



WALGREENS CHOOSES STIRLING ULTRACOLD FOR SAFE COVID-19 VACCINE COLD CHAIN

OVERVIEW

As recently announced, Walgreens was selected by the Centers for Disease Control and Prevention (CDC) and U.S. Department of Health and Human Services to provide COVID-19 vaccinations across the United States, as part of the Federal Retail Pharmacy Program.

With the Pfizer/BioNTech vaccine requiring ultra-low temperature (ULT) storage from -60°C to -80°C , and the Moderna vaccine requiring -20°C , Walgreens assembled a team of in-house engineers to plan and prepare for the vaccine arrival. Walgreens has been managing and administering vaccinations for over a decade, but this time was unique and posed unprecedented challenges.

This case study explains the various levels of planning that occurred between Walgreens and Stirling Ultracold team members and summarizes the final vaccine administration strategy patients experience when receiving their COVID-19 vaccine at a Walgreens pharmacy, today.

COVID-19 VACCINE ADMINISTRATION CHALLENGES

Walgreens has over 9,000 retail pharmacy stores across America. How could they ensure vaccines were getting to the most remote communities? How would Walgreens store these ultracold vaccines within its pharmacies to administer two doses to patients? How do pharmacists prepare and administer these critical doses and continue filling prescriptions? And how will Walgreens best manage the ebb and flow of the vaccine manufacturers supply without having to turn down a single shipment?

ULTRACOLD STORAGE REQUIREMENTS

According to Pfizer, the Pfizer/BioNTech vaccine required an ultracold storage environment ranging from -60°C to -80°C . If left in original form, the vaccine can be placed in a refrigerator and used within five days or stored in a ULT freezer at -70°C for up to six months. To administer, vial contents must be thawed and reconstituted with a special saline solution. Once reconstituted, this vaccine has six hours until expiration.

When looking at Moderna's storage and handling guidelines, the Moderna vaccine requires ultracold storage of -15°C to -25°C until thaw prior to administration. This vaccine does not require reconstitution and can be stored in standard pharmacy refrigerators for up to 30 days.

The Moderna vaccine has simpler storage requirements and may be easier to manage, but because vaccine orders were placed by each state or local jurisdiction, Walgreens had to plan for all scenarios.

Walgreens brought Stirling Ultracold and other ULT freezer manufacturers in for consultation, but ultimately selected Stirling Ultracold freezers for the job because they are the ONLY models that can manage storage temperatures for BOTH the mRNA vaccines, in a single unit.

MANAGING VACCINE SUPPLY

The Pfizer/BioNTech solution for ultracold distribution is affectionately termed the "pizza box." It holds 195 vaccine vials and is grouped with four other "pizza boxes" to form a bundle and ship on dry ice. Each bundle includes temperature monitoring devices to verify the vials were kept within the required temperature range.

The bundles should remain intact until needed, regularly topped off with dry ice, or pharmacy employees can transition the vials to a ULT freezer.

The Moderna vaccine is packaged with ten multidose vials per insulated frozen shipper. Each shipping box has a temperature monitoring device that verifies its frozen temperature upon arrival. Once received, the vials can be placed directly into a refrigerator or freezer.



Walgreens evaluated various methods for pharmacists to store and administer vaccines that were efficient, effective and manageable with expected scheduling and vaccine supply challenges. Investing in freezers gave their pharmacies flexibility for long-term storage if patients missed appointments and would allow them to transport the vaccines within the portable freezer, if necessary, to manage store demand.

The Walgreens in-house engineering team liked the Stirling engine design and knew compressor-based systems must work very hard to achieve these temperatures. Compressor-based freezer systems use two compressors and cooling loops in a cascading arrangement to continuously cycle between on and off states. These systems are often noisy, produce a lot of heat and may potentially not last long enough to make this a cost-effective purchase. Plus, Stirling Ultracold's company size and agility meant Walgreens could get its freezers as quickly as possible.

CENTRALIZED HUB LOCATION DESIGNATION

Walgreens developed a hub and spoke storage model to receive vaccine shipments. To equip the hub centers, Walgreens purchased 300 portable ULT25NEU freezers and 105 undercounter SU105UE freezers from Stirling Ultracold.

The hub locations, outfitted with a ULT freezer, can manage the ebb and flow of supply, and can also act as administration centers themselves. Coolers are then used to carry vaccine supplies, in a thawed state, for daily inoculations at smaller stores.

The freezers each came with custom racks, designed specifically to maximize freezer storage capacity for the Pfizer/BioNTech vaccines, allowing freezer cabinets to hold 8,400 doses or 36,000 doses, respectively.

Whether the hub location received a portable model or the larger model came down to two qualifications. Remote or rural stores, without another store within a reasonable drive, or stores that saw a large population of customers, received the larger freezer. Commonly visited locations would then be given the smaller freezers.

With this plan in place, Stirling Ultracold freezers are now in Walgreens locations across 49 U.S. states and Puerto Rico.

SUCCESSFUL ADMINISTRATION & FUTURE PLANS

To date, Walgreens has administered more than 4.5 million COVID-19 vaccine doses within the United States. The company is confident its long-term plan has prepared it for future outbreaks and has enabled it to scale even faster, bringing hope to millions of Americans who are ready to put this pandemic in the past.

When asked what advice the Walgreen's team would give other pharmacies trying to establish their own vaccination plan, Luke Sauter, Divisional Vice President of Specialty Pharmacy replied, "I would advise other pharmacies to start with the portable, chest-style freezer because it provides the most flexibility and allows users to access freezer contents as much as they would like. In the more rural or metropolitan

areas, I would use the larger model to store more vaccines at any given time and do not discount the important role the custom racks play. They were key to maximizing dose storage."



Walgreens has an entire company division dedicated to specialty pharmaceutical projects. This division is charged with understanding and planning for medicine innovations, up-and-coming cell and gene therapies, and developing the future infrastructure necessary to support these advancements. With life science research galvanized to deliver medications and personalized therapies at a much faster pace, ultracold infrastructure must be in place for support. Walgreens and Stirling Ultracold stand ready.

To learn more about
Stirling Ultracold's ultra-low
temperature freezers, visit:
stirlingultracold.com



6000 Poston Road, Athens,
Ohio 45701, USA

t: 740.274.7900 / 855.274.7900
f: 740.274.7901
www.stirlingultracold.com

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