RRP 2 Products

Company name – Pathogen Solutions Ltd
Product name - Medixair®
Product Summary **RRP Recommendation 2** **Date 28th Jan 2009**

RRP Summary comment

Brief description of the product – this should also include a photograph of the product

Medixair® is a *high energy* ultraviolet air steriliser. Other than the level of energy, the principal features are that it is extremely quiet in operation, economical to operate, portable, easy to install and maintain and has full safety certification. Medixair® is designed to run continuously in the immediate proximity of both patients and healthcare staff.

The controlled clinical trial and continuing surveillance evidence from Northwick Park Hospital demonstrates that when correctly engineered and applied, the contribution of such technology is significant.

Medixair® uses four, 25W low pressure mercury UVc lamps that emit germicidal radiation at a peak wavelength at 253.7nm. By arranging the lamps in a close coupled geometric pattern and employing a slow and controlled airspeed it is possible to produce exceptionally high energy levels which, in turn, generate significant logarithmic levels of pathogen kill.

The product has an internal fan that processes 25m^3 of air per hour. One machine thus produces an ideal level of protection for a single bedded side room. In open wards, the use of multiple machines on a one per bed basis enables treatment of much larger spaces. The machine is designed to be either floor mounted on a wheeled stand or attached permanently to the wall. Mounted on a floor stand the product is 90cm tall and occupies a 20cm x 20cm footprint.

Use of acoustic damping reduces and maintains the machine noise emission to <33dB whilst special filter material within the UVc tube envelopes eliminates the side band UV responsible for creation of ozone.

medixair®

What is it that is innovative/new?

The product represents a combination of power and energy, packaged into a safe, portable and quiet device available for continuous use at the patient's bedside.

The design principles of Medixair address the inherent lack of propagation of UVc radiation through air. This has hitherto prevented products from providing sufficient amounts of usable UV energy with which to effect sterilisation or even adequate decontamination of air passing through a device. There are a number of international patents and patent applications in place for Medixair.

A typical emitter in the UVc spectrum will lose 75% of its available power at a distance of 5cms from the UV source. Medixair overcomes this problem by arranging 4 emitters in an array such that each tube reinforces its neighbour.

Furthermore, by controlling the longitudinal airspeed through the lamp chamber a sufficient irradiation dwell time is provided resulting in a minimum of 22,500μW.s/cm^2 of UVc energy.

The UVc energy levels required to achieve deactivation of most bacterial and viral organisms is available from scientific literature and a table of this information is attached - see Appendix 4.

At 22,500μW.s/cm^2 Medixair produces sufficient energy to effectively address all HCAI bacteria and viruses.

For activity post RRP2

In progress and future plans

The product has been successfully tested through in vitro trials, a controlled clinical study against MRSA and within a 15 month continuous surveillance programme monitoring *C.diff* infection rates in an orthopaedic trauma ward. The product is being further evaluated as part of the "Smart Solutions for HCAI Programme" at the Royal Free Hospital, London.

A number of further trial programmes to broaden the application base of the machine against an even broader spectrum of pathogens and within differing clinical environments are currently being established.

Supporting evidence

Published or other evidence of impact, of product/process on health-care associated infections:

Historically airborne infection has been associated with those illnesses spread by droplet nuclei; such as influenza, the common cold, mumps, measles and TB etc. However many published articles also point to the significance of the air as a reservoir and transmission medium for HCAI pathogens. The rate at which these articles are appearing is rapidly increasing

