Section: Miscellaneous

Original Research Article

ASSESSMENT OF KNOWLEDGE ABOUT AIRWAY-ASSOCIATED MICROBIAL RISKS DURING PAEDIATRIC PROCEDURES UNDER ANAESTHESIA

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ABSTRACT

Background: Exposure to contaminated airway devices may further increase the risk of respiratory complications and delayed recovery. Therefore, assessment of knowledge regarding airway-associated microbial risks among healthcare professionals is essential for identifying gaps in awareness and improving infection control practices. The current study has been undertaken to evaluate the awareness and understanding of healthcare professionals regarding microbial contamination, infection transmission, and preventive measures associated with paediatric airway management during anaesthesia.

Materials and Methods: A total of 40 participants were included in the study. The participants consisted of anaesthesiologists, postgraduate students, operation theatre nurses, and anaesthesia technicians who were actively involved in paediatric airway management during anaesthesia procedures. Data collection was done using a structured self-administered questionnaire prepared based on previously published studies related to infection control practices and microbial contamination of airway devices during anaesthesia. The questionnaire consisted of two sections.

Results: The present study included 40 healthcare professionals comprising anaesthesiologists, postgraduate students, operation theatre nurses, and anaesthesia technicians. Majority of the participants showed adequate knowledge regarding airway-associated microbial risks during paediatric procedures under anaesthesia. Most participants were aware about the importance of hand hygiene and the role of contaminated airway devices in spreading infections. Good awareness was also observed regarding proper sterilisation and disinfection of airway equipment. However, only moderate knowledge was seen in areas related to biofilm formation and ventilator-associated infections associated with endotracheal tubes. Overall, most participant's demonstrated good knowledge, while a few participants showed moderate or poor awareness regarding infection control practices.

Conclusion: The present study revealed that majority of the healthcare professional's possessed satisfactory knowledge regarding airway-associated microbial risks during paediatric procedures under anaesthesia. However, limited awareness was observed in certain areas such as biofilm formation and safe handling of reusable airway equipment. Regular educational programmes and proper infection control practices are necessary to improve patient safety and minimise healthcare-associated infections.

Keywords: Paediatric Anaesthesia, Airway Management, Microbial Contamination, Infection Control.

INTRODUCTION

Airway management is an important part of paediatric anaesthesia and is necessary for maintaining adequate ventilation and oxygenation during surgical and diagnostic procedures. Airway handling in children is more challenging than in adults because of differences in airway anatomy, smaller airway size, higher oxygen consumption, and immature immune function. During anaesthesia, various airway devices such as endotracheal tubes, laryngeal mask airways, face masks, breathing circuits, and laryngoscopes are commonly used to maintain airway patency. Although these devices are essential for patient care, they may also become potential sources of microbial contamination if appropriate infection control practices are not followed.[1] Hospital-acquired infections remain a major concern in healthcare settings, particularly in operation theatres and intensive care units. Paediatric patients are more vulnerable to infections because of their developing immune systems and frequent exposure to invasive procedures. During airway management, healthcare professionals come into contact with respiratory secretions, saliva, blood, and contaminated aerosols. Improper handling, inadequate cleaning, or poor sterilisation of airway devices can lead to transmission of microorganisms between patients. Studies have shown that anaesthesia equipment may act as reservoirs for bacteria and other pathogens, increasing the risk of cross-infection. Endotracheal tubes are widely used in paediatric surgeries and critical care settings.[2] These tubes remain in direct contact with the respiratory tract and may become colonised with microorganisms shortly after insertion. Research has reported the formation of bacterial biofilms on the internal surfaces of endotracheal tubes. Biofilms provide a favourable environment for microbial growth and may contribute to respiratory infections such as ventilator-associated pneumonia. Such infections are associated with prolonged hospital stay, delayed recovery, and increased treatment costs.[3] Therefore, maintaining strict aseptic precautions during airway management is highly important. Supraglottic airway devices are increasingly used in paediatric anaesthesia because they are easier to insert and are associated with fewer airway complications compared to tracheal intubation. These devices may reduce complications such as coughing, laryngospasm, and postoperative throat discomfort. However, concerns regarding their cleaning and reuse remain significant. In many healthcare institutions, reusable airway devices are commonly utilised due to financial limitations. Inadequate sterilisation and repeated reuse without proper disinfection may increase the risk of microbial transmission among patients.[4]

