

Analysis of ultrasonic atomized inhalation of antibiotics in infant pneumonia treatment

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Abstract: To observe and analyze the specific nursing pattern for ultrasonic atomized inhalation of antibiotics in infant pneumonia treatment, 200 children with pneumonia treated in our hospital were enrolled as the study subjects. All the patients were treated with ultrasonic atomized inhalation of antibiotics. The children were divided into a reference group treated with general conventional nursing and a study group treated with targeted nursing. The nursing effect was compared in the two groups. Observation of overall treatment efficacy of the two groups showed that the study group is superior to the reference group, $P < 0.05$; comparison of the recovery time of clinical symptoms and signs between the two groups showed that the study group needs a shorter time to restore cough, fever, asthma, and lung rales. $P < 0.05$; the self-developed satisfaction questionnaire survey shows a higher satisfaction in the study group, $P < 0.05$. In infant pneumonia treatment with ultrasonic atomized inhalation of antibiotics, targeted nursing patterns should be adopted to improve overall treatment efficacy.

Keywords: Ultrasonic atomized inhalation of antibiotics, infant pneumonia, nursing strategy.

INTRODUCTION

Infant pneumonia is a common disease in infants and young children, which has high prevalence in spring and winter in northern China, and is a common cause of death in infants and young children. Pneumonia is lung inflammation due to pathogens infection or inhalation of amniotic fluid and oils or allergic reactions. Its common clinical manifestations include fever, cough, polypnea, dyspnea, and lung rales (He and Su 2014, Liu 2017, Kushwah and Kumar 2017). Infant pneumonia can cause immense pain to children. Therefore, timely and effective treatment is essential. Ultrasonic atomization inhalation of antibacterial agents is a main treatment method for such disease and the common antibacterial agents include amikacin, gentamicin, tobramycin, cephalosporin, polymyxin, lysine aminotrium etc. To improve therapeutic effect, the liquid medicine should fill the atomizer as fully as possible. The humidifying device should be stopped temporarily, and the spray treatment starts when the patient inhales, with spraying air rate > 61 /min. The device locates 30-45cm from the end of artificial airway Y.

The clinical manifestations of infant pneumonia can involve general symptoms, respiratory symptoms, circulatory system symptoms, nervous system symptoms, digestive system symptoms, etc., thus causing a serious impact on the normal quality of life and physical health of children (Zhu *et al.*, 2015; Hanafiah *et al.*, 2017). In terms of its treatment, ultrasonic atomized inhalation of antibiotics is currently extensively applied with good results achieved. While providing active and effective treatment, targeted and individualized nursing should be

chosen to give the treatment effect (Zhou, Zhang and Xu, 2016). This study conducted a rigorous investigation into nursing in ultrasonic atomized inhalation of antibiotics in infant pneumonia treatment.

MATERIALS AND METHODS

The study was conducted on 200 children with pneumonia (fig. 1) treated in our hospital from May 2014 to March 2018. All the children were definitely diagnosed through clinical examination. All their family members signed informed consent. This paper has a rigorous structure, and the conclusion has been approved by relevant ethics and relevant departments..

The children were divided into the study group and the reference group each having 100 cases according to randomization. Where, the study group has 56 males and 44 females ranging in age from 6 months to 4 years with an average age of (2.1 ± 0.9) years. The reference group has 52 males and 48 females ranging in age from 3 months to 5 years with an average age of (2.8 ± 0.5) years. Comparison of the relevant data of the two groups shows comparability, $P > 0.05$.

All patients were treated with ultrasonic atomized inhalation of antibiotics via mouth and nose. The treatment lasted 15 minutes for twice a day. Symptomatic treatment was started at the same time. On this basis, the reference group received general conventional nursing including nursing of physiological symptoms, sleep and diet. Meanwhile, the study group received targeted conventional nursing including the following aspects:

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First, psychological nursing. Children are young and thus uncomfortable with the strange environment of the hospital. Plus the various discomforts caused by the disease, they show irritation, anxiety, crying which reduces treatment compliance. Thus, nursing staff should take the initiative to get close to the children and have warm communication with them. According to their different psychological characteristics, their attention can be diverted by letting them listen to children's music, play toys, play games, watch cartoons etc., so that treatment proceeds unconsciously. In addition, parents should be psychologically nurtured to avoid rage. Health education can be provided to inform them of methods and precautions of infant pneumonia treatment so that they cooperate with doctors and nurses as well.



Fig. 1: Imaging of infant pneumonia.

Second, strengthening environmental nursing. For children with pneumonia, it is important that the ward's environment should be clean and tidy and that has comfortable temperature and humidity. Dirty air hinders the children's quick recovery. Therefore, it is necessary to clean the wards every day, regularly open the windows for ventilation, minimize the number of visitors to the wards so that less carbon dioxide causing unclear air is accumulated and children's rest is not disturbed (Borgo *et al.*, 2017, Aldaihani and Alenezi 2017).

Third, formulating targeted diet plans for children. In view of their deteriorating digestive function, dietary nursing should be strengthened to avoid indigestion and diarrhea. Targeted and individualized rich diet programs should be formulated in strict consistency with children's age characteristics, mainly digestible diet. Diet for breastfeeding children should be milk-based with appropriate water supplements in the principle of multiple meals with small amount for each. Older children should take light diet with more supplements of protein, fresh vegetables, fruits and water.

Fourth, nursing in ultrasonic atomized inhalation. During the ultrasonic atomized inhalation therapy, the atomizer should be maintained at an appropriate horizontal position, and the children should be instructed to take appropriate position (Brooks *et al.*, 2015). After treatment, promptly rap the chest and back, let the children drink more water to dilute the phlegm, and appropriately increase the number of turns in gentle movement. Record the children's treatment effect (Al-Taweel *et al.*, 2017, Chen *et al.*, 2018).

