CHEST Topics in Practice Management

Aerosol Therapy for Obstructive Lung Diseases

Device Selection and Practice Management Issues

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Inhaled aerosol therapies are the mainstay of treatment of obstructive lung diseases. Aerosol devices deliver drugs rapidly and directly into the airways, allowing high local drug concentrations while limiting systemic toxicity. While numerous clinical trials, literature reviews, and expert panel guidelines inform the choice of inhalational drugs, deciding which aerosol device (ie, metered-dose inhaler, nebulizer, or dry powder inhaler) best suits a given patient and clinical setting can seem arbitrary and confusing. Similar confusion regarding Current Procedural Terminology (CPT) coding for administration of aerosol therapies can lead to lost revenue from underbilling and wasted administrative effort handling denied claims. This article reviews the aerosol devices currently available, discusses their relative merits in various clinical settings, and summarizes appropriate CPT coding for aerosol therapy. ***CHEST 2011; 140(3):781–788***

Abbreviations: ACCP = American College of Chest Physicians; AMA = American Medical Association; CPT = Current Procedural Terminology; DPI = dry powder inhaler; E/M = evaluation and management; HCPCS = Healthcare Common Procedure Coding System; ICD-9-CM = *International Classification of Diseases, Ninth Revision, Clinical Modification;* MDI = metered-dose inhaler

Inhaled aerosol therapies are the mainstay of treatment of obstructive lung diseases. Aerosol devices deliver drugs rapidly and directly into the airways, allowing high local drug concentrations while limiting systemic toxicity. While numerous clinical trials, literature reviews, and expert panel guidelines[1-4] assist physicians in their choice of inhalational drugs, deciding which aerosol device (ie, metered-dose inhaler [MDI], nebulizer, or dry powder inhaler [DPI]) best suits a given patient and clinical setting can seem arbitrary and confusing. Similar confusion regarding Current Procedural Terminology (CPT) coding for administration of aerosol therapies can lead to lost revenue from underbilling and wasted administrative effort handling denied claims. This article briefly reviews the aerosol devices currently available, discusses their relative merits in various clinical settings, and summarizes appropriate CPT coding for aerosol therapy.

In an attempt to guide physicians regarding aerosol device selection, the American College of Chest Physicians (ACCP) and the American College of Asthma, Allergy, and Immunology jointly published evidence-based guidelines founded on a comprehensive, systematic review and meta-analysis of randomized, controlled clinical trials.[5] However, the available evidence generally supported the equivalent efficacy of nebulizers, MDIs used with a spacer device, and DPIs, regardless of patient population, clinical setting, and drug administered. At first glance, it would thus appear that the delivery system chosen makes no difference. As noted by the report's authors, however, clinical trials generally exclude subjects deemed incapable of using proper device technique and do not consistently evaluate drug and equipment costs,

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required personnel time, or patient convenience. As such, a review of aerosol devices and their relative merits in a "real-world" setting is instructive.

Types of Aerosol Devices

There are three major aerosol device categories: the MDI, the nebulizer, and the DPI. MDIs deliver a fixed medication dose from a pressurized canister containing a medication/propellant mixture. For most MDIs, depressing the canister into a holder/mouthpiece actuates aerosol release. However, in order to simplify the technique, several companies have produced breath-actuated MDIs. With these devices, inhalation through the mouthpiece triggers aerosol release, though some still require priming by pushing a button or lifting a lever prior to each use. Nebulizers create an aerosol by agitating a medication solution held in a small reservoir. The patient must load the reservoir for each treatment. Traditional jet nebulizers use a stream of compressed air or oxygen to create an aerosol. Ultrasonic nebulizers generate high-frequency ultrasonic waves that are transduced to the medication solution. Vibrating mesh nebulizers force medication solution through a fine mesh or aperture plate to generate an aerosol. Last, DPIs create an aerosol by directing the patient's inspiratory flow through a powdered medication within the device. Some are preloaded with multiple doses that are aerosolized one at a time, and some are single-use devices that the patient must load with a powdered medication capsule for each dose.

