

## Original Article

# Application of comprehensive airway nursing management in the treatment of children with respiratory tract infections

Yanqiu Liu<sup>1</sup>, Cui He<sup>2</sup>, Hui Li<sup>3</sup>, Fuxia Xu<sup>1</sup>, Lulu Feng<sup>1</sup>, Hui Xie<sup>4</sup>

Departments of <sup>1</sup>Otorhinolaryngology, <sup>4</sup>Children's Rehabilitation, Maternity and Child Health Care of Zaozhuang, Zaozhuang City, Shandong Province, China; <sup>2</sup>The Center of Sterilization Supply Room, <sup>3</sup>Apple Community Center, Maternity and Child Health Care of Zaozhuang, Zaozhuang City, Shandong Province, China

Received May 7, 2018; Accepted June 28, 2018; Epub September 15, 2018; Published September 30, 2018

**Abstract:** Objective: The aim of this study was to explore the application and clinical value of comprehensive airway nursing management in nursing children with respiratory tract infections. Methods: A total of 118 cases of children with respiratory tract infections, treated in Maternity and Child Health Care of Zaozhuang, from May 2017 to October 2017, were selected and randomly divided into two groups. There was an observation group and control group, with 59 cases in each group. The control group was treated with conventional pediatric respiratory nursing based on a standard treatment regimen, while the observation group was treated with comprehensive airway nursing management methods. The two groups were compared regarding symptom improvement, symptom remission time, hospitalization time, and nursing satisfaction of the children's parents. Results: Clinical symptoms of both groups were significantly improved after treatment. Improvement in the observation group was significantly better than that in the control group (all  $P < 0.05$ ). In addition, symptom remission time in the observation group was shorter than that in the control group ( $P < 0.05$ ). Additionally, nursing satisfaction of the children's family members in the observation group was higher than that in the control group ( $P < 0.05$ ). Conclusion: Comprehensive airway nursing management is more conducive to improving clinical symptoms in children with respiratory tract infections and in nursing satisfaction, while shortening symptom remission times. Therefore, it should be made more widespread in front-line clinical treatment.

**Keywords:** Respiratory tract infection, infants, comprehensive airway nursing, clinical effects

## Introduction

Respiratory tract infection is a general term for infections of the sinuses, airway, throat, and lungs [1]. It is divided into upper respiratory tract infections and lower respiratory tract infections, according to anatomical position. The former refers to infections involving sinuses to throat while the later includes bronchitis, pneumonia, bronchiectasia, and so forth. Lower respiratory tract infections are more common in clinic, especially pneumonia [2]. Children are at high risk of respiratory tract infections. Foreign studies have shown that incidence of respiratory tract infections in children is approximately 3%. Enclosed environments, such as an enclosed room, will increase incidence of the disease [3, 4]. Although respiratory tract infections are a self-limited disease with very few

complications, pneumonia remains a major cause for death in infants [5]. Statistics show that approximately 136,000 infants die from pneumonia every year worldwide [6].

Treatment for infantile respiratory tract infections is mainly performed by taking effective therapeutic measures based on analysis of pathogenic bacteria of respiratory tract infections in children, reducing the mortality of infants [7]. In addition, airway secretions are the main pathophysiological response to respiratory tract infections. If secretions in the respiratory tract are not removed from children effectively, the illness will relapse. Therefore, respiratory tract nursing is an important supplementary measure for clinical treatment of respiratory tract infections, greatly improving clinical symptoms and treatment efficacy

# Comprehensive airway nursing management in respiratory tract infections

[8, 9]. Pediatric nurses in Maternity and Child Health Care of Zaozhuang applied comprehensive airway management to clinical nursing of children with respiratory tract infections, achieving good clinical results.

## Materials and methods

### General data

A total of 118 cases of children with respiratory tract infections, treated in Maternity and Child Health Care of Zaozhuang, from May 2017 to October 2017, were selected for this study. They were randomly divided into two groups with a random number table according to the number assigned for them on admission, with 59 cases in each group, aged between 3-12 years old. Diagnostic criteria were based on the latest diagnostic criteria for respiratory tract infections in children, according to the Chinese Medical Association [10].