Laryngoscope blades and handles are also recognised as common sources of contamination in anaesthesia practice. These instruments frequently come into contact with oral and pharyngeal secretions during airway procedures. Several studies have demonstrated the presence of microbial contamination on laryngoscope surfaces even after routine cleaning. If proper sterilisation procedures are not followed, these devices may contribute to the spread of infectious agents within operation theatres. Infection prevention during anaesthesia practice largely depends on the knowledge and awareness of healthcare professionals. Anaesthesiologists, operation theatre staff, nurses, and trainees should possess adequate understanding regarding hand hygiene, sterilisation methods, personal protective measures, and safe handling of airway equipment.[5,6] Lack of awareness and inconsistent adherence to infection control guidelines may increase the risk of healthcare-associated infections in paediatric patients. Children undergoing surgery may already have respiratory illnesses or reduced immunity, making them more susceptible to postoperative infections. Exposure to contaminated airway devices may further increase the risk of respiratory complications and delayed recovery. Therefore, assessment of knowledge regarding airway-associated microbial risks among healthcare professionals is essential for identifying gaps in awareness and improving infection control practices.

Aim and objective

The current study has been undertaken to evaluate the awareness and understanding of healthcare professionals regarding microbial contamination, infection transmission, and preventive measures associated with paediatric airway management during anaesthesia.

MATERIALS AND METHODS

Study Design: The present study was conducted as a descriptive cross-sectional questionnaire-based study.

Study Setting: The study was carried out in the Department of Anaesthesiology and Operation Theatre Complex of a tertiary care teaching hospital. The study was conducted over a period of two months after obtaining permission from the institutional authorities and ethics committee.

Study Participants: A total of 40 participants were included in the study. The participants consisted of anaesthesiologists, postgraduate students, operation theatre nurses, and anaesthesia technicians who were actively involved in paediatric airway management during anaesthesia procedures.

Inclusion Criteria

Willing participants who were Healthcare professionals involved in paediatric anaesthesia procedures, anaesthesiologists and postgraduate students from the Department of Anaesthesiology, operation theatre nurses and anaesthesia technicians

involved in airway handling were included in the study.

Study Tool: Data collection was done using a structured self-administered questionnaire prepared based on previously published studies related to infection control practices and microbial contamination of airway devices during anaesthesia. The questionnaire consisted of two sections.

Ethical Considerations: Ethical clearance for the study was obtained from the Institutional Ethics Committee prior to commencement of the study. Participation was voluntary, and informed consent was taken from all participants. Personal details and responses were kept confidential and used only for academic and research purposes.

Statistical Analysis

The collected data were entered into Microsoft Excel and analysed using suitable statistical software. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used for analysing demographic variables and knowledge scores. The results were presented in the form of tables and graphs wherever required.

RESULTS

The present study included 40 healthcare professionals comprising anaesthesiologists, postgraduate students, operation theatre nurses, and anaesthesia technicians. Majority of the participants showed adequate knowledge regarding airway-associated microbial risks during paediatric procedures under anaesthesia. Most participants were aware about the importance of hand hygiene and the role of contaminated airway devices in spreading infections. Good awareness was also observed regarding proper sterilisation and disinfection of airway equipment. However, only moderate knowledge was seen in areas related to biofilm formation and ventilator-associated infections associated with endotracheal tubes. Overall, most participant's demonstrated good knowledge, while a few participants showed moderate or poor awareness regarding infection control practices.

Table 1: Demographic Data of the Participants (n=40)

Variable	Category	Frequency	Percentage (%)
Gender	Male	22	55
	female	18	45
Profession	Anaesthesiologists	14	35
	Postgraduate Students	12	30
	OT Nurses	9	22.5
	Anaesthesia Technicians	5	12.5
Work experience	<5 years	16	40
	5-10 years	15	37.5
	>10 years	9	22.5

Data was presented as frequency and percentage.