Advantages and Disadvantages of Aerosol Devices

Evidence from clinical trials suggests that, when used with the proper technique, the various devices are equally efficacious.[5] However, outside the idealized setting of clinical trials, which generally exclude patients unable to demonstrate adherence and proper device technique, real-world device choices may influence the effectiveness of therapy. Each device has its own advantages and disadvantages (Table 1).

Standard and Breath-Actuated MDIs

MDIs offer reduced cost and convenient medication delivery in a compact and portable package. However, efficacy requires the use of the proper technique, which eludes many patients.[6,7] Surprisingly, even prescribing physicians frequently demonstrate an improper technique.[8] Potential errors in MDI technique are numerous and include not uncapping the mouthpiece, not shaking the canister prior to use, not holding the canister upright, using an empty or expired device, not exhaling prior to device actuation, not pressing the canister at the beginning of inhalation, cessation of inspiration when the cool plume of medication and propellant hits the posterior oropharynx (the "cold Freon effect," thought to be less common since the transition to hydrofluoroalkane MDIs), too fast an inhalation (ideal should be slow, at about 25 L/min[9]), and not holding the breath for 5 to 10 s to allow aerosol deposition in the airways. The most common error is the failure to coordinate device actuation at the beginning of a slow, deep inhalation. Breath-actuated MDIs attempt to overcome this problem by using the patient's inhalation to trigger device actuation. These devices improve coordination, but they are still prone to all the other pitfalls of MDIs and cannot be used with the open-mouth technique. Further, in the United States, only one drug is currently available via breath-actuated MDI (Table 2).[10]

Standard MDIs With a Spacer Device

Spacer devices also address the problem of patient coordination with MDIs. By capturing the aerosol in a reservoir, spacers provide more leeway in the timing of inhalation and less likelihood of the cold Freon effect. These devices decrease oropharyngeal drug deposition and increase lung deposition.[11] However, spacers do not correct for actuation of the device late in inspiration, and long delays between device actuation and inhalation still hinder drug delivery.[12,13] Furthermore, plastic spacers can accumulate electrostatic charges that impair drug delivery,[12,13] especially if not properly cleaned with soapy water. Perhaps most importantly, MDI/spacer combinations are less compact, making them harder to fit in a pocket or purse, and patients generally prefer other delivery systems.[6]

Jet, Ultrasonic, and Vibrating Mesh Nebulizers

Nebulizers make the timing of inhalation largely irrelevant because they produce aerosol continuously. In addition, tidal breathing with only occasional deep breaths is sufficient.[14] Thus, for patients who are unable to master the proper MDI technique despite repeated instruction, the proper use of a nebulizer probably improves drug delivery. Nebulizers have some distinct disadvantages, however. Patients must load the device with medication solution for each treatment, and bacterial contamination of the reservoir can cause respiratory infections,[15] making regular cleaning important. Also, nebulizer treatments take longer than those of MDIs or DPIs to administer (generally 10-15 min for a jet nebulizer and 5-10 min for an ultrasonic or vibrating mesh nebulizer vs one minute for an MDI or DPI). Although they are relatively portable, typical jet nebulizers must be plugged into a wall outlet or power adaptor, and thus cannot be used

easily in transit. Jet nebulizers are more expensive than MDIs, but often insurance coverage will limit patient cost.

Newer nebulizer designs have enhanced patient convenience. Ultrasonic and vibrating mesh nebulizers are quieter and more efficient at generating an aerosol,[14] shortening treatment times. In addition, they do not require a compressor, allowing them to be lighter in weight, battery powered, and easier to use "on the go." Vibrating mesh nebulizers produce a very fine mist with a high respirable fraction, which can increase drug delivery.[16] However, disassembly and thorough cleaning of these devices is required to prevent decreased nebulizer output from clogged apertures. Despite their advantages, ultrasonic and vibrating mesh nebulizers do not provide improved bronchodilator efficacy over jet nebulizers and are more expensive. As a result, most insurance companies do not cover these devices, except perhaps for patients with cystic fibrosis.

