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NEBULIZACJE

BTS

Thorax ONLINE

Nebulizer therapy. Guidelines. British Thoracic Society Nebulizer Project Group

Thorax 1997;52;4-24

Updated information and services can be found at:
http://thorax.bmj.com

1 The aim of treatment with nebulisers is to deliver a therapeutic dose of the drug as an aerosol in the form of respirable particles within a fairly short period of time, usually 5–10 minutes.

2 Nebulisers are useful when large doses of inhaled drugs are needed, when patients are too ill or otherwise unable to use hand held inhalers, and when drugs are not available in hand held inhalers.

3 The commonest indication is for the emergency treatment of asthma [A] and exacerbations of chronic obstructive pulmonary disease (COPD) [A]. Other indications include the long term bronchodilator treatment of chronic airflow obstruction [B]; prophylactic drug treatment in asthma [B]; antimicrobial drugs for cystic fibrosis [A], bronchiectasis [C], and HIV/AIDS [A]; and symptomatic relief in palliative care [C].

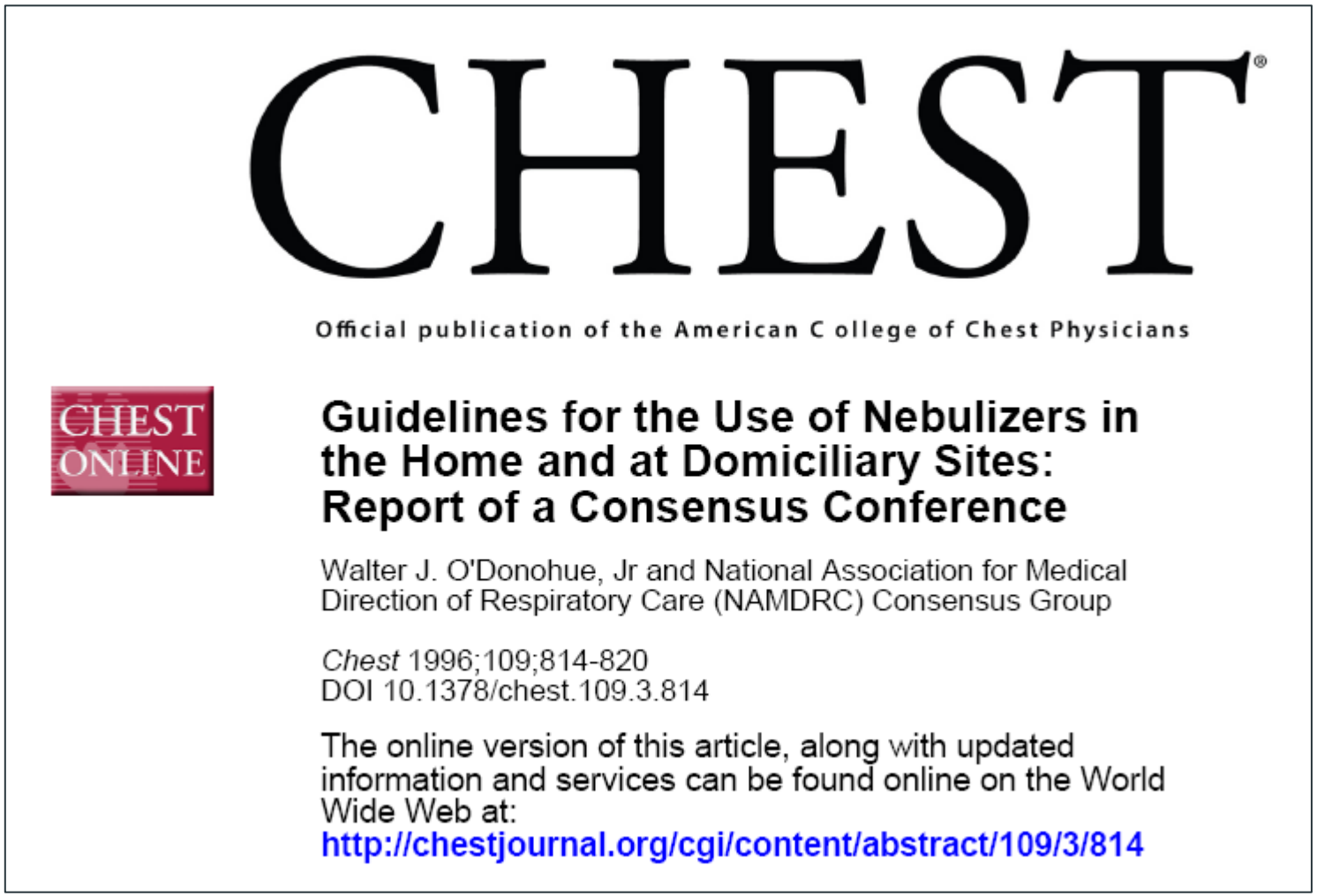
4 The present British Standard (BS7711) for jet nebulisers indicates that they should provide an aerosol with a respirable fraction of at least 50% at their recommended driving gas flows.