Inclusion criteria: (1) Children showing normal mental development; (2) Children's family members were cooperative during the investigation; (3) Children with no insufficiency of major organs such as the liver, kidneys, heart, and brain; and (4) Children proven to have bacterial infections after inspection.

Exclusion criteria: (1) Children in medical disputes; (2) Children with medical history of mental illness or immunosuppression; and (3) Children with tracheotomies or undergoing surgery.

All family members of the children knew the situation and provided informed consent. This study was approved by the Ethics Committee of Maternity and Child Health Care of Zaozhuang.

### Nursing methods

**Control group:** The control group was treated with general nursing measures for respiratory tract infections. 1) Air circulation (ventilation twice a day, each for 15 minutes) was maintained quiet and clean in the wards. Wards were regularly sterilized (once a day) and humidity was maintained between 25%-40%. The number of people allowed in the wards was limited. Additionally, enough nutrition was supplied to the children and adequate fluid intake was ensured [11]. Health knowledge educa-

tion was conducted among the children, nasal secretions were removed, conditions were observed, and body temperatures were measured [12, 13]. 2) Nursing for oxygen treatment: a certain flow of oxygen for children can not only keep their airway unblocked, but also help the discharge of respiratory secretions and sputum. 3) Nursing for atomization inhalation: an atomization regimen involving hormones, bronchodilators, and antibiotic was adopted. Atomization volume was about 2-8 mL. Atomization temperature was between 20-23C, preventing the patients from a stress response. Flow was regulated to avoid breathing difficulties and discomfort. 4) After atomization, the children gargled and family members were timely instructed to slap their backs from the bottom to the top and to gently percuss their back from two sides to the middle part, a total of 3-5 times. School-age children should be actively instructed with correct expectoration techniques to enhance the effects of sputum excretion.

**Comprehensive airway management:** The observation group was treated with comprehensive airway nursing management measures based on routine nursing as follows. An airway management team was established. The head nurse conducted training in comprehensive airway management, mainly including nursing operations, nursing therapy evaluation, and specific operations of the nursing regime. This was to instruct clinical frontline nurses to grasp accurate basic operations about oxygen inhalation and atomization. In addition, the comprehensive airway nursing team also adopted the following nursing operations: 1) Children's oral was cleaned regularly each day to remove intraoral and effectively prevent the growth of bacteria; 2) In the course of treatment, comfort care was provided through methods such as parental care, comfort counseling, and music relaxation to improve compliance of the children during treatment [14]; 3) Various complications were prevented. Hearing loss and purulence in external auditory canals of the children indicated otitis media while headaches aggravated with purulent nasal discharge indicated chronic sinusitis related to complications. If either symptom occurred, it was immediately reported to a doctor; 4) Respiratory tract infections were often accompanied by an increase in body temperature. Nursing cooling or drug cooling was se-

## Comprehensive airway nursing management in respiratory tract infections

**Table 1.** Comparison of general data ( $\bar{x} \pm sd$ )

	Gender (male/female)	Age (year)	Course of disease (day)	Infection site (upper/lower respiratory tract)
Observation group	35/24	6.56±2.43	3.01±0.73	28/31
Control group	34/25	7.01±1.98	3.12±0.59	26/33
t/ $\chi^2$	0.035	1.103	0.900	0.137
P	0.851	0.272	0.370	0.711

**Table 2.** Comparison of improvement rates

	Therapeutic effect (n, %)			Improvement rate (%)
	Remarkable effect	Effect	No effect	
Observation group	38 (64.41)	15 (25.42)	6 (10.17)	53/59 (89.83)
Control group	32 (54.24)	12 (20.34)	15 (25.42)	44/59 (74.58)
$\chi^2$		6.535		4.692
P		0.038		0.030

**Table 3.** Comparison of symptom remission times between the two groups ( $\bar{x} \pm sd$ , day)

	Wheezing	Cough	Lung rale
Control group	4.81±0.91	7.54±1.25	6.89±0.95
Observation group	3.22±0.29	5.46±0.85	4.73±1.53
t	12.787	10.569	9.213
P	<0.001	<0.001	<0.001

lected according to the degree of fever. If a child developed sweating during treatment, nurses were assisted by family members for insulation.