Dry Powder Inhalers

These devices are compact, portable, quick to use, and require less timing and coordination than MDIs. In addition, with no propellants, they eliminate the cold Freon effect. However, patient technique is still relevant.[7] In contrast with MDIs, DPIs require a fast inhalation (ideally about 60 L/min, with rapid early acceleration), and slow inspiration may incompletely empty the device.[17] Also, humidity from exhaling into a DPI can cause clumping of the powder, decreasing drug delivery on subsequent inhalation.[18] Although many devices come preloaded with a month's supply of medication, some must be loaded with a capsule for each use. Handling these capsules is difficult for patients with impairments in vision or manual dexterity, and some patients may mistake the capsules for oral medication.[19]

Selecting a Delivery System

In most cases, there is no evidence-based rationale for choosing one aerosol device over another, but common sense supports some recommendations. Most drugs, if unavailable in a given delivery system, have an equally efficacious alternative in the desired device (Table 2). Where a drug is available by MDI or nebulizer (eg, albuterol, levalbuterol, ipratropium) and the patient demonstrates an adequate technique, most patients and physicians opt for MDIs without a spacer over nebulizers because of their convenience, portability, and lower cost. However, the use of improper MDI technique is common, particularly in young children and adults who are cognitively impaired.[20,21] Before giving up on MDIs, physicians should provide detailed instruction in the proper technique and consider trying a spacer. An excellent set of illustrated patient instructions for various devices is available for free download in both English and Spanish through the ACCP Web site.[22] Teaching the proper MDI technique improves bronchodilator efficacy,[23] but a substantial minority of patients (~20%) demonstrate an inadequate technique, even immediately following expert instruction.[6] In these patients, selecting an alternate device probably improves efficacy, but this remains unproven.

During acute exacerbations of obstructive lung disease, β-agonists have equivalent efficacy when delivered via nebulizer or MDI with spacer.[5] However, for severe exacerbations, most physicians choose nebulizer treatments as patients in severe respiratory distress may not be able to coordinate MDI use or maintain the required breath hold. Intermittent and continuous nebulization of β-agonists are equally safe and effective,[5] though continuous nebulizer treatments probably require less personnel time.[24,25]

Of course, the literature occasionally supports very specific recommendations. Breath-actuated MDIs and DPIs cannot be used with mechanical ventilation as there is no accepted protocol for actuating these devices via a ventilator circuit and humidification causes dry powder clumping.[5,14] A number of technical factors complicate the use of MDIs and nebulizers in mechanical ventilation, but with careful attention to these issues, both can be used effectively. Nonetheless, MDIs are less expensive, require less equipment and personnel time, and avoid the problem of adjusting tidal volume and inspiratory flow to account for nebulizer flow.[26]

In the setting of cystic fibrosis, clinical studies[27] and evidence-based guidelines[28] advocate the use of a specific jet nebulizer and compressor for aerosolized tobramycin. Similarly, dornase alfa is only approved for use with a finite list of nebulizer/compressor combinations.[29] Specific devices have also been approved for aerosolized aztreonam, pentamidine, ribavirin, and iloprost.[14,30]

Overall, each device has significant advantages and disadvantages, and there can be multiple efficacious choices for a given drug or drug class. Comparable device efficacy in most situations leaves ample room for physicians to use their judgment and to accommodate patient preferences. However, patient instruction in proper technique is critical to efficacy, and asking patients to demonstrate their technique will often uncover correctable errors.

