

The megabattle against the superbug

With deaths from hospital superbugs still hitting the headlines, the healthcare industry is keen to find new ways to counteract this potentially deadly disease.

Nosocomial infections, defined as an infection acquired in hospital and not present or incubating at the time of admission, are a major challenge for modern medicine.

The methicillin-resistant staphylococcus aureus (MRSA) is a particular

problem in intensive care units (ICU) where patients may have deep wounds, catheters or drips.

High mortality, prolonged hospital stays, increased work load for hospital staff and increased cost of patient care are all consequences of such infections.

Last year the National Audit Office (NAO) in the UK estimated that infections acquired by patients while they were in hospital could be killing up to 5,000 people a year. The NAO added that altogether 100,000 people could contract infections - costing Britain's National Health Service £1 billion a year.

In October last year BBC News reported the case of a Plymouth man who died after contracting a superbug after being admitted to hospital for emergency heart surgery. His widow claimed that hygiene was poor in intensive care and took her case to the Health Service Ombudsman.

The ombudsman concluded that doctors could spread the MRSA bug by using the same stethoscope as they moved from patient to patient, although the widow was told the case was not suitable for further investigation.

Latest research from the UK shows that ionising machines may help reduce the risk of patients picking up an infection while in hospital.

Researchers from Leeds University found the use of ionisers had a signifi-

cant impact in cutting the number of infections caused by a potentially dangerous bacterium called acinetobacter. This bug has been responsible for increasing numbers of sometimes fatal infections among hospital patients.

The bug is found naturally in the environment and while it poses no real threat to healthy humans, when the body's defences are weakened it can cause serious infections, such as pneumonia and septicaemia.

St James University Hospital in Leeds was having recurrent problems with acinetobacter infections in its ICU.

During a year-long trial, researchers from the aerobiological research group in the university monitored the normal situation in the unit. They took samples from surfaces, patients and from the air to monitor bacteria levels and logged the number of patient infections.

During the second half of the trial the ionisers were switched on - and infections due to acinetobacter reduced dramatically.

Lead researcher Dr Clive Beggs said: "This is the first epidemiological study of its kind into the use of ionisers in hospital wards and the initial results are very promising.

"We believe that the negative air ions are removing the bacteria from the air, so stopping the transmission of infection. Our tests have focused solely on acinetobacter but it's possible the



Battle stations: MRSA is proving to be one of the greatest challenges for modern medicine.

ionisers may have had an effect on other airborne bacteria."

Lead consultant at St James ICU Dr Stephen Dean said: "We wanted to be involved in the trial as infections are a major issue for units such as ours, where many patients are already very vulnerable. The results have been fantastic - so much so that we asked the university to leave the ionisers with us."

Lead clinical microbiologist on the project Dr Kevin Kerr said: "Acinetobacter infections are very difficult to treat as the bacterium is resistant to nearly all antibiotics, so prevention of these infections is of key importance."

"Ionisers may become a powerful weapon in the fight against hospital-acquired infection."

And in December last year British-based company Medipure claimed it had developed an extra-strong disinfectant which could help hospitals beat superbugs. The company says its sterilising liquid can kill E.coli, salmonella and tuberculosis bacterium.

Jim Daly, a chemist and chemical engineer who is leading the research into the super disinfectant, said the liquid could have many uses.

He said: "It is a very powerful disinfectant which is capable of killing anthrax and is very useful for sterilising surgical instruments. And MRSA would be killed by this technology."

Dr Daly and Medipure have been awarded £112,000 for research by Nesta, the National Endowment for Science, Technology and the Arts.

The company is developing a washer-disinfector device to clean endoscopes using the technology; a product could be available as early as next month. And clues to the way MRSA grows on medical equipment may lead to more effective methods to combat the bacteria.

A team from Exeter

University in the UK has examined how the MRSA bacteria build up on silastic rubber, the main component of catheters. They found that the bacteria join forces to form a coating known as a biofilm that is very difficult to remove unless a combination of heavy duty antibiotics is used.

MRSA bacteria have an in-built genetic resistance to most antibiotics but can usually be controlled with one or two modern antibiotics such as vancomycin and rifampicin.

