

Picking a Vaccine Storage Unit Size and Style Of Storage

Sizing a Vaccine Refrigerator

First, figure out what you already have and what you want and what your physical space can be optimized for. If you are just starting out, visit practices and bring a tape measure! There is also a “style” that needs to be decided – do you want a central bulk storage unit with smaller point of service refrigerators for a few days worth of vaccine, or do you want a central refrigerator where all vaccine is stored?

Bulk Storage / Point of service:

With this style of storage, a large refrigerator can be placed in the building where space allows – it does not need to be in the high traffic central area. The smaller Point Of Service refrigerators can be placed in the high traffic areas at each nurses’ station where the vaccines are prepared. The advantages are several:

- 1) The full stock of vaccine is not exposed to warmer temperatures every time the door is opened to retrieve a single dose
- 2) The refrigerator can be placed below the counter where the vaccine is prepared – minimal staff movement to retrieve a dose.
- 3) The bulk storage unit can have a solid door since it is rarely entered and the solid door is not only better during power outages, but generally cheaper. The smaller POS units can have a glass door to make retrieval easier.
- 4) The smaller POS units have only a few days worth of vaccine. Any one vaccine stock is not replenished until it is completely empty – that way the vaccine exposed to repeated thermal variation are used within a few days and potency is maximized.
- 5) Risk of door not being shut completely with so many entries puts only a small amount of vaccine at risk.

Central Storage

With this style, there is a single large refrigerator to hold all vaccine and it is located in the clinical area. Each dose retrieval requires a separate door opening. If there is enough room, there can be a Private and VFC refrigerator each holding a complete set of vaccine. Advantages:

- 1) There may not be a need for a large central refrigerator – smaller practice with 1 or 2 pediatricians.
- 2) The physical size or layout may be better suited to a central source instead of Point Of Service.
- 3) With fewer pieces of equipment it may be easier to monitor and inventory.

Picking a Size:

The easiest way to pick a refrigerator size is to look at what you have and estimate how much room you currently have and how much you would rather have. With adequate room, you can take advantage of “sales” and not sweat a large flu shipment.

Measure what you have:

I am not sure how refrigerators are sized – but I know everyone I have looked at is considerably smaller than what it is “officially” sized. “Useful” space for vaccine storage should exclude the last 1-2 inches against the rear wall for air circulation, and not beyond the leading edge of the shelves. Although it is a good practice to keep vaccine boxes off of the side walls, purpose built vaccine refrigerators generally circulate air down the rear wall, not the side walls. Having gaps between rows of boxes also helps. Wire shelves maximize air circulation and are a must! Understand the circulation pattern of your refrigerator and take that into consideration when measuring useful space.

For instance, I have a freezerless refrigerator billed as a “17 Cu Ft” refrigerator. If I measure the useful space that I can use in cubic inches and convert to cubic feet (WxHxD in inches divided by 1728 cu in/cu ft) I find that the three shelves provide only 6 cu ft and the floor area used to hold cold water has only 2.4 cu ft. To replace this refrigerator, I purchased a vaccine refrigerator with an electronic thermostat advertized as “23 cu ft”. When it arrived, I calculated how big the useful space was to store vaccine and I measured only 12.6 cu ft! So I measured another refrigerator, a two door vaccine refrigerator advertized as “49 cu ft” and came up with 28.7 cu ft.! If I did not count a makeshift shelf I added on the bottom (see below) , the 49 cu ft would have had only 24 cu ft – or about half the rated size! I suspect all manufacturers do some similar magic with their cu ft rating – the usable inside dimensions seem to be approximately half of the advertized space.

Other options to maximize space:

When ordering refrigerators, remember to look at the number of shelves that come with the refrigerator and the vertical space those shelves occupy. Most manufacturers allow you to order extra shelves and I encourage you to order at least one more than standard. I added two for my 49 and 23 cu ft refrigerators – one from the manufacturer and one I built (see below). For vaccine storage of private and VFC, we need “front space” or “linear shelf space” to help spread out the different types of vaccine. We have a lot of different products and it is good to avoid stacking behind each other. Height or depth is not as important as width. But building space limitations often dictate how wide the refrigerator can be – then the only way to get more linear space is to have more shelves. I have found that approximately 9”-10” between shelves with perhaps more on the top shelf to be a good rule of thumb.

Adding an extra floor shelf:

Remember with purpose build pharmacy grade refrigerators which have a fan to stir the interior compartment, nearly all of the space can be used. To make use of the floor, I laid chilled water bottles on the bottom to completely cover the floor. I then purchased inexpensive wire shelving at a hardware

store and laid it on top of the horizontal half-liter water bottles. I verified the shelf temperature with a data logger and now have a “spare” place for the large flu shipments. It is interesting that with the compressor under the floor of my refrigerator, the floor was the warmest area of the refrigerator by 0.5C to 1.0C – not the coldest! Still safe for vaccine and with the water bottle buffer, the temp differential is not minimal.

So What Size to Pick?

Ask your friends! Visit other practices! Our freezerless domestic 3 shelf, 17 cu ft rated, 6 cu ft used, solid door refrigerator was adequate for a 2 doc practice with both VFC and Private vaccine. But it was quite crowded and had to stack vaccine behind each other. Also, we had the option of bringing vaccine from the main site if we miss-judged the volume. We have replaced that with a 5 shelf 23 cu ft rated, 12.6 cu ft actual, solid door, electronic thermostat vaccine refrigerator and love the extra space. Our clinical area did not have room for the bulk storage, so we use a POS smaller vaccine refrigerator. It is a 2.5 cu ft rated refrigerator with a glass door. We keep a “VFC tray” and a “Private tray” of vaccine in the POS. When the nurse needs a vaccine, she reaches in, pulls out the VFC or Private tray, closes the door, removes the needed vaccine, and places the bucket back in the POS. Very easy and fast.

If you are looking at under the counter units, remember to ask if the heat from the compressor is vented to the rear of the front. If to the rear, you need to be sure there is adequate ventilation behind the unit. Some of the smaller POS and freezers have their heat exchange coils in the outer walls of the refrigerator. That keeps them from getting dusty or damaged, but you will need proper lateral and top clearance for heat to leave. If you are ordering a double door refrigerator, be very careful to measure the height of all doorways. The double door units are too large to be tilted to go through a low doorway. The castor wheels can be removed (generally about 5 inches when present) but you will still need an inch or more for a specialized dolly with wheels to guide it in your building. Some carriers offer “inside delivery” or “white glove” delivery for an extra charge. I strongly recommend the extra delivery charge! No one wants a 400 lb refrigerator delivered with a lift gate to your parking lot!

Storing complete sets of Private and VFC vaccine can be difficult – but not as difficult as storing three sets which is a possibility with the crazy rules coming from Washington concerning segregation of differently funded vaccine. Three sets could happen!

So - it is always better to err on the side of more refrigerator room than less – I hope we will always be adding to our vaccine armament! The more the better!

-Graham Barden MD FAAP 11/13

Coastal Children’s Clinic; North Carolina