Practice Management Issues

Improper coding of aerosol therapy can lead to both lost revenue from underbilling and wasted administrative effort from denied claims. CPT codes

Table 1—*Advantages and Disadvantages of Common Aerosol Devices in the United States*

Aerosol Devices	Advantages	Disadvantages
Standard MDIs (without spacer device)	Require less time (about 1 min) Compact/portable Less expensive No drug preparation required Can be used with mechanical ventilation	Proper patient technique/timing is essential Possible cold Freon effect (less common with newer HFA inhalers) Requires breath hold More oropharyngeal drug deposition
BA-MDIs (without spacer device)	Require less time (about 1 min) Compact/portable Less expensive than nebulizer (but more than standard MDI) No drug preparation required Patient timing less critical because of breath actuation	Proper patient technique still required (timing less important) Possible cold Freon effect (less common with newer HFA inhalers) Requires breath hold More oropharyngeal drug deposition Limited availability in United States Cannot be used in mechanical ventilation
Standard MDIs (with spacer device)	Require less time (about 1 min) Technique/timing less critical because of reservoir effect Less oropharyngeal drug deposition Little to no cold Freon effect Less expensive than nebulizer (but more than MDI alone) No drug preparation required	Less compact; not as easy to fit in a pocket or small purse Plastic spacers can acquire static charge, limiting drug delivery
Jet nebulizers	Technique/timing less important No breath hold required Portable (but may require power outlet for use) Can be used with mechanical ventilation	More expensive Drug preparation required Require more time (10-15 min) Most require wall outlet for use Reservoir contamination possible; must be cleaned regularly
Ultrasonic and vibrating mesh nebulizers	Patient technique/timing less important No breath hold required Portable; often battery powered, allowing use "on the go"	Most expensive, often not covered by insurance Drug preparation required Require more time (5-10 min) Reservoir contamination possible; must be cleaned regularly
DPIs	Require less time (< 1 min) Patient timing less critical because of breath actuation Compact/portable Less expensive than nebulizer (but more than standard MDI)	Proper patient technique still required (timing less important) Single-dose devices require drug preparation and may be mistaken for oral medications More oropharyngeal drug deposition Cannot be used with mechanical ventilation

BA-MDI = breath-actuated metered-dose inhaler; DPI = dry powder inhaler; HFA = hydrofluoroalkane; MDI = metered-dose inhaler.

are published by the American Medical Association (AMA) to provide a uniform description of medical services and are the basis for billing third-party payers. These codes are copyrighted by the AMA and updated regularly by the CPT Editorial Panel with input from expert advisors. CPT evaluation and management (E/M) codes designate patient visits furnished by a care provider. Additional "modifier" codes allow communication of special circumstances that may affect billing. For example, a physician providing a separate and distinct E/M service (ie, above and beyond the usual preprocedure and postprocedure care) on the same day as a bronchoscopy would bill for the procedure (eg, 31622) and then append the "-25" modifier to the E/M code to indicate a separate E/M service rendered by the same provider on the same day (eg, 99233-25). Without this modifier, the payer may reject the E/M service as covered under the global fee for the bronchoscopy. Obviously, in this case, documentation must support that a separate and distinct E/M service was both required and provided. Readers seeking comprehensive resources on the proper use of CPT codes and modifiers are referred to *Current Procedural Terminology*, published by the AMA,[31] and *Coding for Chest Medicine 2011*, published by the ACCP.[32]

CPT codes and descriptions for aerosol therapy are listed in Table 3. Code 94640 designates intermittent

Table 2—*Drugs Available for Each Device in the United States*[10]

Drug Class	MDI	BA-MDI	Nebulizer	DPI
SABA	Albuterol Levalbuterol Pirbuterol	Pirbuterol	Albuterol Isoproterenol Levalbuterol Metaproterenol	None
Short-acting anticholinergic	Ipratropium	None	Ipratropium	None
SABA/anticholinergic combination	Albuterol/ipratropium	None	Albuterol/ipratropium	None
LABA	None	None	Arformoterol Formoterol	Formoterol Salmeterol
Long-acting anticholinergic	None	None	None	Tiotropium
ICS	Beclomethasone Ciclesonide Flunisolide Fluticasone Triamcinolone	None	Budesonide	Budesonide Fluticasone Mometasone
ICS/LABA combination	Budesonide/formoterol Fluticasone/salmeterol Mometasone/formoterol	None	None	Fluticasone/salmeterol

