

# Safer Aerosol Drug Delivery for Ventilation Studies and Respiratory Care



(800) 321-5981, (626) 960-9822

[info@medinuclear.com](mailto:info@medinuclear.com)

[www.medinuclear.com](http://www.medinuclear.com)

4610 Littlejohn Street, Baldwin Park, CA 91706

# Many Thanks

Medi/Nuclear® would like to thank all of the nuclear techs that contributed tips and words of wisdom to this presentation. The generosity of their time and selfless actions are greatly appreciated, and have helped nuclear departments weigh the pros and cons of moving forward with ventilation studies during the Covid-19 crisis.



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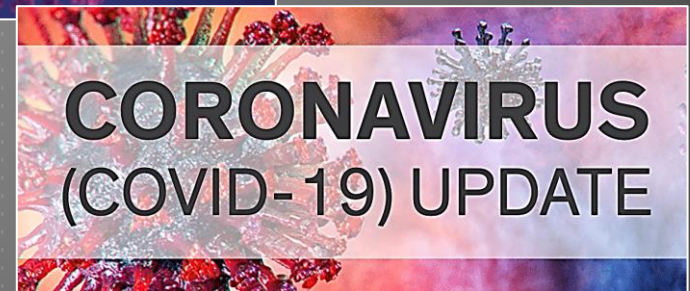
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# Covid-19 Guidelines Regarding Aerosol Delivery

- Due to Covid-19, and the intense fear about contaminated airborne particles, industry guidelines recommend not performing aerosol drug delivery.
- Officials have sounded the alarm about performing nebulizer treatments for respiratory care and radioaerosol delivery for nuclear lung diagnostics.
- Being considered equally risky, both procedures have been strongly discouraged.



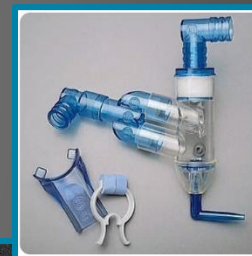
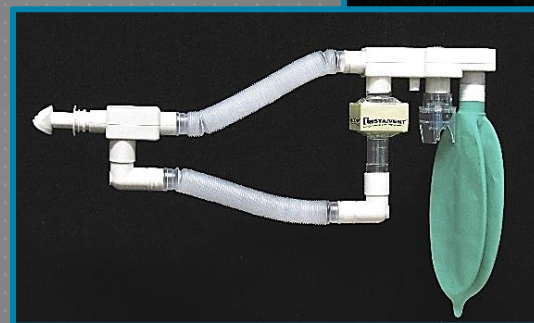
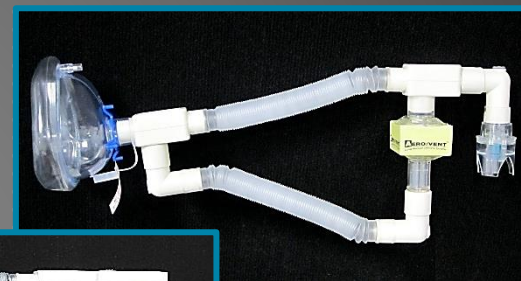
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# But these two applications are not the same...at all.

## Respiratory Nebulizing Systems vs. Nuclear Nebulizing Systems



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# Nebulizer Treatments for Respiratory Care

- Delivery devices are generally unfiltered.
- Straight mouthpieces or vented face masks are most often used.
- A nose clip is rarely used, if ever.
- Respiratory treatments take longer than radioaerosol delivery.

The fear about contaminated airborne particles is very real and completely understandable.