5 Any combination of compressor and nebuliser needs to be assessed for a particular drug solution and drug volume [A]. For the commonly used bronchodilators, output data derived from 0.9% sodium chloride can be used as a general guide [B].

6 For drugs other than bronchodilators there is a particular need only to use equipment known to provide a suitable output [B] and for patients to have specific instructions. Such treatment is best supervised by hospital specialists.

7 Nebulisation time for bronchodilators should be less than 10 minutes [B]. Patients should know how long nebulisation should take when their equipment is working correctly [C]. For bronchodilators the use of a mask or mouthpiece should depend upon convenience and/or patient preference (see paragraph 22).

Nebulizacja domowa – raport z konferencji



CHEST

Official publication of the American College of Chest Physicians

CHEST ONLINE

Guidelines for the Use of Nebulizers in the Home and at Domiciliary Sites: Report of a Consensus Conference

Walter J. O'Donohue, Jr and National Association for Medical Direction of Respiratory Care (NAMDRC) Consensus Group

Chest 1996;109;814-820
DOI 10.1378/chest.109.3.814

The online version of this article, along with updated information and services can be found online on the World Wide Web at:
http://chestjournal.org/cgi/content/abstract/109/3/814

Podawanie leków dooskrzelowych w pediatrii w leczeniu astmy

Review

Expert Opinion

1. Introduction
2. Guideline recommendations
3. Factors affecting drug delivery to the lung
4. Nebulisers
5. Metered-dose inhalers
6. Dry powder inhalers
7. Comparisons of delivery devices for paediatric asthma
8. Expert opinion

Paediatric pulmonary drug delivery: considerations in asthma treatment

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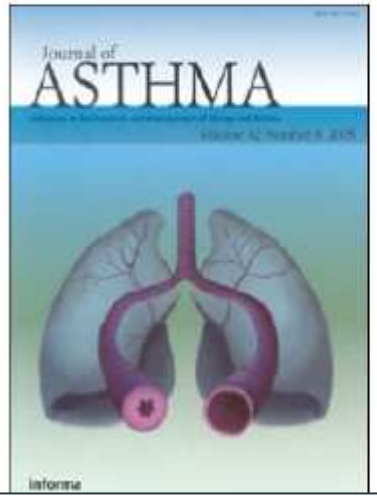
Aerosol therapy, the preferred route of administration for glucocorticosteroids and short-acting β_2-adrenergic agonists in the treatment of paediatric asthma, may be given via nebulisers, metered-dose inhalers and dry powder inhalers. For glucocorticosteroids, therapy with aerosolised medication results in higher concentrations of drug at the target organ with minimal systemic side effects compared with oral treatments. The dose of drug that reaches the airways in children with asthma is dependent on both the delivery device and patient-related factors. Factors that affect aerosol drug delivery are reviewed briefly. Advantages and disadvantages of each device and device-specific factors that influence patient preferences are examined. Although age-based device recommendations have been made, the optimal choice for drug delivery is the one that the patient or caregiver prefers to use, can use correctly and is most likely to use consistently.