Published References

1. **Airborne bacteria and surgical infection**
   OM Lidwell et al – 1981 American Journal of Medicine (AM.J.Med vol 70 no 3 pp693-697 1981
2. **Environmental Study of a Methicillin-Resistant Staphylococcus aureus Epidemic in a Burns Unit**
   Rutala, et al 1983 Department of Hospital Epidemiology, North Carolina Memorial Hospital, and Division of Infectious Diseases, Department of Medicine, University of North Carolina School of Medicine, USA
3. **Medical and microbiological problems arising from airborne infection in hospitals.**
   Schaal K P - 1991: Institute for Medical Microbiology and Immunology, Rheinische Friedrich- Wilhelms Universität Bonn Germany J Hosp Infect. 1991 Jun;18 Suppl A:451-9
4. **The Role of the Physical Environment in the Hospital of the 21st Century**
   Ulrich & Xiaobo Quan, 2004 Health Systems Design Center, College of Architecture, Texas A&M University USA
5. **The correlation between airborne methicillin resistant Staphylococcus aureus and the presence of MRSA colonized patients in a general intensive care unit.**
   WILSON et al - 2001 Dept of Intensive Care Medicine, Nepean Hospital, University of Sydney, New South Wales Australia
6. **"Cloud" Health-Care Workers**
   Robert J. Sherertz, Stefano Bassetti, Barbara Bassetti-Wyss 2001 Wake Forest University School of Medicine, North Carolina, USA
7. **Significance of Airborne Transmission of Methicillin-Resistant Staphylococcus aureus in an Otolaryngology–Head and Neck Surgery Unit**
   Shiomori et al 2001 School of Medicine, Kitakyushu Japan
8. **Environmental reservoirs of methicillin-resistant Staphylococcus aureus in isolation rooms:**
9. **correlation with patient isolates and implications for hospital hygiene.**
   O'Neill E., Sexton T., Dillane T., Clarke P., O'Gara J., Smyth E., Humphreys H. Beaumont Hospital, Dublin 15th European Congress of Clinical Microbiology and Infectious Diseases Copenhagen April 2-5, 2005

Unpublished

1. **"Something in the Air"** – Dr Nigel Tomlinson NHS Estates– Royal Society, February 2008

Poster

2. **MRSA: understanding the aerobiological transmission of nosocomial infections.**
   Peder Bo Nielsen, MD, MSc, MRCPath. DipHIC: Presented at 32nd National Congress of Indian Association of Medical Microbiologist Oct 2008

In-vitro Testing

1. Medixair has been evaluated by a UKAS accredited microbiological laboratory. Three reports are available for review :

   a. **Antimicrobial Performance of the Medixair UVc Air Sterilisation Device - 2002**

Peer reviewed publications (up to 10) these will be the references for web users to access:

1. **A New Mobile Air Sterilisation Device Prevents the Airborne Spread of Methicillin-Resistant *Staphylococcus aureus***
   Peder Bo Nielsen, MD, MSc, MRCPath. DipHIC., Jayakeerthi S. Rangaiah, MBBS MD

   Abstract
   The present study is the first sequential clinical trial testing the effect of ultraviolet light against MRSA in a clinical setting. The study demonstrated Medixair's effectiveness in reducing MRSA contamination from the environment and also its ability to protect patients even when MRSA was present in the immediate vicinity.
   The UVC device has only one function: to deliver clean sterilised air. In this study it has resulted in a remarkable reduction in MRSA contamination and colonisation which can only be explained by interruption of the airborne transmission of MRSA. In other words, this study confirms the conclusion of previous studies that the airborne route of transmission plays an important role in the spread of MRSA.

2. ***Clostridium difficile* Aerobiology and nosocomial transmission**
   Peder Bo Nielsen MD MSc, MRCPath. DipHIC

   Presented at 32nd National Congress of Indian Association of Medical Microbiologist Oct 2008

   Abstract
   Clostridium spores survive for a long in the environment. However, they may also become airborne and transported by the wind over a kilometre in distance. This is the lessons from biological warfare and laboratory accidents. It would be reasonable to conclude that *Clostridium difficile* spores have the same ability and therefore also have an airborne mode of transmission.

   The general professional understanding is that direct and indirect contact is responsible for colonisation of patients and contamination of the environment.

   The present study compares two time periods. One, where the air is actively sterilised and one without. The air sterilisation unit has only one function viz. to sterilise air. It does not protect against direct contact transmission or contaminated hands. Its function is solely directed against bacteria and spores that become airborne and subsequently pass through the air sterilisation unit.

   The study results support the hypothesis that airborne transmission may play a role in cross-infections and colonisation of patients, and also contamination of environment with Clostridium difficile.

This report is offered in comparison with the national statistical report on Clostridium difficile infection issued by the Department of Health on 23rd October 2008 which reports a drop of 21% in Q2:2008 compared with the average for 2007/8

Supplier Information

Statement (50 words)

Link to the company website

The product is distributed in the UK by:

GE Healthcare, Clinical Systems (UK) Ltd

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Karina Ridgewell
or
Ben Green

The product is designed and manufactured in the UK by;

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Position: Managing Director Date: 28th Jan 2009