Nursing measures were taken for the two groups until the end of treatment and discharge.

**Basic clinical treatment principles:** Both groups were treated by the same group of doctors according to the standard treatment regime. According to the sputum, blood routine examinations, blood culture, and drug susceptibility test results, appropriate antibiotics were selected for anti-infective treatment.

### Observation indexes

The main observation index was improvement rate during intervention. Remarkable effect: clinical symptoms (asthma, cough, lung rale) completely disappeared and signs returned to normal within three days of treatment; Effect: symptoms disappeared and signs became normal within four days to one week of treatment; No effect: symptoms improved and disappear after one week. Improvement rate =

remarkable effective rate + effective rate.

The secondary observation index was nursing satisfaction. Nursing satisfaction was obtained through questionnaires developed by Maternity and Child Health Care of Zaozhuang. These involved three aspects, satisfaction with nursing staff attitude, satisfaction with comprehensive nursing, and satisfaction with nursing operation skills. Each item was rated on a scale of 1-4. There were 25 items in total,

0-100 points for each item, and the total score of each aspect was 100 points. Higher scores indicated higher nursing satisfaction. Evaluation was carried out when the children were discharged.

Other observation indexes included disappearance of asthma, coughing, and lung rale, along with hospitalization time.

### Statistical analysis

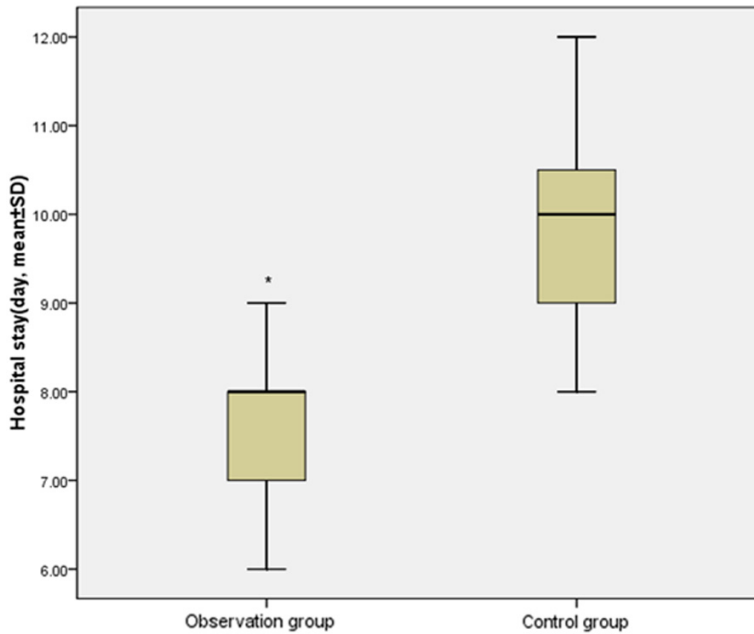
Analysis was performed using SPSS20.0 statistical software. Measurement data concerning the two groups are based on mean  $\pm$  standard deviation ( $\bar{x} \pm sd$ ). The two groups were compared using independent-samples t-test. Sample rates were compared through Chi-squared test or Fisher's exact test.  $P < 0.05$  is considered statistically significant.

## Results

### General data concerning the two groups

There were no statistical differences in the two groups in gender, age, course of disease, and

## Comprehensive airway nursing management in respiratory tract infections



**Figure 1.** Comparison of hospitalization times between the two groups. Hospitalization time in the control group was longer than the observation group and differences were statistically significant ( $t = -7.72$ ,  $*P < 0.001$ ).

