

Inhaler Usage Training for Mothers of Infants with Respiratory Disease

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Abstract

Infections associated with respiratory disease can be easily recovered if properly managed, but serious complications such as bronchopneumonia, atelectasis, and airway obstruction can affect the growth and development of children. Infant depends entirely on adult care because he/she cannot take care of him/herself on the nature of growth and development. Therefore, in order to reduce the incidence and recurrence of infant respiratory disease, it is necessary to provide information and education on respiratory disease management for the carers who care children. Inhalation therapy is a method of administering drugs locally to the target bronchus using inhalation devices, which is actively recommended for the treatment of infant diseases but is often used without proper training on the proper use of inhalation devices in many cases. In addition, training about the use of the inhaler currently depends on a brief description of the physician or instructions attached to the inhaler. This problem should be more systematically taught to parents of infants who have respiratory diseases because this problem has a greater impact on infants than adults. Using existing brochures or print media may not provide realistic and effective training. When performing inhalation therapy, the infant suddenly feels uncomfortable about treatment due to the incoming moisture and visible smoke and expresses it as behavior. At this time, most parents feel vague fear and anxiety. In this aspect, it is necessary to develop training information using video.

Keywords: Infant, inhalation therapy, Respiratory Disease, Mother

I. INTRODUCTION

The babyhood affects lifelong health as well as growth and development throughout subsequent life cycles and is prone to infectious diseases due to imperfect development of the immune system and increased contact with the outside [1-4].

Respiratory disease has the highest frequency of acute diseases in babyhood. If it is not managed appropriately, it affects life as well as growth and development of child because of severe complications. In particular, the infant's immune function is immature, the development of respiratory muscle is not complete and the interval between the respiratory tract from the organ to the terminal bronchus is short, so infants are sensitive to respiratory infections and require hospitalization and intensive care [5].

Respiratory infections include lower respiratory infections such as bronchial asthma or pneumonia as well as upper respiratory infections such as runny nose, cough and sore throat [6]. These babyhood respiratory diseases affect all family members including parents. If the child experiences symptoms such as difficulty in breathing, fever, rough breathing, change in skin color, loss of appetite, or exhaustion, the family is embarrassed depending on the respiratory disease severity of the child, and prone to feel fatigue due to care [7]. In relation to the infant's respiratory disease morbidity, Shin et al [8] reported that infants are more likely to have infantile respiratory infection in the cases where they are bottle feeding, or have allergic disease or mother has an allergic disease than where they are breast feeding. In the previous studies related to education of family members of children with respiratory infections, areas where education was highly required were in order of diagnosis, treatment, items on test result, post-discharge management, and in-hospital management [9], and the appropriate time to provide the education to parents was when the child was in young age and the first child was being looked after [10].

Infections associated with respiratory disease can be easily recovered if properly managed, but serious complications such as bronchopneumonia, atelectasis, and airway obstruction can affect the growth and development of children [11]. Infant depends entirely on adult care because he/she cannot take care of him/herself on the nature of growth and development. Therefore, in order to reduce the incidence and recurrence of infant respiratory disease, it is necessary to provide information and education on respiratory disease management for the carers who care children [12]. The mother of child who has a close relationship with child in the family tends to feel guilty about her role when the child is hospitalized, anxiety about the unfamiliar hospital environment, anxiety about the future and the child suffering from pain. This results in unstable emotional reactions such as fear, frustration, and lethargy. These negative emotions increase the anxiety of the child and delay treatment, but positive emotions play an important role in reducing the anxiety of the child and assisting in proper adaptation, disease treatment and recovery [13-15]. Parents of infants want to hear a special description of their child's illness, want information about the course of the disease, diagnosis, treatment and procedures the child receives, and want to exactly understand the information they receive.

Information on disease management should be provided in a way that reduces harmful emotional responses by preparing them for upcoming work. The provision of information on medical care and nursing situation is used as an intervention to

help the physical and psychological well-being of patients by informing about nursing or treatment [16]. Information can be provided in several ways, but new educational media are being introduced because of the rapid development of science and the sharing information through the spread of the Internet [17].

