

# A GUIDE TO *Aerosol Delivery Devices*

**FOR** *Respiratory  
Therapists*

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*With a Foreword by*

*Sam Giordano, Executive Director*

**American Association for Respiratory Care**



Produced in collaboration with the  
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Aerosol therapy is both an art and a science. And for respiratory therapists, who are the experts in aerosol therapy, the terms “art” and “science” take on a practical meaning. Respiratory therapists are the only health care providers who receive extensive formal education in aerosol therapy and who are tested for competency in aerosol therapy. In fact, administration of prescription drugs via the lungs is a major component of the scope of practice for all respiratory therapists. Respiratory therapists are *the* experts when it comes to the art and science of aerosol therapy.

How does art combine with science in the context of aerosol therapy? “Science” includes pharmacology, cardiopulmonary anatomy and physiology, physics, and mathematics. In order to claim expertise in aerosol therapy and optimize its many uses, one must have a thorough understanding of the drug formulation, know its mode of action, and understand the conditions where it is effective. One must also know the contraindications to avoid harm and to influence decisions related to effective use of aerosols. The same 5 rights that apply to all medication delivery apply also to aerosol therapy: the right patient, the right medication, the right time, the right route, and the right dose.

For aerosol therapy, the right dose is technique-dependent. One can select the right drug and fail to administer the right dose because the medication was not delivered using correct technique. Here is where “art” comes into play. There is ample scientific evidence of ineffective use of aerosols when they are self-administered because the patient lacks knowledge about proper technique. Aerosol therapy is not a “re and forget” clinical intervention. Many patients benefit from aerosol therapy, especially in hospitals, because it is administered by respiratory therapists. Many millions of other patients, however, do not receive optimum (or sometimes any) benefit from their prescribed metered-dose inhalers, dry powder inhalers, and nebulizers simply because they are not adequately trained to use them.

There is a critical juncture where science intersects with art. For aerosol therapy to be effective, the appropriate delivery system for the medication must be matched to the patient’s ability to use it correctly. The art of aerosol therapy does indeed arise from the science. First, we must identify the appropriate medication, based on physician diagnosis. Next, we must assess the patient’s ability to correctly use the aerosol delivery device. That assessment should be done by a respiratory therapist, as well as physicians and nurses who interact with the patient. This assessment should not be limited to respiratory function since other factors also contribute to effective use of aerosol delivery systems. For example, all too often patients are prescribed the appropriate inhaled medication but do not receive the prescribed dose because the patient cannot use the delivery system appropriately.

While respiratory therapists are best able to demonstrate complete and correct knowledge of aerosol delivery devices, there remains room for improvement. Because aerosol therapy is integral to our scope of practice, and because we are considered the experts in this area, we have a professional obligation to continue our learning in this area. Respiratory therapists have an opportunity to reinforce their value by updating their knowledge of aerosol delivery systems and combining that knowledge with effective assessment of patients requiring this therapy. Recommending an appropriate delivery system tailored specifically to the patient’s abilities is part of that assessment.

This booklet provides detailed and comprehensive information that, when combined with your dedication and commitment to be the professional experts in this important area, will empower you to provide guidance to your physician, nurse, and pharmacist colleagues, but, most importantly, to your patients.

With a widening array of effective inhaled medications and with billions of dollars spent on aerosol medications, you can have a profound impact on bringing about the appropriate match of medications and device delivery to your patients. You’ll not only improve the patient’s condition, but also contribute to more cost-effective use of health care system resources.

Here’s your opportunity to improve your expertise in this area. Accept the challenge and realize your potential as a respiratory therapist.

**Sam Giordano MBA RRT FAARC**  
**Executive Director**  
**American Association for Respiratory Care**

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The proceedings from the symposium contained in this book are approved for 4 CRCE contact hours, and as an AARC member, there is no charge to you. To earn those CRCE contact hours, please go to the AARC website at:

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Further instructions will be given on that website, including...

- how you register to take an examination to assess your mastery of course objectives;
- how to update your email address so that registration confirmations can be sent to you.

## Learning Objectives

You should expect to learn the following as you read this book.

1. State approximate amount of aerosol deposited in the lower respiratory tract for nebulizers, metered-dose inhalers, and dry powder inhalers.
2. List advantages and disadvantages of inhalation compared to other routes of drug administration.
3. Compare the principle of operation of a jet nebulizer, mesh nebulizer, and ultrasonic nebulizer.
4. Describe methods that are used to decrease aerosol loss from a nebulizer during exhalation.
5. List advantages and disadvantages of nebulizers for aerosol delivery.
6. Describe the basic components of a metered-dose inhaler.
7. List advantages and disadvantages of metered-dose inhalers.
8. Compare HFA and CFC propellants in metered-dose inhalers.
9. Explain the importance of priming and tracking the number of doses for a metered-dose inhaler.
10. Compare the design of holding chambers and spacers.
11. Describe factors that affect dose delivery from a holding chamber/spacer.
12. List advantages and disadvantages of dry powder inhalers.
13. Describe the principle of operation of various commercially available dry powder inhalers.
14. List the correct steps for use of a nebulizer, metered-dose inhaler, metered-dose inhaler with holding chamber/spacer, and dry powder inhaler.
15. Describe the proper technique of cleaning aerosol delivery devices.
16. Discuss criteria to assist clinicians in selecting an aerosol delivery device.
17. List common problems and errors with each type of inhaler.

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