Urządzenia stosowane do inhalacji w leczeniu dzieci



Journal of Asthma
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Delivery of Inhaled Medication to Children

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URL: http://dx.doi.org/10.3109/02770909709055389

Budesonid podawany przez 2 różne systemy u dzieci z przewlekłymi objaami ze strony układu oddechowego

Acta Pædiatr 89: 1449–55. 2000

Budesonide delivered by dosimetric jet nebulization to preterm very low birthweight infants at high risk for development of chronic lung disease

B Jónsson, M Eriksson, O Söder, U Broberger and H Lagercrantz

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Jónsson B, Eriksson M, Söder O, Broberger U, Lagercrantz H. Budesonide delivered by dosimetric jet nebulization to preterm very low birthweight infants at high risk for development of chronic lung disease. Acta Pædiatr 2000; 89: 1449–55. Stockholm. ISSN 0803–5253

We investigated the effect of an aerosolized corticosteroid (budesonide) on the oxygen requirement of infants at high risk for developing chronic lung disease (CLD) in a randomized, double-blind study. The study objective was to attain a 30% decrease in FiO_2 levels in the budesonide treatment group after 14 d of therapy. Thirty very low birthweight (VLBW) infants (median (range)) gestational age 26 wk (23–29) and birthweight 805 g (525–1227) were randomized. Inclusion criteria were mechanical ventilation on day 6 of life, or if extubated on nasal continuous positive airway pressure with $FiO_2 \geq 0.3$. The budesonide (Pulmicort™) dose was 500 μg bid, or placebo. The aerosol was delivered with a dosimetric jet nebulizer, with variable inspiratory time and breath sensitivity. Inhalations were started on day 7 of life. Twenty-seven patients completed the study. A significant lowering of the FiO_2 levels at 21 d of life was not detected. Infants who received budesonide were more often extubated during the study period (7/8 vs 2/9) and had a greater relative change from baseline in their oxygenation index (budesonide decreased 26% vs placebo increased 60%). Subsequent use of intravenous dexamethasone or inhaled budesonide in the treatment group was significantly less. All patients required O_2 supplementation on day 28 of life. At 36 wk postconceptual age, 61% of infants in the budesonide group needed supplemental O_2 as opposed to 79% in the placebo group. No side effects on growth or adrenal function were observed.

Conclusion: We conclude that inhaled budesonide aerosol via dosimetric jet nebulizer started on day 7 of life for infants at high risk for developing CLD decreases the need for mechanical ventilation similar to intravenous dexamethasone, but without significant side effects.

Nebulizacja – potrzeby opracowania

- Potrzeba standardu – przewodnika po nebulizacji – dla dorosłych i dla dzieci
- Określenie wskazań do nebulizacji
- Pewne wskazania do decyzji Specjalisty

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Nebulizacja – potrzeba odpowiedzi na pyatania

- Jakim gazem (wskazania dla tlenu)
- Rola nawilżenia w różnych jednostkach chorobowych
- Dobór leku i dawek
- Różnica w farmakokinetyce substancji z tych samych grup
- Określenie możliwości łączenia leków – jednoznaczne określenia

Nebulizacje – główne tematy

- Edukacja

1/ technika aerozoloterapii – nebulizacji

2/ ustnik maska

3/ profilaktyka zakażeń

Nebulizacja – potrzeby na 2008

- Opracowanie „Przewodnika nebulizacji ”, który powinien zawierać:

1. Określenie wskazań:

- Preferencje dla nebulizacji
- Współistnienie nebulizacji z innymi technikami aerozoloterapii

2. Przedstawienie tabeli leków zarejestrowanych w odpowiednich wskazaniach (tabelę leków podawanych w literaturze w odpowiednich wskazaniach)
3. Potrzeba określenia zmian zachodzących w nebulizacji, ze strony urządzeń i ze strony lekowej