In recent years, as a method of administering drug, that is, a delivery system of drug administrating drug using an inhaler has been developed and widely used. Among the delivery systems of various drugs, inhalation therapy is recommended because of its advantageous, fast, and low drug dose and its low side effects [18,19]. Inhalation therapy is a method to administer drugs locally to the target bronchial tube using an inhaler [18,19]. Spray therapy for childhood disease is actively recommended but is often used without proper training on the correct use of the inhaler. In addition, education about current inhaler usage depends on a brief description of the physician or instructions attached to the inhaler [20]. The use of inhalants in Korea is estimated to be problematic because of the lack of detailed prescriptions, periodic inspections and systematic education.

Although these problems may have a greater impact on infants than adults, systematic education should be provided to the parents of children with respiratory diseases, but the research on this problem is still insufficient.

In this study, the researcher aimed to investigate the proper use of inhalant with mother who is taking care of infant hospitalized dye to respiratory disease.

II. THEORETICAL BACKGROUND

The respiratory system is divided into two parts, upper airway and lower airway. The upper airway includes nose, pharynx, adenoid, one way, epiglottis, larynx, organs. The lower airway consists of bronchi, bronchioles, alveolar tubes, and alveoli. All lower airway structures except the left and right main bronchi are in the lungs. The primary purpose of the respiratory system is the exchange of oxygen and carbon dioxide between the atmosphere and blood [21, 22].

The child's respiratory system is smaller in the alveolar surface area and in the airway diameter than the large child or adult, and the peripheral airway resistance is increased. In addition, the volume of bronchial smooth muscle is small, the development is immature, the density of the mucous membrane in the airways is high, and the percentage of muscle fibers that can overcome the fatigue of the diaphragm muscle is low. For these reasons, children are susceptible to respiratory ventilation and proliferation and are also susceptible to fatigue [23, 24].

The World Health Organization (WHO) has proposed respiratory disease as the second leading cause of infant mortality below age 5 [25, 26]. Most of the acute infections in childhood are respiratory infections and are the main cause of admission to 1-9-year-old children, ranging in severity from mild to life-threatening. Especially respiratory syncytial virus (RSV) causes most infections. Generally, children under 5 years old have a high rate of viral infection, and those after 5 years have a high rate of bacterial infection such as hemolytic streptococci and Hemophilus influenza. Common symptoms of

acute respiratory infections include fever, meningism, anorexia, vomiting, diarrhea, abdominal pain, nasal congestion, runny nose, cough, abnormal breathing, and sore throat [27]. Respiratory infections due to viruses often lead to bronchial asthma, pneumonia, acute exacerbations of asthma, and severe respiratory infections in children with bronchopulmonary dysplasia, immune deficiency syndrome, or congenital heart disease [25]. Compared to adults, children have a narrow airway and high airway resistance, which can lead to respiratory disturbances during disease morbidity [28]. Airway stimulation causes a lot of mucus. If the child is breathing fast as a respiratory disease, the flow of air is accelerated, and the mucous membrane becomes dry and stickier. Thus, expectorant therapy, which can dilute mucus and help release mucus, has been proposed as a therapeutic management for this disease [28].

1. Types of Inhalants :-

1) *Quantitative inhaler*

The quantitative inhaler is the most widely used inhaler. It usually contains a mixture of propellants (chlorofluorocarbon or hydrofluoroalkane) and a medicament in a pressurized metal container. At room temperature, the liquid and gas form are in equilibrium (Fig1). The liquid contains solid particles that are polished to an appropriate size for breathing. The mixed solution is shaken and mixed well, and then a certain amount is ejected through a valve system by pressing the cylinder. The metering valve is designed to constantly regulate the amount of liquid to be ejected. When the agent is ejected, the propellant vaporizes and provides high kinetic energy to the solid particles. The quantitative inhaler is small, easy to carry, simple, and relatively inexpensive. However, the degree of delivery of the drug is highly dependent on the skill of the patient to use the inhaler and, if not properly used, the amount of drug delivered to the lungs may fall below a reasonable level (Fig 1).

