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OZONE STERILISER

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Ozone Steriliser

INTRODUCTION

One of the most important aspects of the current hospital management is to control cross-infection within a hospital. Hence, effective sterilisation and hygiene management is of utmost importance.

OBJECTIVE

To determine the safety, effectiveness and cost-effectiveness of the use of ozone steriliser in sterilising hospital equipments including beds, mattresses, pillows, files and documents, as well as cleaning and freshening room air.

METHODOLOGY

Electronic databases like Pubmed, Ovid, Cochrane DSR, Journal @ Ovid full text via OVID, CINAHL, were searched. A general search was also conducted using Google. The following keywords were used either singly or in combinations: *ozone steriliser, ozone sterilizer, bed steriliser, bed sterilizer, mattress steriliser, mattress sterilizer, hospital equipment steriliser, hospital equipment sterilizer effectiveness, safety, cost-effectiveness, risk, harm.*

There were, however, no retrievable reports or articles from the databases or websites searched. The distributing company was inevitably contacted to provide any scientific evidence available. It was informed by the company representative the only available reports are in Mandarin and these may also not be available electronically.

TECHNICAL FEATURES

Ozone is the trivalent form of oxygen, generated by nature or produced by man. When produced by man it has to be generated on site as it has a short half-life. It is an extremely reactive and unstable toxic gas, and can react spontaneously at concentrations above 20% weight and at pressures above atmospheric. Therefore, ozone concentrations for chemical use are normally lower than 18% in weight.

Ozone is a powerful oxidising agent and a strong disinfectant. Ozone can be used for several purposes when applied to water. Examples of its use are as bacterial disinfectant, colour, taste or odour removal, detergents and pesticides amongst others.

The bed-unit steriliser delivers high concentration ozone into a special bed covering through a closed pipe for one-shot sterilisation of hospital bedding, mattress, pillow etc. This is done by adopting high frequency ceramic electrodes and constant flow gas pump technology. Each process of ozone sterilisation takes approximately 20 minutes.

Sterilisation by ozone process occurs by rupture or disintegration of bacteria cell wall (cell lysine). Chlorine then diffuses through the cell wall, resulting in ‘death by attack’ of enzymes.

Colour test cards are equipped within each special bed cover and function as an indicator to ensure the outcome of each sterilisation process.

RESULTS AND DISCUSSION

EFFECTIVENESS

According to a study done in a public hospital in Shanghai, using the bed unit steriliser, bactericidal rate of the Colon Bacillus and Staphylococcus Aureus bacteria were found to be 99.96% and 99.92% respectively. In the study, petri dishes containing cultured Colon Bacillus and Staphylococcus Aureus were placed in the four corners and the centre of the hospital bed covered by bed sheets and blankets which were then subjected to ozone sterilisation. The process for each batch of petri dish was repeated twice. Using the similar technique, bactericidal rate of HbsAg virus and White Moniliasis were also tested and were found to be 1.82% and 99.91% respectively[1].

In another study in Shanghai, China, the bed unit steriliser was tested. In this study 40 bed units (20 from internal medicine, 20 from other wards) were chosen. 5 points were sampled – surface of cushion, bedding and pillow, before and after sterilisation. The killing rate was determined by weighted mean and was found to be 97.93%. However, the type of micro-organism tested for was not specified[2].

A similar study conducted in Ruijin Hospital, China concluded that the ozone steriliser is effective, safe and simple, with no ozone leakage. The killing rate and destroy test results were found to be satisfactory[3].

SAFETY

There is no available evidence supporting the safe aspect of the ozone steriliser.

COST-EFFECTIVENESS

There is no available evidence on the cost implications of the ozone steriliser.

CONCLUSIONS

There is insufficient evidence to support the effectiveness of the ozone steriliser. There is no evidence on the safety and cost-implication of the ozone steriliser. More clinical research is warranted to support its safety and effectiveness.

REFERENCES

1. Shanghai Municipal Disease Prevention and Control Centre. Summary report on test relating to the disinfection of micro-organism. Test report no. 2002-0014. 2002 Feb.

2. No. 9, People's Hospital of Shanghai. Report of clinical study. 1999 Sept 11.

3. Ruijin Hospital, China. Report of clinical study. 2004 October 24.

EVIDENCE TABLES

OZONE STERILISER: SAFETY, EFFECTIVENESS AND COST-EFFECTIVENESS

No	Author, Title, Journal, Year, Volume, Page Number	Study Design, Sample Size, Follow up	Outcomes & Characteristics	Level	Comment
Effectiveness					
1.	Shanghai Municipal Disease Prevention and Control Centre. Summary report on test relating to the disinfection of micro-organism. Test report no. 2002-0014.	Petri dishes with respective cultured micro-organisms were placed in 4 corners and centre of the bed, covered by bed sheets and blankets. The bed was covered / wrapped with a plastic bed cover to prevent leakages. Machine used: bed unit steriliser – model GCXD-1000	Bactericidal rates were tested on various micro-organisms: Colon Bacillus – 99.96% Staphylococcus Aureus – 99.92% HbsAg destructive test – 1.82% White Moniliasis – 99.91%	9	Summary report
2.	No. 9, People's Hospital of Shanghai. Report of clinical study. 1999 Sept 11.	40 beds – 20 beds from internal medicine ward, 20 from other wards. Samples were taken from the surface of cushion, bedding and pillows (before and after sterilisation) – germiculture counting was done on the samples. Machine used: bed unit ozone steriliser – model GCXD-1000	Killing rate calculation by weighted mean – 97.93%	9	Clinical test report
3.	Ruijin Hospital, China. Report of clinical study. 2004 October 24.	Items sterilised are quilt cover and pure woollen carpet. Machine used: bed unit ozone steriliser – model GCXD-1000 Measurements of killing rates of Staphylococcus Aureus and coliform, and HbsAg destroy test were taken.	Killing rate of coliform: - woollen carpet: 95.7% - 99.3% - quilt: 91.94% - 99.6% Killing rate of S. Aureus: - woollen carpet: 98.6% - 99.5% - quilt: 93% - 96.7% Destroy test of HbsAg (S/N value): - woollen carpet: 0.364-0.668 - quilt: 0.139-0.836	9	Clinical test report