



Bacterial Colonization of the Anaesthesia Breathing Circuit: A Quality Control Initiative.

Qi X.Y.¹, Chia Y.Y.¹, Lim E.C.C.¹, Ng A.S.B.²
Wangmo K.P.², Nah J.S.N.³, Lee A.C.H.⁴, Tee N.W.S.⁵
¹Division of Nursing, ²Department of Paediatric Anaesthesia,
³Major Operating Theatre, ⁴Day Surgery,
⁵Department of Pathology and Laboratory Medicine



Background

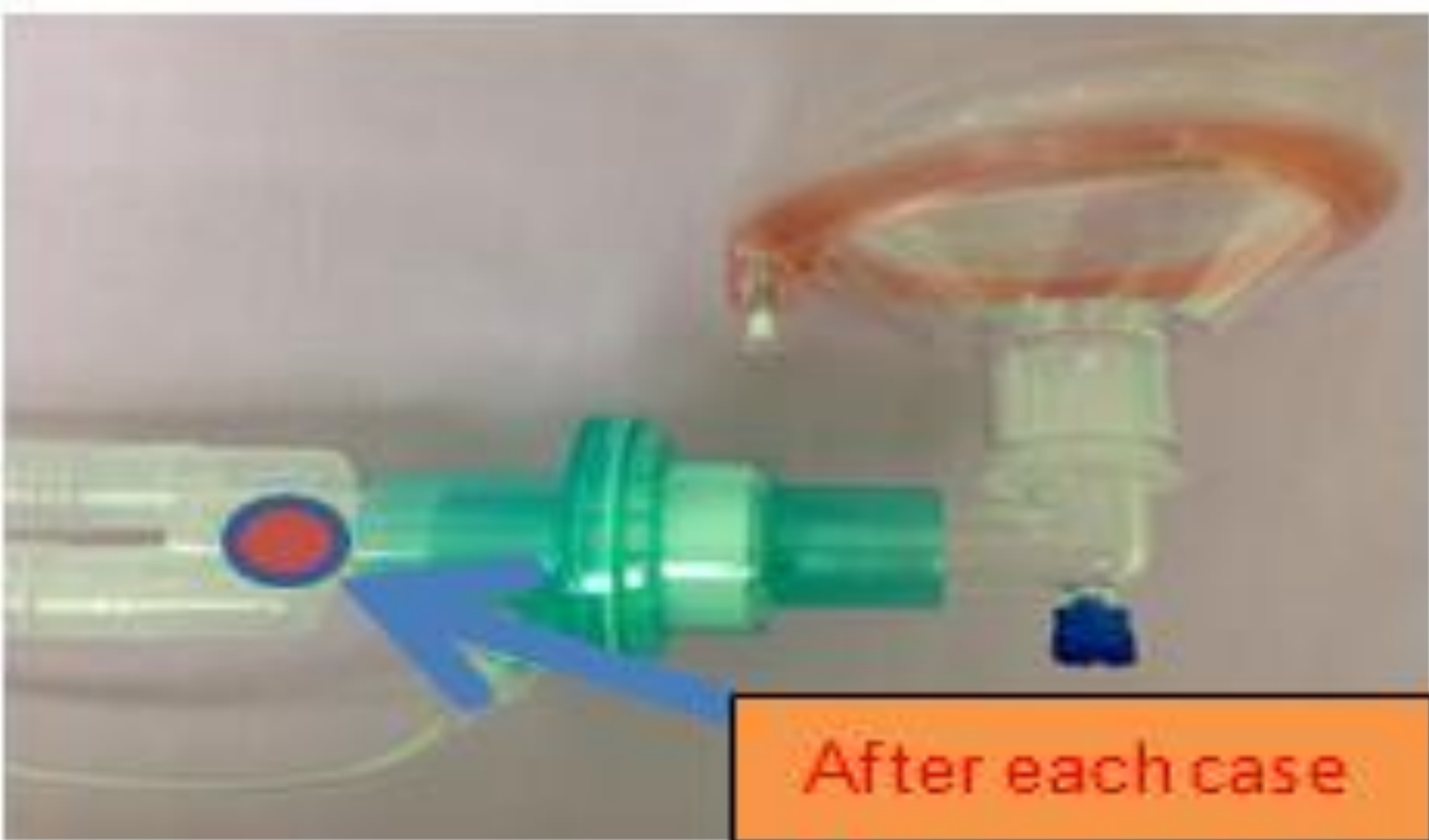
In KKH Operating Theatre, the anaesthesia breathing circuits are changed daily, but in some other hospitals in Singapore, the circuits are disposable after each patient.

Aims

In KKH Operating Theatre, a new bacterial filter is used for each patient. The anesthesia breathing system is used for one day. It is only changed if the patient has infectious respiratory disease or the circuit is soiled. This was a pilot study to obtain baseline information about the extent of bacterial contamination of the breathing circuit. The use of bacterial filters (placed between the Y-piece of the breathing circuit and the endotracheal tube) has been recommended to protect the anesthetic apparatus (including breathing circuit) from being contaminated.

Methodology

Total of 10 swabs were taken in one day, the swab culture was taken from the Y-piece of the breathing circuit at the beginning of the day, before commencement of first case, and as well as after the completion of each case. One last swab was taken at the distal end of the expiratory tubing after the circuit filter, and it was only taken after the last case on the list. Two paediatric circuits was tested , one circuit used for short cases, which the general anaesthesia was less than one hour, the other one used for long cases, which the general anaesthesia was more than one hour. Each circuit was used for three cases. There was no change to the current practice in the operating theatre in regards to changing of breathing circuit (daily) and bacterial filter (every patient).



Results

Of the 10 swabs obtained, 9 of them had no bacterial growth, only 1 reported Klebsiella species (Scanty growth), due to sampling contamination when collected the swab.

Paediatric circuit used	1100 (Total No of paediatric circuit used in 2013)	3062 (Actual patients No in 2013 if change circuits)
Cost \$43	1100 X \$43 = \$47,300	3062 X \$43 = \$131,666

Adult circuit used	2346 (Total No of adult circuit used in 2013)	11,163 (Actual patients No in 2013 if change circuits)
Cost \$6	2346 X \$6 = \$14,070	11,163 X \$6 = \$66,978

In 2013, from the chart, the total cost saved \$137,268. {(\$131,666+\$66,978)-(\$47,300+\$14,070)} In addition, the cost of disposal of waste is \$72/tonnes excluding the haulage (\$98), approximately 5 tones saved for both paediatric and adult circuits, would result to \$72 X 5= \$360 per year saving from the waste disposal. The total cost saving for reuse of breathing circuits and waste disposal was \$137,628 (\$137,268+\$360)per year for the circuits.

Nursing implication

Nursing has always been involved in infection control and prevention of nosocomial infection. This study has created awareness and demonstrated that the bacterial filter is effective in filtering and blocking bacteria thus prevents contamination of the breathing circuit and anaesthetic machine between cases throughout the day. In the present healthcare environment, rising costs and the use of medical supplies are under scrutiny. This study provided evidence for cost cutting by changing the bacterial filter instead of breathing circuit for each patient.

Conclusions

This quality control initiative reviewed that it is safe to reuse the anaesthesia breathing circuit over one day, and to achieve the considerable cost and environmental savings.