Np.:

Table 1—*Lung Diseases for Which Aerosol Therapy is Indicated*

Diseases (*ICD-9*)	Therapies
Obstructive airway disease	
Asthma (493.00)	β-Agonist†; Ipratroprium‡; Cromolyn sodium†; Steroids‡; N-acetylcysteine‡; Sodium chloride‡; Sodium bicarbonate‡
Asthmatic bronchitis (493.20)	
Chronic bronchitis (491.00)	
Emphysema (492.8)	
COPD (496)	
Bronchiectasis (494)	
Bronchiolitis (466.0)	
Bronchopulmonary dysplasia (770.7)	Antibiotics‡; Furosemide§; Morphine§; Dornase alfa§
Cystic Fibrosis (277.0)	Dornase alfa‡; N-acetylcysteine‡; Antibiotics‖; β-agonist‡; Amiloride§; Uridine triphosphate (UTP)§
Parenchymal disease	
P carinii pneumonia (136.3)	Pentamidine‡; Ribavirin‡; Morphine§; Antiprotease§
RSV* (480.1)	
Other restrictive lung disease (516-517)	
Cough, intractable (786.2)	Lidocaine‡

Note: the "groups" of drugs represent therapy for any of the "groups" of diseases.
*RSV=respiratory syncytial virus.
†FDA approved.
‡Not FDA approved, little clinical data supporting use but currently prescribed.
§Investigational.
‖Not FDA approved, good clinical data supporting use.

WNIOSKI Nebulizacje

- Technika nebulizacja

-ZALETY

1. Najmniejszy odsetek błędów popełnianych przez chorych przyjmujących leki (11%, MDI 70%, DPI 50%)
2. Skuteczność kliniczna mimo porównywalnie niedużej depozycji (12-22-28 % do 72%)
3. Czasami minimalna dawka skuteczna mimo stosowania różnych urządzeń, przy tym samym leku jest ta sama
4. Powtarzalność dawki – stała
5. Możliwość stosowania w każdym wieku
6. Stosowanie w różnych trudnych grupach terapeutycznych
7. Skuteczność w leczeniu zaostrzeń i w leczeniu przewlekłym
8. Możliwość doboru różnych leków i dawek
9. Efekt nawilżenia
10. Element psychologiczny – poczucia leczenia

WNIOSKI Nebulizacje

- Technika nebulizacja

-ZALETY c.d.

1. Stosowanie w każdych warunkach – szpitalnie i ambulatoryjnie (nowoczesne nawet przenośnie)
2. Ostateczne efekty farmakoekonomiczne w kosztach pośrednich
3. Podniesienie jakości życia (mniejsza ilość hospitalizacji, mniejsza ilość zaostrzeń wymagających użycia GKSsys
4. Mniejsza absencja chorobowa (dzieci – rodzice)
5. Możliwość jednorazowego podania dużej dawki
6. Możliwość eliminacji niektórych działań ubocznych (miejscowych i uogólnionych) – w zależności od rodzaju leków
7. Możliwość stosowania tlenu (leku i jednocześnie nośnika)
8. Inhalacja swobodnym oddechem

Nebulizacje

- Technika nebulizacja

-WADY

1. Czyszczenie i dezynfekcja
2. Ew utrudnienie przenoszenia
3. Czas trwania inhalacji (complajans)

NEBULIZACJE/AEROZOLOTERAPIA

Table 1. Available delivery devices for inhaled asthma medications [1].

