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Research Article

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Analysis of the Effect of Quality Control Circle Activities on Improving the Implementation Rate of Airway Humidification in Hospitalized Children

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Abstract

Objective This study explored the effect of quality control circle (QCC) activities on improving the implementation rate of airway humidification in hospitalized children. Methods Through the implementation of the quality control circle, the medical staff and nurses cooperated to analyze the factors affecting airway humidification and take corresponding measures, thus achieving the integration of airway humidification, assisted expectoration and airway purification [1]. Results After the implementation of the quality control circle activities, the implementation rate of airway humidification in hospitalized children increased from 48.33% to 88.33%, the target achievement rate was 133.69%, and the improvement rate was 82.76%. The difference was statistically significant (P < 0.01). Conclusion Carrying out quality control circle activities can effectively improve the work of nursing staff, improve the treatment efficacy of children, and promote the continuous improvement of nursing quality.

Keywords: Quality Control Circle, Airway Humidification, Continuous Improvement of Nursing Quality.

Introduction

Airway humidification airway humidification uses a humidifier or various humidification methods to disperse solutions or water into extremely fine particles to increase the temperature and humidity of the inhaled gas, so that the trachea and lungs can inhale gas containing sufficient water, thereby humidifying the airway mucosa, diluting sputum, and maintaining normal mucociliary movement [1]; airway humidification is one of the important measures for children's airway management. Airway humidification will help achieve the best humidification effect, reduce complications, reduce the rate of lung infection, and promote the treatment of primary diseases [2]. Our department preliminarily retrospectively collected statistics on the implementation of airway humidification in children discharged from September to December 2023. The implementation rate was 59.44%. Based on the current situation of the department, we carried out a quality control circle activity with the theme of "improving the implementation rate of airway humidification in hospitalized children" and achieved satisfactory results, which are summarized as follows.

Data and Methods

General Data

From January to July 2024, our department collected data from 60 (before) and 60 (after) hospitalized children with airway humidification. The difference was statistically significant (P > 0.05), indicating comparability.

Methods

Theme Determination: After research, the theme for this activity was selected using the 5, 3, 1 evaluation method. Eight participants participated in the selection process, ultimately deciding on improving the implementation rate of airway humidification in hospitalized children. Implementation rate = number of qualified airway humidification cases during the monitoring period / total number of airway humidification cases during the monitoring period × 100%.

Activity Plan: Based on the 10 steps of the quality control circle, the time required for each step was planned, the work allocation for circle members was rationally allocated, and a Gantt chart was created.

Current Situation: First, a flow chart for airway humidification implementation before improvement was developed to understand the reasons for the low implementation rate. A checklist was developed and reviewed over 21 days, covering the last 60 cases of airway humidification therapy. The implementation rate was 29/60, or 48.33%. Next, a Pareto chart was created, following the 80/20 rule, to identify the two key issues: family refusal and child non-compliance.

Target Setting: Target Value = Current Value + [(1 - Current Value) × Improvement Focus × Circle Capacity] = 48.33% + 51.63% × 82.22% × 70% = 78.05%.

Cause Analysis

The two key factors mentioned above were further analyzed using a fishbone diagram and a cause-and-effect relationship diagram. Furthermore, on-site surveys, questionnaires, and root cause verification were conducted to confirm each of these key factors. Therefore, the following six key areas were identified as key areas for improvement in this circle: lack of nurse knowledge; incomplete humidification assessment; lack of family knowledge; poor treatment comfort; inadequate nurse education; and incomplete humidification procedures. 1.2.6 Countermeasures formulation and implementation review: In response to the six key issues for improvement, the following countermeasures were formulated and integrated through repeated brainstorming by circle members, and then implemented and reviewed on site: Optimize the management team and strengthen personnel training. Establish an airway management team and implement multi-dimensional quality control; conduct standardized training for medical staff through online and offline channels; conduct daily and theoretical operation assessments after training. 8s checklist management and improve the humidification process. The high-flow respiratory humidification therapy device operation process, airway humidification-sputum removal operation process, high-flow oxygen therapy application process in acute respiratory failure, and high-flow oxygen therapy application time process after tracheal extubation were developed to achieve homogeneity Improve the humidification device and provide comfortable care. In response to the children's lack of cooperation and the repeated detachment of the nasal plug, an HFNC nasal plug auxiliary fixation device was invented [4] and a mask-type humidification device [5]. Various methods such as issuing encouraging stickers attracted the attention of children; and a "pediatric airway humidification comic and audio picture book" was developed, with game-style interactive guidance [6]. Diversified health education programs were implemented to encourage family participation: written educational materials, videos, QR codes, and health education clinical pathways were produced; public lectures were held monthly.

Results

Tangible Achievements

After the implementation of the quality control circle, 60 airway humidification sessions were performed in hospitalized children, with an implementation rate of 88.33%. Target achievement rate = (after improvement - before improvement) / (target value - before improvement) × 100% = (88.33% - 48.33%) / (78.05% - 48.33%) × 100% = 114%. The achievement rate was 114%. 2.2

Intangible Results

Target Achievement Rate = (After Improvement - Before Improvement) / (Target Value - Before Improvement) × 100% = (5.23 - 30.59) / (12.38 - 30.59) × 100% = 133.69%. Improvement Rate = (After Improvement - Before Improvement) / Before Improvement × 100% = (88.33% - 48.33%) / 48.33% × 100% = 82.76%.

Intangible Results

Each QCC member was evaluated before and after the QCC on eight criteria, including work responsibility and teamwork, with significant results.

Discussion

QCC is an improvement process that leverages collective wisdom, collective strength, and teamwork. It has been widely used in the continuous improvement of healthcare quality and has achieved excellent results. Through this quality control circle activity, our department not only effectively improved the implementation rate of airway humidification, but also revised the airway humidification process and strengthened the department's training and assessment of nursing staff on both theoretical and operational knowledge related to airway humidification. This, in turn, ensured patient treatment efficacy and increased patient and family satisfaction with the medical staff. Furthermore, conducting quality control circle activities can inspire nursing staff to continuously identify and address issues, continuously improving work efficiency and quality. It can fully mobilize nursing staff's enthusiasm, stimulate their potential and creativity, greatly foster a sense of collective honor and team responsibility, and strengthen effective communication among medical staff within the department.

References

1. Chinese Nursing Association. (2019–2023). Group Standard T/CNAS 03-2019 T/CNAS 37-2023: Airway purification nursing. Chinese Nursing Association.
2. Qin, Q. (2021). Airway humidification therapy for children. Chinese Journal of Practical Pediatrics, 36(3), 220–225.
3. Hu, Y. (2017). Mechanism of action and application of heated humidified high-flow nasal cannula oxygen therapy in pediatrics. Chinese Journal of Pediatric Emergency Medicine, 24(3), 220–225.
4. Xia, J., Duan, X., et al. (2020). Application of Saifurun and Amp patches in nasal and facial pressure injuries of nursing staff. Nursing Research, (16), August 2020.
5. Experts from China, the United States, and France. (2022). High-flow oxygen combined with mask application to improve oxygenation. Annals of Intensive Care, September 2022.
6. Zheng, T., & Chen, J. (2021). Application progress of therapeutic games in pediatric nursing. Nursing Research, 7, 1222–1225.