

# Minimizing COVID-19 Vaccine Dose Variability

## Recommendations for vaccine withdrawal and administration techniques to decrease variability between doses

*There have been reports of variability between stated doses available from each COVID-19 vaccine vial and what is typically obtained in practice. This resource provides recommendations from the field for preparing COVID-19 vaccines for withdrawal and administration to minimize the potential for variability in the number of doses obtained from COVID-19 vaccine vials.*

### Quick Links

- USP's [COVID-19 Vaccine Storage and Handling Toolkit](#)

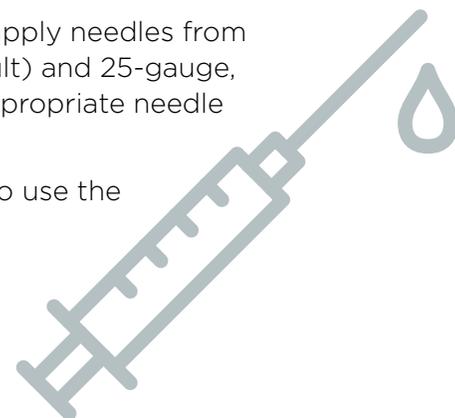
### Proper COVID-19 vaccine preparation and handling

- [Pfizer-BioNTech](#): Each vaccine vial vaccine must be diluted with 1.8 mL of 0.9% Sodium Chloride Injection, USP, using a 21-gauge or narrower transfer syringe. After dilution, each dose should be a final volume of 0.3 mL.
- [Moderna](#): Vials should not be diluted. Each dose should be a final volume of 0.5 mL. Swirl vial gently between withdrawing each dose.
- It is not necessary to change needles between withdrawing vaccine from a vial and administering it to a patient.
- Refer to “At-a-glance: mRNA COVID-19 Vaccines” in [APhA's COVID-19 Resources: Know the Facts](#) library.



### Syringe and needle factors impacting dose variability

- COVID-19 vaccines are provided with [Government Supply Kits](#) (page 30) which include variable needle and syringe options that impact the number of doses obtained from each vial.
- Review kit contents upon receipt to ensure all supplies are included and accurate. If the kit is missing contents, have a plan in place to supply replacement stock from the pharmacy (e.g., ensuring normal saline is available for reconstitution).
- [Needle selection](#) depends on patient age and weight, and the kits supply needles from varying manufacturers of 22-gauge to 25-gauge, 1”-1.5” needles (adult) and 25-gauge, 1” needles (pediatric). Be sure to administer the vaccine using the appropriate needle size for an intramuscular injection to the patient.
- Syringe selections in the kits range from 1 mL–3 mL. It is preferable to use the smallest syringe size possible for accuracy in measuring the dose.
- If you need additional supply kits, inform your practice’s vaccination program coordinator. They can reach out to their state health department or federal contact.



# Minimizing COVID-19 Vaccine Dose Variability (continued)

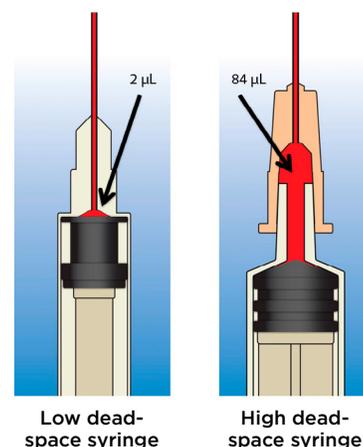
## Recommendations for vaccine withdrawal and administration techniques to decrease variability between doses

### Syringe and needle factors impacting dose variability Continues.

- Do not use tuberculin or insulin syringes, as those needles are too short for intramuscular injection, and the syringe calibration may be in units instead of mL.
- Dead volume refers to the space that exists between the syringe hub and needle. The suspension that remains in this space does not get injected. The [Pfizer-BioNTech vaccine FDA Emergency Use Authorization](#) indicates that a low dead-volume syringe and/or needle should be used to extract a sixth dose from a single vial. If standard syringes and needles are used, there may be insufficient volume to extract a sixth dose from a single vial, regardless of the type of syringe or needle.
- Make sure to draw full doses of vaccine, and do not combine remaining vaccine from content multiple vials.

#### Mean Volume of Fluid Retained with Plunger Depressed

(Image link [here.](#))



### Review intramuscular (I.M.) injection technique

- Both Pfizer-BioNTech and Moderna vaccines are administered I.M. to the deltoid muscle. Review proper technique for [adults](#) and [children](#).

### Skills and technique assessment

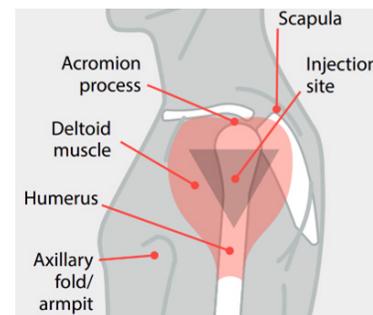
- Conduct staff skills and technique [assessment](#) to ensure accurate technique is applied. This includes preparation of vaccine, identification of injection site, administration at the same level as the patient at a 90-degree angle, and disposal of sharps.

### Lessons learned from frontline pharmacists

- Upon arrival of kits, inspect for complete contents and integrity of supplies. Have pharmacy replacement stock ready if needed.
- When reconstituting the Pfizer-BioNTech vaccine, ensure removal of 1.8 mL of air from the vaccine vial with diluent syringe to equalize pressure in the vaccine vial and decrease risk of loss due to pressure change.
- Encourage second-check practices for volume and product accuracy prior to administration.

#### Injection Site for an Adult Patient

(Image link [here.](#))



# Minimizing COVID-19 Vaccine Dose Variability (continued)



## Recommendations for vaccine withdrawal and administration techniques to decrease variability between doses

### Lessons learned from frontline pharmacists *Continues.*

- When preparing vaccine indoors then taking outdoors for administration, recognize that temperature change from warm to cold poses a chance for vaccine to leak from needle/syringe into cap. It is recommended to follow Pfizer-BioNTech and Moderna guidance for temperature excursions and storage.
- Prefilling of syringes should be limited, as vaccine stability in syringes has not been thoroughly evaluated. Vaccine should be administered in a timely manner.
- Ensure the full standard vaccine volume is administered for a single dose. Avoid dividing doses into smaller volumes. If less than a full recommended dose of a vaccine is administered because of syringe, applicator, or needle leakage, the dose should be [repeated](#).



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