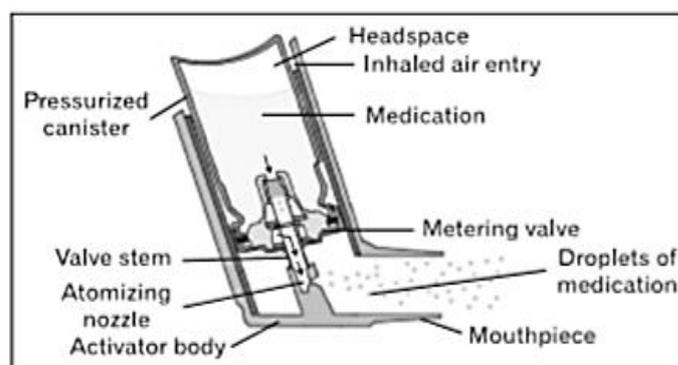


Figure 1. Diagram of the pressurized metered-dose inhaler [29]

2) *Dry Powder Inhaler*

Dry powder inhaler is a recent popular inhaler because it does not require a hand-breath coordination to 'breathe in and out pressing the drug cylinder' as required by the quantitative inhaler because the inhaler is operated by the inspiratory flow of breathing air without propellant. Powdered medicines may

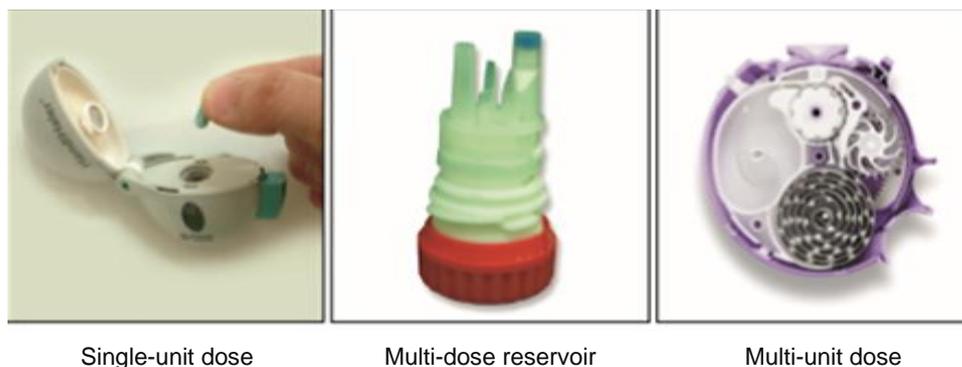


Figure 2. Classification of dry power inhalers according to reservoir [29]

consist of pure drugs alone or may contain excipients such as lactose in order to have a taste or feel when inhaled. When inhaled, such medicines or medicament-medicinal lumps are disintegrated into a particle form by the shearing force generated by the patient and sucked into the airway. In order for the loaded powder to be scattered in the air, the energy must be transferred by the respiration of the patient, so the patient has to inhale relatively fast. Currently, dry powder inhalers sold in Korea are divided into single-unit dose, multi-dose reservoir, and multi dose reservoir and multi-unit dose inhaler depending on the type of prescribed drug stored in the container (Fig 2).

3) Auxiliary inhalation device (spacer)

The quantitative inhaler has the disadvantage that it is ineffective in infants and elderly people who are difficult to match the pushing and sucking movements. Therefore, by attaching an auxiliary device such as a spacer to the quantitative inhaler, it is effective for effective drug inhalation. The spacer reduces the particle size of the inhaled drug, and the user has the advantage that they do not have to be precisely inhaled when operating the instrument. The use of ancillary devices can also reduce the side effects of drugs by reducing deposition on the oropharyngeal airway. However, there is a drawback that the size of the inhaler increases due to its volume, and when the medication is administered using a facial mask without using the mouthpiece, the infant can be stimulated by closely adhering the mask to the face of the infant.