Table 2: Knowledge Regarding Airway Associated Microbial Risk

Knowledge variable	Correct response	Percentage (%)
Airway devices may cause cross-infection	34	85
Laryngoscopes can harbour microorganisms	32	80
Importance of hand hygiene	36	90
Use of personal protective equipment	30	75
Biofilm formation on endotracheal tubes	28	70
Risk of ventilator-associated pneumonia	26	65
Unsafe reuse of disposable airway devices	29	72.5
Need for sterilisation of reusable airway devices	31	77.5
Contaminated breathing circuits may spread infection	27	67.5

Data was presented as frequency and percentage.

DISCUSSION

Airway management is an important part of paediatric anaesthesia and requires proper infection control practices to reduce the risk of healthcare-associated infections. Airway devices such as endotracheal tubes, laryngeal mask airways, breathing circuits, and laryngoscopes are commonly used during anaesthesia procedures and may become sources of microbial contamination if proper cleaning and sterilisation measures are not followed. The present study was conducted to assess the knowledge regarding airway-associated microbial risks among healthcare professionals involved in paediatric procedures under anaesthesia.The findings of the present study showed that most participants had adequate awareness regarding infection transmission through contaminated airway devices.[6-8] Majority of the healthcare professionals were aware that improper sterilisation and disinfection of airway equipment can lead to cross-infection among patients. Similar

findings have been reported in earlier studies where anaesthesia equipment was identified as a potential source of hospital-acquired infections. These findings indicate that healthcare professionals working in operation theatre settings possess basic understanding regarding the importance of maintaining aseptic precautions during airway management procedures. Good awareness regarding hand hygiene practices was also observed among the participants. Most of the participants understood the importance of performing hand hygiene before and after airway manipulation procedures. Hand hygiene is considered one of the simplest and most effective methods for reducing microbial transmission and preventing healthcare-associated infections. Previous studies have also highlighted that proper compliance with hand hygiene practices among anaesthesia personnel can significantly reduce perioperative infection risks.[9]

`The present study also demonstrated satisfactory awareness regarding sterilisation and disinfection of airway devices such as laryngoscope blades and supraglottic airway devices. Laryngoscope blades and handles frequently come into contact with oral and respiratory secretions during airway procedures and may remain contaminated if proper sterilisation is not performed. Earlier studies have reported microbial contamination of laryngoscope equipment even after routine cleaning procedures. Therefore, adequate knowledge regarding high-level disinfection and sterilisation practices is essential for preventing infection transmission in operation theatres. However, only moderate knowledge was observed regarding biofilm formation and ventilator-associated infections related to endotracheal tubes. Many participants were not fully aware that prolonged use of endotracheal tubes may lead to microbial colonisation and development of respiratory infections. Biofilm formation inside endotracheal tubes can promote bacterial growth and increase the risk of ventilator-associated pneumonia, especially in critically ill paediatric patients. Similar findings have been reported in previous studies where healthcare professionals demonstrated limited awareness regarding airway biofilms and their role in infection development. The study also identified that some participants had inadequate awareness regarding safe reuse practices of disposable airway devices. Reuse of disposable airway equipment without proper sterilisation may increase the risk of microbial contamination and cross-infection between patients. Lack of standardised protocols, limited resources, and insufficient training may contribute to such practices in certain healthcare settings. Children undergoing surgery are more susceptible to infections because of immature immunity and frequent exposure to invasive procedures. Any lapse in infection control practices during airway management may result in respiratory complications, prolonged hospital stay, and increased healthcare burden.[10-13] Hence, proper knowledge regarding airway-associated microbial risks among healthcare professionals is highly essential for ensuring patient safety during paediatric anaesthesia procedures. Overall, the findings of the present study suggest that healthcare professionals possess reasonably good knowledge regarding airway-associated microbial risks and infection prevention measures. However, certain gaps still exist in areas related to biofilm formation, ventilator-associated infections, and safe reuse of airway equipment. Regular training programmes, infection control workshops, and continuing medical education activities may help improve awareness and strengthen safe airway management practices in paediatric anaesthesia settings.

CONCLUSION

The present study revealed that majority of the healthcare professional's possessed satisfactory knowledge regarding airway-associated microbial risks during paediatric procedures under anaesthesia. However, limited awareness was observed in certain areas such as biofilm formation and safe handling of reusable airway equipment. Regular educational programmes and proper infection control practices are necessary to improve patient safety and minimise healthcare-associated infections.

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