**Table 4.** Comparison of nursing satisfaction between the two groups ( $\bar{x} \pm sd$ , score)

	Staff's attitude	Comprehensive nursing	Operation skill
Observation group	94.19±4.01	93.57±3.78	93.51±3.09
Control group	91.23±5.29	90.12±4.01	91.25±2.99
t	4.166	4.809	4.037
P	<0.001	<0.001	<0.001

site of infections (all  $P > 0.05$ ). All were comparable as shown in **Table 1**.

### Comparison of improvement rates

Effective rates, remarkable effective rates, and improvement rates of the observation group were all higher than those of the control group (both  $P < 0.05$ ) as shown in **Table 2**.

### Disappearing time of wheezing, coughing, and lung rale

Disappearing time of clinical symptoms (wheezing, coughing, and lung rale) in the observation group was obviously shorter than that in the control group. Differences were statistically significant (all  $P < 0.05$ ) as shown in **Table 3**.

### Comparison of hospitalization times between the two groups

Results showed that the average hospitalization time in the observation group was shorter than that in the control group ( $7.00 \pm 1.05$  days vs.  $10.50 \pm 0.97$  days;  $t = -7.72$ ,  $P < 0.001$ ). Differences were statistically significant as shown in **Figure 1**.

### Comparison of nursing satisfaction of the children's family in the two groups

**Table 4** shows that nursing satisfaction in each dimension of the children's family members in the observation group was higher than those in the control group, with statistically significant differences (all  $P < 0.05$ ).

## Discussion

Due to short respiratory tracts and insufficient functional respiratory reserve, the rate of respiratory tract infections among infants is far greater than that among adults. In addition, respiratory

tract infections in children have the characteristic of a long disease cycle [15]. Common bacterial respiratory tract infections in hospitalized children are mostly caused by gram negative bacteria. Traditional penicillin and cephalosporins can display good clinical antibacterial effects [16]. However, if no airway nursing is done and airway secretions are not removed effectively in time, there will be a risk of delayed healing or even exacerbation for children [17].

In this study, a comprehensive airway nursing regime was adopted for the observation group. It began with oral cleaning to reduce the breeding of oral bacteria, thereby reducing incidence of respiratory tract infections. Additionally, Li has confirmed that oral nursing is an important part of comprehensive air-

way nursing for patients with severe pneumonia [18].

The atomization regime in this study involved hormones, bronchodilators, and antibiotics. A small dose of hormones acting directly on respiratory tracts can not only reduce the edema of tracheal mucosa but can also restrain inflammatory reaction to some extent. At the same time, atomized antibiotics can strengthen antibacterial effects and improve clinical symptoms in children with bronchiectasia through bronchodilators [19]. Study results showed that clinical symptoms of both groups improved, indicating that atomization therapy could be adopted as an important clinical auxiliary treatment for respiratory tract infections. Average hospitalization time is an important index of clinical disease treatment evaluation. Results showed that average hospitalization time in the observation group was significantly shorter than that in the control group, proving that the comprehensive airway nursing management was superior to measures adopted to the control group in the treatment of children with respiratory infections. Comfort care adopted by the comprehensive airway nursing management team, including measures of humanized nursing such as music playing, relieved anxiety and other negative emotions of the family members, helping improve compliance during treatment [20]. A harmonious relationship between doctors and patients is an important index for nursing evaluation. Comprehensive airway nursing measures not only improved the effectiveness of treatment but also met the psychological treatment expectations of the families. Results showed that the nursing satisfaction in each dimension in the observation group was superior to the control group.

In summary, in addition to basic symptomatic anti-inflammatory or anti-viral treatment for children with respiratory tract infections, comprehensive airway nursing management has displayed definite effectiveness in shortening symptom remission times and hospitalization times while improving clinical treatment effectiveness and nursing satisfaction. However, these study results are based on clinical experience from a single center with a small sample size. Therefore, further study is required to verify the efficacy of comprehensive airway nursing in the treatment of children with respiratory tract infections.

### Disclosure of conflict of interest

None.