ICS = inhaled corticosteroid; LABA = long-acting β-agonist; SABA = short-acting β-agonist. See Table 1 for expansion of other abbreviations.

aerosol treatment via any device for relieving acute airway obstruction or for sputum induction. Medication costs are not included, so providers must code for drugs separately using a series of "J codes" (Table 3) from the Healthcare Common Procedure Coding System (HCPCS) developed by the Department of Health and Human Services, Centers for Medicare and Medicaid Services. For example, if a provider administers a 2.5-mg albuterol nebulizer treatment to relieve acute bronchospasm in a patient with asthma, he or she would bill 94640 and three units of J7613 for the albuterol, along with any appropriate E/M code. Because aerosol treatments and education do not carry a global fee, the "-25" modifier should not be necessary for same-day E/M services.[33] However, physicians are advised to clarify this issue with their major insurers as some may require the "-25" modifier nonetheless. Because bronchodilator administration codes (94640 and 94644/94645, discussed in the next paragraphs) are designated as "technical" codes in the Medicare Physician Fee Schedule, care providers cannot bill these codes in facility-based settings (eg, outpatient or inpatient hospitals, EDs, skilled nursing facilities).[34] In these settings, the facility may bill for the technical fees, but there are no professional fees for the ordering provider. Thus, providers may only bill for bronchodilator administration when it is performed in their private offices.

Repeated aerosol treatments on the same day require the "-76" modifier (repeat procedure or service). So, if the patient with asthma mentioned previously required two albuterol nebulizer treatments, the provider would bill 94640 for the first treatment, 94640-76 for the second treatment, and one unit of J7613 for each milligram of albuterol used. When bronchodilators are used for reversibility testing (ie, 94060, prebronchodilator and postbronchodilator spirometry) drug costs are similarly excluded, and in this case, they can be billed under code 99070 (materials and supplies provided by the physician) or the appropriate HCPCS J code. It is important to note, however, that many payers have stopped reimbursing code 99070 in favor of the more-specific HCPCS J codes. In addition, providers can only bill for medication that is allocated to an individual patient. Thus, laboratories using bronchodilator treatment delivered by MDI for reversibility testing cannot bill for the cost of the bronchodilator as the MDI is reused for multiple patients. Last, providers can only bill for medications purchased by the practice, and charging for pharmaceutical samples is inappropriate.

In 2007, the AMA added CPT codes 94644 and 94645 to designate the administration of continuous inhalational treatments for acute airway obstruction. Code 94644 is used for the first hour, with 94645 being used for each subsequent hour. These codes also exclude medication costs and physician work, so they should be supplemented with any appropriate J code and/or E/M code. Consider again the previously mentioned patient with asthma. This time, the provider notes severe wheezing and distress and orders continuous albuterol nebulization (10 mg over 2 h) under close observation. The patient subsequently improves and is sent home with an updated care plan. In this case, the physician would bill 94644 for the first hour of continuous albuterol, one unit of 94645 for the second hour, 10 units of J7613 for the albuterol, and any appropriate E/M code.