However the formation of a biofilm on catheters or prosthetic joints provides the bacteria with extra protection, both from these last-resort drugs and the body's immune system.

Lead researcher Dr Steven Jones, now based at Cardiff University, said: "We've noticed that MRSA biofilms were only killed when vancomycin and rifampicin were used in combination."

"This strategy was effective at rapidly decreasing biofilm coverage and thickness over a 48-hour period."

Dr Jones said the use of either of the antibiotics could also be effective - but only if they were administered at an early enough stage.

He said: "This suggests that antibiotics should be given directly after surgery before a biofilm can become properly established."

A new product unveiled at Arab Health 2003 was the MedicCleanAir Filter System which has been designed to combat the problem of airborne infections.

Managing director of the Belgium-based company Hendrik van Passel said: "One out of four patients in ICUs gets infected with nosocomial infections. Sixty per cent of these 25 per cent get an airborne infection and 50 per cent of that 60 per cent will die as a result of this."

"Increasing air pollution combined with the rising number of patients with immune system deficiencies

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has become a serious problem. There is a huge price to pay for airborne infections, both in terms of human life and financial costs.

"Consequently there is a need to ensure the air in the hospital environment - in all parts of the facility - is of the highest possible quality."

He added airborne infections were an increasingly important factor in the growing problem of hospital acquired infections. Reasons for this included the fact that air was being transported from the outside into the hospital and frequent and increasing movement inside the hospital.

His company claims that the revolutionary MedicCleanAir Pro has been proven to reduce airborne infections by more than 70 per cent.

A study carried out between 2000 and 2001 in the Haematology department of an Italian hospital by Mattell, Mordini, Lonigro et al concluded that the use of MedicClean Air devices for air filtration was able to dramatically reduce the incidence of Invasive Aspergillosis (IA).

The study concluded that use of this product could save an "overall expense of more than 161,000 Euros a year" and added "such an approach appears to be easily feasible even in poor economic countries".

And another study at the University Hospital of Antwerp concluded that use of the MedicCleanAir system caused a significant decrease of the Aspergillus spore concentration.

Hendrik Van Passel said: "We have devised a very good efficient filter backed up by scientific studies."

Also at the exhibition was English-based company Pall Mall with its range of cleansing and sterilisation products. The Pall LaparoShield minimises patient and staff exposure to potentially harmful surgical smoke and its disposable water filter system offers



The stethoscope – guilty of carrying MRSA from patient to patient.

reliable protection for high risk patients and effective protection against water-borne contamination.

Alessandro Da Pieve of Pall Medical UAE said: "The water filtration system has a very good record in Europe and so we decided to introduce it to the Middle East."

British company Kimal was also showing off its products

at Arab Health. International manager Brian Deane, based in Dubai, said: "Our coated catheter is certainly the most effective product around. We are finding there is concern in the Middle East about combating the superbug and sales of our products are growing."

Jack Eichner from US-based Herman Miller added

that hospitals had a "big problem" with infections and a lot of hospitals wanted to be accredited by the Joint Commission of Healthcare Organisations (JCAHO.) This is a voluntary organisation which develops standards for hospitals and currently accredits around 19,500 healthcare organisations throughout the USA.

What is methicillin-resistant staphylococcus aureus (MRSA)?

A bacterial infection which is resistant to the antibiotic methicillin.

What are its symptoms?

MRSA produces symptoms no different from any other type of Staphylococcus aureus bacteria. The skin will appear red and inflamed around the wound. Symptoms in serious cases may include fever, lethargy and headache. MRSA can cause urinary tract infections, pneumonia, toxic shock syndrome and even death.

Who is susceptible to MRSA infections?

It can spread among patients who are usually very ill with immune systems which cannot fight off the infection.

How is it spread?

Usually in hospitals on people's hands. Healthcare workers' hands may become contaminated by contact with patients or surfaces in the workplace and medical devices that are contaminated with body fluids containing MRSA.

How can it be prevented?

By standard infection control precautions including hand washing; wearing gloves and masks and gowns; appropriate cleaning, disinfection and sterilisation of patient care equipment.