**Address correspondence to:** Hui Xie, Department of Children's Rehabilitation, Maternity and Child Health Care of Zaozhuang, The Crossroad of Guangming Avenue and Fuyuan Third Road (1200 m South), Xuecheng District, Zaozhuang City 277800, Shandong Province, China. Tel: +86-0632-8791178; E-mail: xiehui7749@163.com

### References

- [1] Chen R, Chen Y, Black S, Hao CL, Ding YF, Zhang T and Zhao GM. Antibiotic resistance patterns and serotype distribution in *Streptococcus pneumoniae* from hospitalized pediatric patients with respiratory infections in Suzhou, China. *J Trop Pediatr* 2010; 56: 204-205.
- [2] Le MF, Tu XL and Shi MT. Analysis of pathogenic bacteria and drug resistance of respiratory tract infection in hospitalized children. *Chinese Journal of Nosocomiology* 2017; 8: 1856-1859.
- [3] Irwin AC, Fernando AM and Paul SP. At a glance: respiratory tract infections in children. *J Fam Health Care* 2015; 25: 22-25.
- [4] Rogers E, Greaves K and Paul SP. A clinical companion to the NICE guide on bronchiolitis. *Nurs Child Young People* 2017; 29: 14-16.
- [5] GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 2016; 388: 1459-1544.
- [6] Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, Mathers C and Black RE. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. *Lancet* 2015; 385: 430-440.
- [7] Nascimento-Carvalho CM, Araujo-Neto CA and Ruuskanen O. Association between bacterial infection and radiologically confirmed pneumonia among children. *Pediatr Infect Dis J* 2015; 34: 490-493.
- [8] Yu H. Effect of comprehensive nursing intervention on upper respiratory tract infection in children. *Journal of Modern Medicine & Health* 2015; 6: 923-925.
- [9] Liu JX. Effect of comprehensive nursing care on the effect of nebulized inhalation in children with respiratory tract infection. *Henan Medical Research* 2017; 1: 175-176.
- [10] Lu Q, Chen HZ, Jiang L, Yang YH. Guidelines for rational use of antibiotics for acute respiratory



## Comprehensive airway nursing management in respiratory tract infections

- infections (tentative, later part). *Chinese Journal of Practical Pediatrics* 2001; 12: 755-759.
- [11] Schuster Bruce C, Hoare C, Mukherjee A and Paul SP. Managing acute respiratory tract infections in children. *Br J Nurs* 2017; 26: 602-609.
- [12] Liu J and Wang D. Relationship between RSV and ADV with illness condition in children with acute respiratory tract infections. *International Journal of Virology* 2015; 1: 33-35.
- [13] Li YL. Observation and analysis of nursing care of children with respiratory tract infection treated by atomization inhalation. *Nei Mongol Journal of Traditional Chinese Medicine* 2015; 4: 164.
- [14] Ma LJ. Comfortable nursing cooperation in the treatment of respiratory tract infection in children by atomization inhalation. *Journal of Huaihai Medicine* 2017; 4: 494-495.
- [15] Paul SP and Linney MJ. Significance of very high C-reactive protein (CRP) values in the paediatric practice: a retrospective study. *Clinical Biochemistry* 2011; 44: 540-541.
- [16] Jiang SY. Clinical application and analysis of antibiotics in pediatric respiratory tract infection. *Chinese Journal of Modern Drug Application* 2015; 3: 115-116.
- [17] Xia ZC and Zhang BP. Clinical characteristics and prognostic factors of severe pneumonia complicated with acute respiratory distress. *Zhejiang Clinical Medical Journal* 2016; 12: 1184-1185.
- [18] Li XL. Observation on the effect of comprehensive airway care in reducing respiratory tract infection in children with severe pneumonia. *Oriental Diet Therapy and Health Care* 2016; 12: 7.
- [19] Liu YX. Application of comfortable nursing in the treatment of upper respiratory tract infection in children. *The Medical Forum* 2015; 6: 803-804.
- [20] Ye XP. Application effect of music interference combined with comfortable body position on relieving infant vaccination pain. *Acta Medica Sinica* 2015; 2: 86-88.