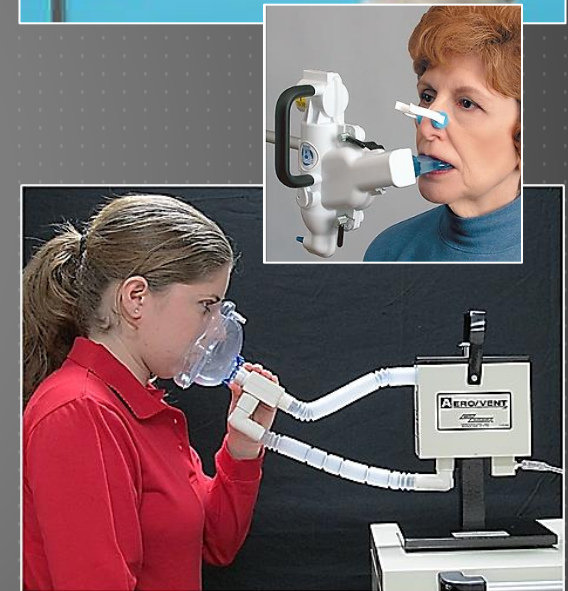
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# Radioaerosol Delivery for Ventilation Studies

- Closed circuit delivery devices are used.
- HEPA filters with 99.9% trapping efficiency are standard.
- Mouthpieces are always used with a nose clip.
- Scuba style mouthpieces and unvented face masks are readily available.
- Radioaerosol delivery takes less time than most breathing treatments.
- Nuclear techs are trained to manage possible risk from radioactivity and common infectious disease, so are better prepared than respiratory therapists to deal with increased risk from Covid-19.

Radioaerosol delivery is much safer than nebulizer treatments for respiratory care.



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# So Where Do We Go From Here?

Keeping in mind that a ventilation study itself is a safe procedure, the risky part of performing one is the patient. The same holds true of CTs, x-rays, intubations and any other procedure. The patient is the unknown part of any familiar procedure.

To revise protocols and get ventilation studies back on schedule, it's apparent that we'll have to raise comfort levels by:

- 1) Educating decision makers.
- 2) Being even safer.

But can this be done during the Covid-19 pandemic??? Absolutely!



# Addressing the Concern About Coughing

## BREATHING

Any delivery system that requires deep or rapid breathing, or breath holding, will most certainly induce coughing from a sick patient, and should not be used. This applies to Xenon procedures and also to Technegas procedures when deep or rapid breathing is required.

NOTE: Chest CTs require breath holding so coughing is a concern there as well.

### TIP:

- Use a radioaerosol delivery system, such as Medi/Nuclear's® Aero/Vent™ or Insta/Vent™ systems, that require and emphasize just tidal breathing, as these are much less likely to invoke coughing spasms.



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# FACE MASKS

## TIP:

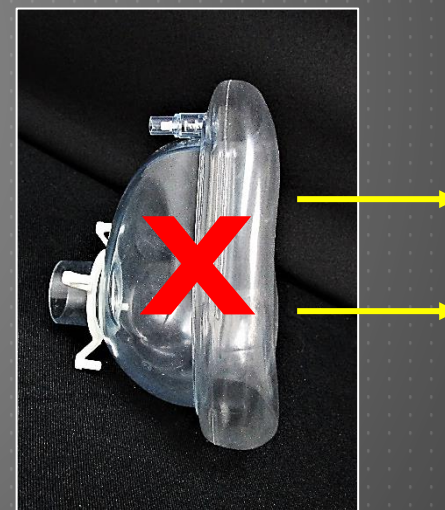
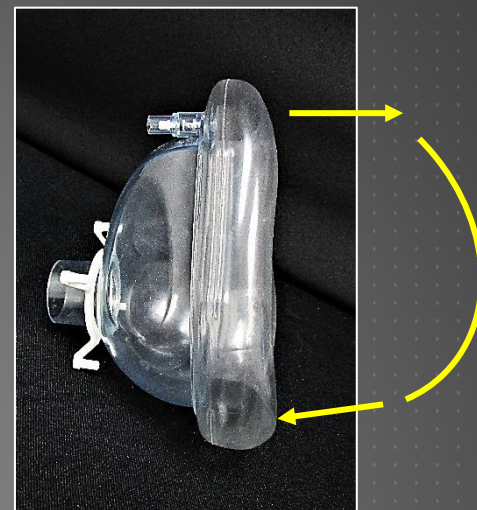
Due to concerns about coughing, a properly fitted, unvented air-cushioned face mask is suggested, as it will securely cover a patient's nose and mouth.

To properly apply a face mask;

- 1) Place it on the bridge of the nose.
- 2) Carefully roll it down toward the chin.

