- Dry ice will sublimate quickly over time and temperature.

Source: Region VI Public Health Training Center / Tulane School of Public Health & Tropical Medicine

Dry Ice: Handling Hazards and Protective Equipment

Hazard	Explanation	Protection
Contact Hazard	The temperature of dry ice at -109 °F (-79°C) will cause severe frostbite to the skin cells, and they will freeze very quickly.	Wear protective gloves – preferably loose-fitting thermally-insulated gloves.
Asphyxiation Hazard	In unventilated areas, the lack of O2 can cause dizziness, headaches, difficulty breathing, loss of consciousness, and potentially death.	Ventilate before entering dry ice storage areas.
Over-pressurization Hazard	While CO2 itself is not combustible, sublimation of CO2 will build up gas in a tightly sealed container. This could result in the over-pressurization and violent rupture of the container.	Always store dry ice in an appropriate Styrofoam or CO2 designated container where the CO2 gas is released. Wear safety glasses when packing or storing dry ice.

Source: Region VI Public Health Training Center / Tulane School of Public Health & Tropical Medicine

Cold Chain and POD-based Operations

- Be aware of temperature requirements according to manufacturer guidelines

  Plans must consider:

  - How long an MCM can remain viable without refrigeration
  - Does the POD locations and operations have adequate electric amperage and plugs
  - Consider whether you'll deploy multiple mini-refrigerators and/or a larger, central refrigerator
  - Be aware of your jurisdictional weather patterns. If inclement weather is possible, be sure to consider redundant power sources for your MCMs so they remain viable

For more information and training on Infection and Prevention Control, visit *ipc.nnphi.org*.

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