If a child suffers from dyspnea, the general inhalation agent will prevent the drug from being properly delivered to the airway. In this case, administering a bronchodilator or inhaled steroid with a nebulizer (spray inhaler) is good for rapid condition improvement. The aerosols from the nebulizer used in the treatment are composed of various particles 1-5 μ m in diameter. Most nebulizers use compressed air (jet), but they also use ultrasound. The Nebulizer differs from a simple atomizer in that there is a shield that prevents large particles from coming out.

2. Inhaler Usage Training:-

Treatment with inhaled medication can effectively deliver medication to the airway while reducing systemic side effects, but there is a problem of knowing exactly how to use the inhaler

for proper use. Improper use of inhaler can result in decreased drug delivery and reduced efficacy, failure to achieve the expected therapeutic effect and lead to increased treatment failure and direct and indirect costs. The inability to use the inhaler improperly is not the only problem for the caregiver, and the knowledge and proficiency of doctors and medical staff is also known to be below the appropriate level. Simply providing infant's mother with paper manuals and audiovisual videos is not enough. It is best for medical staff to be more interested in using infant mothers' samples, explaining their use, and checking and monitoring their regular use. Educational benefits can be enhanced by using disease-related information provided by the Atypical Asthma Education Information Center, videos on how to use inhalants, and educational books [29].

III. CONCLUSION

The purpose of this study is to investigate the actual status of inhaler usage training for mothers of infants suffering from respiratory disease and to use it as basic data of the training program.

In recent years, as a method of administering drug, that is, a delivery system of drug to administer drug using an inhaler has been developed and widely used. Inhalation therapy is recommended among the delivery systems of various drugs because of the advantages of good efficacy, fast efficacy, and low drug dose, which results in fewer side effects [19]. Inhalation therapy is a method of administering drugs locally to the target bronchus using inhalation devices, which is actively recommended for the treatment of infant diseases but is often used without proper training on the proper use of inhalation devices in many cases. In addition, training about the use of the inhaler currently depends on a brief description of the physician or instructions attached to the inhaler. This problem should be more systematically taught to parents of infants who have respiratory diseases because this problem has a greater impact on infants than adults.