This process will move the soft tissues out of the way, securely sealing the edges of the face mask on the hard bones of the face.

NOTE: Although this seems obvious, this technique is infrequently used. Merely placing a face mask on a face may not allow the edges to seal securely.



## TIP:

- Because of Covid-19, the use of a face mask harness is recommended. This secures the face mask and reduces close contact with a patient.
- For an additional layer of protection, a damp cotton or cotton blend cloth may be placed around the edges of the face mask. The moisture in the cloth will fill the pores of the cloth, allowing escaped particles, if any, to be collected. The cloth may be discarded as hazardous waste after the procedure.



## FREQUENTLY ASKED QUESTION...

If a patient coughs during a procedure, will the nebulizer, internal pressure port (if used) or oxygen inlet port get contaminated?

No. When using a properly fitted face mask, patient exhalation and coughs will go through the circuit and into the HEPA filter. This is the case for two tube systems, as well as single tube systems.



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# Addressing the Concern About Contamination

## HEPA FILTER

HEPA filters have 99.9% trapping efficiency of particles larger than 0.3 microns. As nebulizers produce particles of various size, and they begin to grow upon inhalation, the chance of pass-through is extremely low.

### TIP:

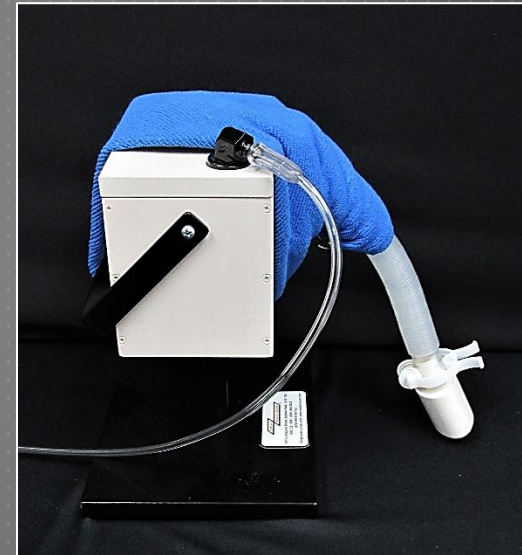
- The HEPA filter on two tube (unidirectional) systems is fully contained inside the shield. Once a kit has been discarded, the inside of the shield may be wiped down, along with the rest of the study area, to avoid possible surface contamination.
- Depending on the shield model, an extra HEPA filter may be added to a single tube kit if additional protection is desired. To better fit a shield, an elbow or adapter may be needed to angle the filter away from the shield.



# SHIELDING

## TIP:

To further reduce the possibility of patient contamination, a damp cotton or cotton blend cloth may be placed around the outside of a lead shield, covering the mouthport opening and/or filter exhaust port. The moisture will fill the pores in the cloth allowing it to capture escaped particles, if any. The cloth may be discarded as hazardous waste following the procedure.

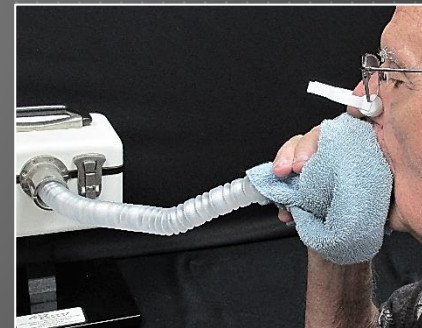
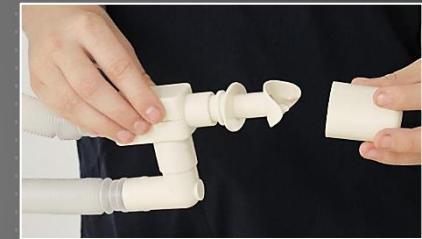


# MOUTHPIECES

Straight mouthpieces come standard on several radioaerosol delivery systems. Because of possible slippage or leakage from the corners of a patient's mouth, these aren't optimal for use on patients with possible infectious disease.