Code 94664 denotes demonstration and/or evaluation of patient use of an aerosol device. Whether this service is billable depends on the context. In the cases

Table 3—*Commonly Used CPT and HCPCS Codes for Aerosol Therapy*

Code	Description	Comments
94640	Pressurized or nonpressurized inhalation treatment of acute airway obstruction or for sputum induction for diagnostic purposes (eg, with an aerosol generator, nebulizer, MDI, or IPPB device).	Standard code used for administration of intermittent aerosol therapy. Use with "-76" modifier (see "'-76' modifier" row) for additional administrations on the same day.
94642	Aerosol inhalation of pentamidine for *Pneumocystis carinii* pneumonia treatment or prophylaxis.	Only occasionally used given availability of oral alternatives.
94644	Continuous inhalation treatment with aerosol medication for acute airway obstruction; first hour.	Added in 2007 for continuous nebulizer therapy. If < 1 h, use 94640 instead.
94645	Continuous inhalation treatment with aerosol medication for acute airway obstruction; each additional hour.	Use for each additional hour of continuous nebulizer therapy.
94664	Demonstration and/or evaluation of patient use of an aerosol generator, nebulizer, MDI, or IPPB device.	Proper use depends on context. Some payers stipulate that this service is included in the E/M service code and will thus not reimburse for it separately.
"-76" modifier	Repeat procedure or service by the same physician. Used with 94640 for additional administrations of inhalational treatment on the same day.	Use 94640 for first administration and 94640-76 for each additional treatment.
"-59" modifier	Distinct procedural service. Can be used with 94664 for device demonstration/instruction for a new inhaler device as a separate service on the same day as administration of an inhalation treatment.	Use 94640 with 94664-59 only if separate education for a different device than that used for treatment (ie, 94640 includes education services for the device used). Also, do not bill 94640 and 94664-59 if inhalation treatment was given solely as part of demonstration.
J7611	Albuterol, inhalation solution, FDA-approved final product, noncompounded, administered through DME, concentrated form, 1 mg.	Use with 94640 or 94644 for cost of concentrated albuterol (one unit for each milligram delivered).
J7612	Levalbuterol, inhalation solution, FDA-approved final product, noncompounded, administered through DME, concentrated form, 0.5 mg.	Use with 94640 or 94644 for cost of concentrated levalbuterol (one unit for each 0.5 mg delivered).
J7613	Albuterol, inhalation solution, FDA-approved final product, noncompounded, administered through DME, unit dose 1 mg.	Use with 94640 or 94644 for cost of albuterol (one unit for each milligram delivered).
J7614	Levalbuterol, inhalation solution, FDA-approved final product, noncompounded, administered through DME, unit dose 0.5 mg.	Use with 94640 or 94644 for cost of levalbuterol (one unit for each 0.5 mg delivered).
J7644	Ipratropium bromide, inhalation solution, FDA-approved final product, noncompounded, administered through DME, unit dose 1 mg.	Use with 94640 for cost of ipratropium (one unit for each milligram delivered).
99070	Supplies and materials (except spectacles), provided by the physician over and above those usually included with the office visit or other services rendered (list drugs, trays, supplies, or materials provided).	Use with 94060 (prebronchodilator and postbronchodilator spirometry) for cost of bronchodilator. Can also use appropriate HCPCS J code.

Note that the included list of J codes is not exhaustive. A complete listing of 2011 HCPCS codes is available at http://www.cms.gov/HCPCSReleaseCodeSets/Downloads/INDEX2011.pdf. HCPCS codes are developed by the Department of Health and Human Services, Centers for Medicare and Medicaid Services. CPT codes and their descriptions are copyrighted by the American Medical Association. CPT = Current Procedural Terminology; DME = durable medical equipment; E/M = evaluation and management; FDA = US Food and Drug Administration; HCPCS = Healthcare Common Procedure Coding System; IPPB = intermittent positive pressure breathing. See Table 1 for expansion of the other abbreviation.

previously described, the codes for intermittent (94640) and continuous (94644, 94645) nebulizer treatments include any time spent educating the patient on the proper technique.[35] As a result, billing 94664 in addition is inappropriate. However, if the provider also prescribed a new DPI corticosteroid or albuterol MDI for home use and gave instruction in the proper technique for this additional device, it would be appropriate to bill for the nebulizer treatment and also bill for MDI or DPI education using the "-59" modifier (ie, 94664-59). Last, if a dose of medication is administered as part of a demonstration of inhaler technique, it would not be appropriate to bill for aerosol treatment (94640) in addition to inhaler demonstration (94664) as the dose was integral to the demonstration and thus already covered. Providers should also be aware that some insurers consider education/demonstration to be covered under E/M service codes and will therefore not reimburse code 94664 on the same date.