Observation indicators

The overall treatment efficacy of the two groups was observed and compared, including the three criteria of recovery, effective and invalid. Where, the criterion of recovery is that clinical symptoms and signs completely disappear within a week after treatment; effective criterion is that the clinical symptoms and signs are significantly improved within a week after treatment; invalid criterion is, there is no change compared to the situation before treatment. Statistic is made as to the recovery time of cough, fever, asthma and lung rales in the children. Patients' satisfaction was surveyed by the self-developed nursing satisfaction questionnaire, with 90-100 points for very satisfied, 70-89 points for satisfied, and 69 points or less for unsatisfactory.

STATISTICAL ANALYSIS

The statistical analysis software used was SPSS 21.0. Where, the measurement data were expressed as mean \pm average ($\bar{x} \pm s$), and t was used for comparison between groups; the count data was expressed using natural numbers (n) and percentages (%), and χ^2 was used for comparison between groups. $P < 0.05$ indicates statistical value (Akay *et al.*, 2017).

RESULTS

Comparison of overall treatment efficacy between the two groups

As shown in table 1, comparison of overall treatment efficacy shows that study group is significantly superior to the reference group, $P < 0.05$, statistically significant.

Comparison of recovery time of clinical symptoms and signs between the two groups

As shown in table 2, compared with the reference group, the study group has a shorter recovery time of clinical symptoms and signs, $P < 0.05$, statistically significant.

Comparison of overall nursing satisfaction between the two group parents

As shown in table 3, after different nursing patterns are taken, the patients of study group treated with targeted nursing program have significantly higher overall nursing satisfaction than those of reference group treated with

Table 1: Comparison of overall treatment efficacy between the two groups [n (%)]

Group	Case number	Recovery	Effective	Invalid	Overall Treatment Efficacy
Study group	100	78	20	2	98 (98.00)
Reference group	100	52	30	18	82 (82.00)
X ²					13.18
P					<0.05

Table 2: Comparison of recovery time of clinical symptoms and signs between the two groups ($\bar{x} \pm s$)

Group	Cough (d)	Fever (d)	Asthma (d)	Lung rales (d)
Reference group (n=100)	5.6±3.1	4.8±5.3	5.6±3.3	6.9±1.0
Study group (n=100)	3.2±0.9	3.0±1.5	3.9±0.8	4.2±1.2
t	6.32	4.27	4.56	6.03
P	<0.05	<0.05	<0.05	<0.05

Table 3: Comparison of overall nursing satisfaction between the two group parents [n (%)]

Group	Case number	Very satisfied	Satisfied	Unsatisfactory	Overall satisfaction
Study group	100	80	20	0	100 (100.00)
Reference group	100	46	30	24	76 (76.00)
X ²					8.59
P					<0.05

conventional nursing program, $P < 0.05$, statistically significant (Hubalkova *et al.*, 2017).

**Fig. 2:** Imaging of bacterial pneumonia

DISCUSSION

Relevant data surveys show that, the incidence of infant pneumonia is on a constant rise in China, which has far exceeded that in developed countries (Zou 2013 and D'Souza 2018). Studies have shown that there are many pathogenic factors in infant pneumonia, such as bacterial pneumonia (fig. 2), viral pneumonia (fig. 3), fungal pneumonia (fig. 4), mycoplasma pneumonia and Chlamydia pneumonia. Pathological changes in infant pneumonia are demonstrated as lung inflammation and mucosal edema, which can have a certain influence on the gas exchange in the lung (Wan 2017, Roel *et al.*, 2014, Nawaz *et al.*, 2017). Ultrasonic atomized inhalation, which changes liquid to aerosol using ultrasonic technology, targets at the respiratory tract to dilute sputum

and treat inflammation, while significantly alleviating mucosal edema. Studies have pointed out (Bahi-Buisson *et al.*, 2017) that ultrasonic atomized inhalation of antibiotics can directly deliver drugs to the inflammation site, so that efficacy is directly and fully exerted. Moreover, antibiotics dosage is reduced, so that toxic side effects are greatly reduced (Palmer *et al.*, 2017, Gao *et al.*, 2017, Ge *et al.*, 2017, Gohar *et al.*, 2017).

**Fig. 3:** Imaging of viral pneumonia

During ultrasonic atomized inhalation of antibiotics in infant pneumonia treatment, scientific nursing patterns should be provided to give the treatment effect. The targeted nursing program can provide more comprehensive and individualized nursing services for children in aspects of environment, diet, life, psychology, and physiology, so that nursing quality greatly improves, children's pain reduces and recovery of clinical symptoms and signs in the shortest time is possible. In the research of Bahi-Buisson *et al.* (2017) 1246 pediatric patients with pneumonia who were treated by ultrasonic atomization

inhalation of antibacterial drug were selected as research objects. After applying targeted nursing model, the total treatment effective rate reached 97.55% (1233/1264). Palmer *et al.* (2017) randomly divided 800 pediatric patients with pneumonia into two groups: control group consisting of 356 patients accepting general nursing, and observation group consisting of 44 patients accepting targeted nursing. Results showed that the observation group was significant superior to control group in total effective rate and length of stay, which is consistent with the results of relevant foreign studies. In this study, the study group treated with targeted nursing pattern was significantly superior to the reference group treated with conventional nursing in terms of overall treatment efficacy, recovery time of clinical symptoms and signs, and overall nursing satisfaction.



Fig. 4: Imaging of fungal pneumonia.

CONCLUSION

In summary, for children with pneumonia who are treated with ultrasonic atomized inhalation therapy, targeted nursing patterns should be adopted to improve the overall treatment efficacy, actively improve clinical symptoms, and improve nursing quality, which is worthy of extensive promotion and practice.

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