## TIP:

- If a mouthpiece is to be used, a scuba style mouthpiece is suggested. The possibility of slippage is greatly reduced and the corners of the mouth are covered to reduce possible leakage.
- Medi/Nuclear's® scuba style Safety Shield™ Mouthpiece goes one step further by offering a cap. This can be used to collect contaminated saliva from a patient's mouth during mouthpiece removal, and then quickly cover the mouthpiece for a safer disposal.
- To further reduce possible contamination, a moist cotton or cotton blend cloth may be wrapped around the mouthpiece to collect escaped particles, if any, and then discarded as hazardous waste.



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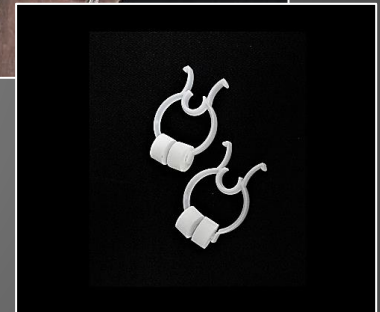


## NOSE CLIPS

Placing a nose clip is a simple and yet very important part of patient prep. If placed improperly contaminated leakage will occur through a patient's nose.

### TIP:

To place a nose clip properly, ensure the nose pads are located on the lower part of the nose, keeping nostrils closed tightly. If a patient is placing the nose clip, check to make sure it is located properly. This will enhance safety and speed up dosing.



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## WRAPPING UP

### TIP:

- After a procedure, before removing a mouthpiece or face mask, allow the patient to continue breathing room air via the kit for an additional 20-30 seconds (4-5 breaths). This will maximize the clearance of any remaining activity in the tubing, and reduce the possibility of inadvertent contamination to the patient, tech or room by allowing particles to be captured in the HEPA filter.
- Have the patient put on a personal face mask following the procedure.
- Clean and disinfect the procedure area according to facility protocols.



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# Final Thoughts Regarding the Safety of Radioaerosol Delivery

Ventilation studies are an important diagnostic procedure. Not performing them jeopardizes patient health and reduces vital revenue streams for our healthcare facilities, at a time when they're urgently needed. Understandably, how to protect our healthcare heroes and the public is of utmost importance.

Clearly, radioaerosol delivery does not carry the same risk of contaminated airborne particles that respiratory nebulizer treatments do. We hope the provided information is comforting and reassuring to those performing ventilation studies, as well as thought provoking to those making decisions regarding them.



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# But What About Aerosol Drug Delivery?

Covid-19 virus particles are roughly 0.12 microns and appear to affect the lower lungs, causing inflammation and mucous production, ultimately preventing oxygen exchange through the alveoli and often leading to the use of a ventilator.



Because of the concern over contaminated airborne particles, physicians are relying on Metered Dose Inhalers (MDI) and Dry Powder Inhalers (DPI), rather than nebulizers, to deliver drugs to patients. This is unfortunate as these devices are difficult for patients to use and deliver large particles for treating the upper airways only.

# Just Imagine...

What might happen if nebulized drugs were safely delivered deep into the lungs, where damage is occurring? We would expect to:

- Slow down the progression of disease.
- Reduce the length of hospital stays.
- Possibly save lives.

Even commonly used, already FDA approved drugs, would produce better patient outcomes.



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# Moving Healthcare Forward

Aerosol drug delivery is an exceptional method of drug delivery. It's fast acting, has very few side effects, if any, and can be targeted for local or systemic therapies. Treatments can be personalized and quality of life improved.

At Medi/Nuclear<sup>®</sup>, we believe...

- Nebulized drugs can be delivered safely.
- Targeted lung delivery is possible.
- Old aerosol drugs can have new purpose with better delivery devices.
- New or combination aerosol drugs can have more positive results using better delivery devices.
- The possibilities for improving patient health with nebulized drugs are endless.



Armed with knowledge learned from nuclear lung imaging, Medi/Nuclear<sup>®</sup> has taken the task of improving aerosol drug delivery to heart.



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# Introducing Medicator<sup>®</sup> Maximizer

The high-efficiency Medicator<sup>®</sup> Maximizer Small Volume Nebulizer (SVN) is based on the highly acclaimed Insta/Vent<sup>™</sup> Plus. It includes many of the same great features, unheard of in respiratory care.

