

Managing human factors in the assembly of the paediatric bronchoscope

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Abstract

Foreign body aspiration in children is a life threatening event and prompt bronchoscopy and extraction is essential for their survival. During a recent paediatric airway emergency at Torbay hospital, Devon, the theatre staff were unable to assemble the paediatric bronchoscope. We therefore investigated methods to improve the efficiency and timeliness of the assembly of the paediatric bronchoscope.

To assess the current problem we asked ten theatre staff at random to assemble the paediatric bronchoscope. 70% of the staff were not able to assemble the paediatric bronchoscope. A prompt poster was developed as a visual aid to help demonstrate how to assemble the paediatric bronchoscope. Another ten theatre staff were asked to assemble the paediatric bronchoscope. Now all of the staff were able to assemble the paediatric bronchoscope.

The prompt poster enabled all the theatre staff tested to correctly assemble the paediatric bronchoscope and the average time taken was reduced. To further develop the service mandatory training sessions have been arranged to help theatre staff remain confident and continue to develop their skills and knowledge.

Problem

Foreign body aspiration in children is a life threatening event and prompt bronchoscopy and extraction is essential for their survival (1). During a recent paediatric airway emergency at Torbay hospital, Devon, the theatre staff were unable to assemble the paediatric bronchoscope which led to a delay in the removal of the foreign body. Since foreign body aspiration is an uncommon paediatric emergency at Torbay hospital theatre staff can be unfamiliar with the assembly of the bronchoscope. This issue could have a significant effect on the morbidity and mortality of the patients involved. We therefore investigated methods to improve the efficiency and timeliness of the assembly of the paediatric bronchoscope.

Background

Bronchoscopy first saw clinical use in 1897 when Killian removed a pork bone from the right main bronchus of a German farmer (2). Bronchoscopes are available in a range of sizes and lengths, enabling surgeons to even safely examine the tracheobronchial tree of a premature neonate (2).

Foreign body aspiration is the leading cause of accidental death in children less than one year old in the United States (1). It is a medical emergency that requires early diagnosis and intervention. Foreign body aspiration is an important and preventable cause of morbidity and mortality in childhood (3). Choking followed by an acute episode of coughing is the most common presentation of foreign body aspiration (3). However clinical presentation may mimic different diseases, delaying the correct diagnosis. Bronchoscopy is indicated in all patients with suspected aspiration, even when the physical and radiological examination is inconclusive

(1).

Baseline Measurement

To assess the current problem of the assembly of the paediatric bronchoscope we asked ten theatre staff at random (Ear Nose and Throat (ENT) and Emergency) to assemble the paediatric bronchoscope. We asked a specific task that an ENT surgeon would request: "assemble a 200 x 4 mm rigid bronchoscope with an adjustable magnifier and light lead connected." Five Operating Department Practitioners (ODPs) and five staff nurses took part. None of the staff had received prior training in paediatric bronchoscopy. The mean ENT experience of the staff was 3.7yrs (range: 0-18 yrs). The mean number of paediatric airway emergencies attended by the staff was 4 (range 0 - 10). 70% of the staff were not able to assemble the paediatric bronchoscope. 30% correctly assembled it and the average time taken was 3 minutes 39 seconds.

Design

We arranged an open forum for the ENT department which included Consultants, Registrars, nurses and theatre staff. Here we discussed the major concerns regarding the assembly of the paediatric bronchoscope. Theatre staff were unfamiliar and did not feel confident with how the equipment fitted together. A prompt poster was suggested as a visual aid to help demonstrate how to assemble the paediatric bronchoscope. The poster was designed as a simple and clear photograph so that it could be quick and easy to use in an emergency situation. The prompt poster was laminated and fixed to the top of the paediatric emergency airway trolley so that it would be visible and permanently available to use.

Strategy

PDSA Cycle 1

A multidisciplinary open forum was created where the ENT department at Torbay hospital could raise issues and concerns about the current use of the paediatric bronchoscope. They were then encouraged to brain storm ideas to improve the current system for the next session. This forum created a non-threatening positive learning environment and was a useful team building exercise.

PDSA Cycle 2

Using ideas generated at the open forum, a draft poster on the assembly of the paediatric bronchoscope was produced. Once circulated to all members of the forum, comments were gathered and appropriate changes made. A finalised prompt poster was produced to aid theatre staff assemble the paediatric bronchoscope.

Results

Ten theatre staff (ENT and Emergency) were asked to "assemble a 200 x 4 mm rigid bronchoscope with an adjustable magnifier and light lead connected."

Four ODPs and six staff nurses were given the prompt poster and asked to "assemble a 200 x 4 mm rigid bronchoscope with an adjustable magnifier and light lead connected." No staff had received training. The mean ENT experience was 4.5 yrs (range 0-18 yrs). The mean number of paediatric airway emergencies attended was one (range 0 - 6). All of the staff were able to assemble the paediatric bronchoscope and the average time now was just 1 min 37 seconds.

See supplementary file: ds2446.pptx - "Prompt poster"

Lessons and Limitations

Creating a departmental change proved challenging, both getting the entire department to be enthusiastic about proposed changes and also to help generate ideas. It was essential to get views from all members of the clinical team involved with the procedure to produce an effective intervention. Empowering all staff members ensured hierarchical boundaries were broken and created a strong team spirit. This attitude was key in ensuring this project was a success.

The low incidence of mortality and morbidity of paediatric bronchoscopies will make it a slow process to find out if the prompt poster has impacted on patient safety. It will be necessary to audit the use of the poster to ensure that it is being properly used by all the theatre staff and that any difficulties which arise with its use are properly documented and acted upon.

Although our prompt poster is a simple and cost-effective intervention we only tested it on 10 members of theatre staff

therefore giving us a small sample size. Creating a multidisciplinary working group that meets regularly to discuss any issues that have developed will be necessary to ensure the efficiency of the procedure continues.

Conclusion

The prompt poster enabled all the theatre staff tested to correctly assemble the paediatric bronchoscope and the average time taken was reduced. Our prompt poster is a cost-effective and sustainable method to improve the efficiency of the assembly of the paediatric bronchoscope. To further develop the service and therefore patient safety; regular mandatory training sessions have been arranged to help theatre staff remain confident and continue to develop their skills and knowledge.

References

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Declaration of interests

Nothing to declare

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