In order to avoid denied claims, CPT codes associated with the delivery of aerosol devices must be supported by relevant disease codes from the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM). In particular, bronchodilator therapy for acute relief of symptoms should be accompanied by ICD-9-CM codes indicating acute exacerbation or bronchospasm. A list of diagnostic codes commonly used to support the medical necessity

for aerosol therapy for obstructive lung diseases is included in Table 4.

Practice revenue generated for any CPT code varies depending on the practice's payer mix and its contracted fee schedules. As a result, even two practices with identical contracts providing identical services may generate different amounts of revenue from a given CPT code if they have a different proportion of patients from the various payers. Further, as discussed above, bronchodilator administration codes (94640, 94644, and 94645) cannot be submitted by providers in facility-based settings. Given these complexities, generalized prescriptions for maximizing revenue from CPT coding for aerosol therapy are not feasible, and each practice must decide whether it is advantageous to bill a certain CPT code based on its setting, individual contracts, and payer mix. Nonetheless, in 2009, Medicare paid claims for code 94640 over 574,000 times and code 94664 over 191,000 times,[36] suggesting that providers who forego billing Medicare for appropriately rendered services related to aerosol therapy are likely leaving revenue on the table.

Proper coding of aerosol therapy will minimize lost revenue from underbilling as well as wasted administrative effort handling denied claims. A number of available resources will help providers stay up to date with coding relevant to chest medicine, including textbooks and online resources from the AMA (http://www.ama-assn.org), updates from professional societies such as the ACCP (http://www.chestnet.org/accp/practice-management) and the American Thoracic Society (http://www.thoracic.org/clinical/coding-and-billing), and practice-specific textbooks.[32] A little time spent learning the relevant aspects of coding will increase providers' practice efficiency, allowing them to spend more time on the rewarding part: delivering excellent care.

Table 4—*Common ICD-9-CM Codes Supporting Medical Necessity for Aerosol Therapy*

ICD-9-CM Code	Medical Condition
277.02	Cystic fibrosis with pulmonary manifestations (includes cystic fibrosis with pulmonary exacerbation)
466	Acute bronchitis and bronchiolitis (includes that with bronchospasm or obstruction)
493.0	Extrinsic asthma
	493.01 Extrinsic asthma with status asthmaticus
	493.02 Extrinsic asthma with (acute) exacerbation
493.1	Intrinsic asthma
	493.11 Intrinsic asthma with status asthmaticus
	493.12 Intrinsic asthma with (acute) exacerbation
493.2	Chronic obstructive asthma
	493.21 Chronic obstructive asthma with status asthmaticus
	493.22 Chronic obstructive asthma with (acute) exacerbation
493.9	Asthma, unspecified
	493.91 Asthma, unspecified, with status asthmaticus
	493.92 Asthma, unspecified, with (acute) exacerbation
491.2	Obstructive chronic bronchitis
	491.21 Obstructive chronic bronchitis with (acute) exacerbation
	491.22 Chronic bronchitis with acute bronchitis
492.8	Emphysema
494	Bronchiectasis
	494.1 Bronchiectasis with acute exacerbation
496	Chronic airway obstruction, not elsewhere classified
518.81	Acute respiratory failure
519.11	Acute bronchospasm

Note that the included list of ICD-9-CM codes is not exhaustive. Physicians should use their judgment regarding diagnostic codes used to support the medical necessity of aerosol therapy. ICD-9-CM = *International Classification of Diseases, Ninth Revision, Clinical Modification*.

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