- Closed circuit system, with bacteria or HEPA filter standard, reduces exposure to patient contaminants and aerosolized drugs.
- Efficiently delivers over 40% of a patient dose, as compared to the usual 6-15%.
- Fine particle producing nebulizer available for deep lung or systemic therapies, diagnostic purposes or pediatric treatments.
- Unidirectional air flow delivers more medication in less time.
- Unvented face masks, scuba style mouthpieces, pole mounting and hands-free options available.



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# Asthma Rescue Kit™ (ARK)

The Asthma Rescue Kit™ is a Large Volume Nebulizer (LVN) with an operating time of 4-6 hours. It seamlessly transitions from one mode of therapy to another, making it more cost effective than utilizing multiple individual devices. Highlights include:

- Individual dose treatments or continuous nebulization therapy using oxygen or Heliox.
- Readily attaches to oxygen flowmeter or IV pole with special pole-mount bracket.
- Built-in Mix and Mount Cap™ provides complete control of oxygen/Heliox mixture so Heliox may be added at any time.
- Closed system includes soft, portless mask with elastic head strap that may be switched to mouthpiece (included) when appropriate.
- Pediatric and adult models available.



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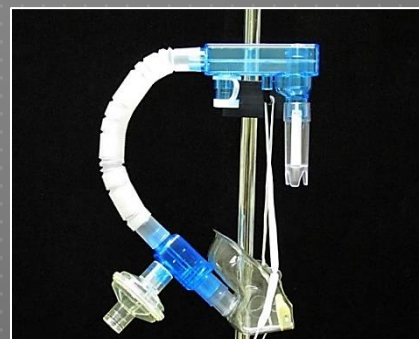
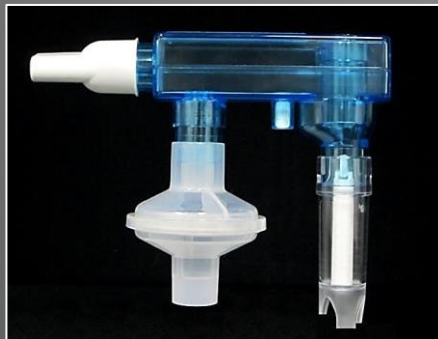
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# Medicator<sup>®</sup> RediNeb

Medicator<sup>®</sup> RediNeb produces both large and small particles for upper airway and general purpose use. Because of this, and its simplicity, Medicator<sup>®</sup> RediNeb is a fine choice for both hospital and home use. Other features include:

- A streamlined body, free of center pin valves that strip medication from aerosol mist, allowing each inhaled breath to be fully medicated.
- Unidirectional air flow to maintain optimal particle size and virtually eliminate breathing restrictions for shallow breathers.
- Easy-fill RediNeb nebulizer in 3mL for standard dosing using pre-filled ampoules, or 9 mL for large volume applications such as combination drugs or lengthier treatments.
- Breath-enhancing diaphragms to increase the speed of delivery.
- Closed circuit system, as always, to reduce possible exposure.



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# Methacholine Challenge Test Kit

The high-efficiency Medicator<sup>®</sup> Maximizer is the core component of the Methacholine Challenge Test Kit for Pulmonary Function labs. Highlights include:

- Breathing time of only 2 minutes.
- Choice of HEPA or bacteria filter.
- 5 and 10-step kits available.



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# Final Thoughts Regarding the Safety of Aerosol Drug Delivery

In respiratory care the general school of thought is:

1. Small particles (<0.5 microns) should be disregarded as they don't carry enough medication to be worthwhile, and they're generally breathed in and then out.
2. Nebulized drugs can't be delivered safely.

In nuclear medicine, judging by safe radioaerosol delivery and quality lung scans, we know this isn't true.

With Covid-19 among us, now is the time to share our knowledge with open minded professionals seeking to improve patient outcomes and protect front line heroes.

With a bit of innovation and a lot of education, Medi/Nuclear® hopes to do just that.



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As we proceed through the pandemic and the challenges that surround it, please know that Medi/Nuclear® will do what it can to make positive change. This includes supporting you and your efforts.

Please let us know how we may be of service.



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