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REFERENCES

- [1] Chang eui Hong, Hyo seop Ahn, Pediatrics. Seoul: Korean Textbook, 2005.
- [2] Hertzman C, & Weins M, Child development and long term outcomes: A population health perspective and summary of successful intervention. Social Science Medicine, 43(7), 1996, 1083-1095.
- [3] Jae Mo Yang, A public health course Seoul: Hydrologic history, 1992.
- [4] Mi Young Yi, Effects of the Educational Session of Infant Respiratory Disease Management on Mother's Performance Level, Department of Nursing Chonnam National University Graduate School, 2006.
- [5] C.K. Kim, Y.Y Koh, Callaway Z, The validity of induced sputum and bronchoalveolar lavage in childhood asthma, The Journal of Asthma , 46(2), 2009, 105-112.
- [6] Michelow IC, Olsen K, Lozano J, Rollins NK, Duffy LB, Ziegler T, Epidemiology and clinical characteristics of community acquired pneumonia In hospitalized children, Pediatrics, 113(4), 2004, 701-707.
- [7] Miedema CJ, Kors A, Ten WETA, Kimpen J L L, Medical consumption and socioeconomic effects of infection with respiratory syncytial virus in the Netherlands, The Pediatric Infectious Disease Journal, 20(2), 2001,160-163.
- [8] S.W. Shin, E.Y Kim, Y.I. Rho, E.S Yang, K. R Moon, S.K. Park, "A prevalence of respiratory infection and its associated factors in infants", The Medical Journal of Chosun University, 31(3), 2006, 35-41.
- [9] H.Y. Koo, The educational needs of families with respiratory infected children and the degree of nurses' educational performances perceived by families, Korean Journal of Child Health Nursing, 8(3), 2002, 281- 290.
- [10] M.K. Park, Y.S. Ko, K. I. Park, Knowledge and practice level of infection management for child guardians with respiratory infections after H1N1 diffusion, Journal of Korean Academy of Child Health Nursing, 17(1), 2011, 19.
- [11] Kyung Min Yi, Effects of Information on Management Practices for Children Suffering from Respiratory Communicable Diseases, Child Health Nursing Research, vol, 15, No. 3, 2009, pp. 291-298.
- [12] Mi Young Yi, Effects of the Educational Session of Infant Respiratory Disease Management on Mother's Performance Level, Korean Association of Hat Health , 20, 2006, 83-84.
- [13] Jung Ja Bae, Effect of a Nursing Education Program for Mothers of Hospitalized Children on State Anxiety and Belief on Parental Role of Mothers, Korean Association of Hat Health, 5(1), 2001, 71-82.
- [14] Bright F, The pediatric nurse and parental anxiety, Nursing Forum, 4(2), 31-39.
- [15] Gardner D, Stewart N, Staff involvement with families of patient in critical care unit, Heart & Lung, 7(1), 1978,105-110.
- [16] Mi Sook Kim, Kyung Won Baek , So Ra Choi , Sun Wha, Hae Sun Jang, The Effects of Nursing Education Program on Satisfaction of Nursing Care and Belief of Parental Role for Admitted Children's Mothers" Clinical Nursing Study, 9(1), 2003, 91-101.
- [17] Eun Joo Lee, The effects of development of an ostomy self-care education program and it's effect in patients on ostomy, Graduate School of Education at Korea University, 2010.
- [18] Seung Eun Rhee, The Usage of Home Nebulizer in Asthmatic Children, Graduate School of Medicine at Yonsei University, 2000.
- [19] Ki Young Lee, Allergy, Immunologic diseases, Hyper sensitivity, Immunity, Allergy and Immunology, History of Korean Medicine, 1992.
- [20] Eun Jeong Choi , Hyun Jin Yun , Hye Sung An, Ju Suk Lee, Jin A Jung, The Evaluation of an Education Program for Using an Inhaler Devices in Childhood Asthma Pediatric allergy and respiratory disease, 21(2), 2011, 108-114.
- [21] Kyung Rim Shin, Ok Soo Kim, Gwi Bun Kim, Nam Cho Kim, Jie Won Park, Ae Ri Kim, Adult Nursing I, Hyeonmunsa, 2010.
- [22] Jung Min Lee, Application and evaluation of Nebulizer therapy education program for parents with respiratory disease children, Master's Degree, 2016.
- [23] Min Hyang Park. Burnout Evaluation according to the Parenting Stress Types of Respiratory Disease Child's Mother who Visits Pediatrics Clinic Crisisonomy, 11(3), 2015, 207-229.
- [24] Chang Eui Hong., Hyo Seop Ahn, "Pediatrics" , Seoul: Korean Textbook, 2002.
- [26] Yu Kyung Kim , Jin Woo Kim , Young Sun Wee., Eun Gyong Yoo , Man Yong Han, Clinical Features of Human Meta pneum ovirus and Respiratory Syncytial Virus Infection in Hospitalized Children" Pediatric allergy and respiratory disease, 19(1), 2009,12-19.
- [25] Murray CJL, Lopez AD, Mathers CD, Stein C, The global burden of disease 2000 project: aims, methods and data sources, World Health Organization, 2001.
- [26] Ja hyung Lee, Hee Sook Kim, Young Ae Park, Sun Young Moon, Shin jung Kim, and Hye Young Kim,

Children's and Adolescents' love Affairs, shin kwang
Publishing Co, 2009.

- [27] Hyoun Jin Park, Joo Hyun Kim, Yoon Hong Chun Lee, Kim Soo Young, Sang Yong Kang, Jin Han, Clinical Manifestations, Management, and Natural Course of Infants with Recurrent Bronchiolitis or Reactive Airways Disease”, the Korean Society for Pediatric Infectious diseases, 21 (1), 2004, 37-42.
- [28] Hyeon Sook Kim, Kyung Ah Kang, Shin Jung Kim, Hyun Ok Kim, Sun Young Moon, Sun Young Hwang, Child and Adolescent Nursing, Shin Kwang Publishing Co, 2013.
- [29] Jeon Jae Won, Inhalation Therapy in Respiratory Diseases, Korean Journal Fam Practice, 2, 2012,304-310.