Delivery device	Medication	Recommended age for use*	Remarks
pMDI	Anticholinergics, β_2-agonists, corticosteroids, cromolyn sodium, nedocromil sodium	> 5 years (< 5 years with spacer/holding chamber and face mask for some children)	The child may have difficulty triggering a puff while inhaling; helps to use device with a spacer/holding chamber
Breath-actuated MDI	β_2-Agonists	> 5 years	The child may not be able to generate the necessary inspiratory flow; device does not require the use of a holding chamber or spacer
Dry powder inhaler	β_2-Agonists, corticosteroids	> 5 years (can be used in 4 year olds but delivery is more consistent at > 5 years of age)	Some devices deliver drug more effectively than an MDI; some devices may not work in children with low inspiratory volumes
Nebuliser	Anticholinergics, β_2-agonists, corticosteroids, cromolyn sodium	Patients of any age who cannot use an MDI with spacer/holding chamber or with face mask	Useful in infants and very young children, and in any child with a moderate-to-severe asthma episode, although MDI with spacer/holding chamber may be as effective; delivery method of choice for cromolyn sodium

*Suggested ages; clinicians should use their own judgement to tailor treatment according to the specific needs and circumstances of the individual child or family.
MDI: Metered dose inhaler; pMDI: Pressurised metered-dose inhaler.

NEBULIZACJE/AEROZOLOTERAPIA

Table 2—*Advantages and Disadvantages in the Use of SVN, MDI, and DPI

Advantages	Disadvantages
SVN—Compressor/jet	
Less patient coordination required	Expensive
High doses possible (including continuous nebulization)	Contamination possible if not carefully cleaned
No CFC† release	Not all medications available
	Pressurized gas source required, not convenient or portable
	More time required
	Drug instillation required before treatment
SVN—Ultrasonic	
Less patient coordination required	Expensive
Small dead volume	Contamination possible
Quiet	Prone to electrical/mechanical malfunction
Faster delivery	Not convenient or portable
Aerosol accumulates in device during exhalation	Not all medications available
No CFC* release	Drug instillation required before treatment
MDI	
Convenient	Patient coordination essential
Less expensive	Patient activation required
Portable	Large pharyngeal deposition
No drug preparation required	Potential for abuse
Difficult to contaminate	Difficult to deliver high doses
	Not all medications available
	Dependent on ozone-depleting CFC*
MDI With Accessory Device	
Less patient coordination required	More complex for some patients
Less pharyngeal deposition	More expensive than MDI alone
	Less portable than MDI alone
DPI	
Less patient coordination required	Requires high inspiratory flow (>30 L/min)
Breath-hold not required	Most units are single dose
No CFC* required	Can result in pharyngeal deposition
Breath activated	Not all medications available
	Difficult to deliver high doses

*Adapted from Respir Care 1991; 36:960.
†CFC=chlorofluorocarbons.

NEBULIZACJE/AEROZOLOTERAPIA

- Wskazówki kliniczne

1. Jest to forma preferowana dla najmłodszej grupy chorych
2. Jest to forma preferowana dla najtrudniejszych grup pacjentów
3. Jest to forma preferowana dla chorych u których dotychczasowe inne formy aerozoloterapii są nieskuteczne
4. Jest to forma preferowana w zaostrzeniach
5. Jest to forma preferowana w ciężkich postaciach dla redukcji lub zastąpienia terapii systemowej

NEBULIZACJE/AEROZOLOTERAPIA

- Techniczne aspekty
- Oddech swobodny
- Brak konieczności koordynacji i współpracy
- Brak konieczności przylegania maski

NEBULIZACJE/AEROZOLOTERAPIA

1/ NEBULIZACJA NIE JEST TECHNIKĄ DO ZASTĄPIENIA PRZEZ INNE FORMY AEROZOLOTERAPII.

2/ OPISYWANA JEST JAKO FORMA NAJBARDZIEJ SKUTECZNA

3/ MOŻE BYĆ BEZPIECZNIE STOSOWANA WE WSZYSTKICH SCHORZENIACH UKŁADU ODDECHOWEGO

4/ POTRZEBNE JEST NOWE SPOJRZENIE NA NEBULIZACJĘ W ŚWIETLE NOWSZYCH URZĄDZEŃ, LEKÓW, NOWYCH DANYCH Z BADAŃ KLINICZNYCH

Dziękuję wszystkim współpracującym na warsztatach nebulizacyjnych – Julek Bokiej