Could copper pyjamas stop you getting a hospital superbug?

By: Pat Hagan
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The birth of her first son Alfie in September 2012 should have brought nothing but joy to Gemma Wilby.

Instead, it left the 30-year-old barmaid from Caterham in Surrey fighting a life-threatening infection as the wound from her emergency Caesarean became infected with the drug-resistant superbug MRSA.

Even though she was given the most powerful antibiotics available, underwent surgery to remove the infected tissue and even had maggot therapy (where the disinfected fly larvae are used to clean the wound), six weeks later nothing had improved.

Her doctors said it was one of the worst cases of MRSA infection they had ever seen.
'I thought I was going to die,' recalls Gemma, who lives with her partner and Alfie's father Mark Minick, a 32-year-old chef.

'I was really scared. I was in so much pain and so feverish I couldn't even cuddle Alfie. I felt like a freak, and the wound was so badly infected you could smell it several feet away.'

Yet just six weeks later the infection had completely healed. As unlikely as it sounds, Gemma insists that the solution was a pair of pyjamas she bought for £49.99.

The pyjamas were made from fabric with fine strands of copper running through it.

Copper has a long history as an anti-bacterial agent. In 2,500BC, copper salts were used as wound dressings by the Ancient Egyptians. Roman and Greek sailors used to place a copper coin in their drinking water to prevent it fouling during long voyages.
But it is only in the past ten to 15 years, with the rise of drug-resistant superbugs, that copper's antimicrobial properties have attracted renewed attention. There have since been dozens of studies highlighting the extraordinary power of copper to destroy potentially lethal organisms such as MRSA, E.coli and Clostridium difficile.

When these bacteria come into contact with copper surfaces, they rapidly self-destruct. It is thought that copper effectively punches holes in the outer membrane of bacteria, viruses and fungi in such a way that the cells implode. This makes it very unlikely that superbugs will learn to become resistant to the treatment.

'When bugs come into contact with a copper surface, they are like a boat that has sprung a leak - the copper floods in and engulfs the organism,' says Professor Bill Keevil, a microbiologist and director of the environmental healthcare unit at Southampton University.

Professor Keevil's experiments show that when bugs encounter a copper surface, they are killed off in under 90 minutes. His team placed ten million bacteria on a square centimetre of stainless steel (used for door handles, taps and other fittings in most hospitals), and on pure copper.

The results, published in the Journal of Hospital Infection in 2008, showed bacteria survived on the stainless steel for several days. But within 90 minutes, there was no trace of them on the copper.

Last year, a study by scientists at the Medical University of South Carolina reported that MRSA infection rates among intensive care patients were more than halved if copper alloy surfaces replaced steel or plastic ones. Another study found that spraying steel fittings with a copper coating virtually eradicated bugs.

In the NHS, copper's use has been confined to a handful of hospitals taking part in bug-busting trials - yet these studies all found that copper led to a dramatic reduction in bacteria on surfaces.

At the moment, most NHS trusts try to combat superbugs through strict hygiene, mainly involving alcohol-based gels for hands, and chlorine products, such as bleach, for sterilising surfaces.

But evidence suggests chlorine provides only short-lived sterility, and corrodes surfaces, allowing bugs to 'hide' in grooves and cracks. Meanwhile, repeated contact with alcohol-based hand gels can lead to dry and cracked skin.
Leading microbiologists confess they are baffled and frustrated by the NHS's failure to use copper.

'It's a great shame because the science is absolutely solid,' says Dr Vanya Gant, consultant in microbiology and infection at University College London Hospital.

Five years ago, Dr. Gant and his colleagues helped to develop a range of gels and handwashes made from liquid copper to tackle hospital superbugs. The rationale was that although copper surfaces work well, they still have to be kept scrupulously clean to kill bacteria - and once a layer of residue builds up, perhaps from alcohol gels used by staff, the copper becomes less effective.

'We took copper and enhanced its antibacterial capacity in liquid form by over a thousand times,' says Dr. Gant. 'In trials we took four wards and cleaned them either as normal, using chlorine or detergent, or with copper solution - and found a significant reduction in all known bacteria by cleaning with liquid copper.'

Dr. Gant then joined forces with a company called Micron Clean to develop microfibre cleaning cloths pre-loaded with copper solution.

But the NHS trusts they approached preferred to stick with conventional cleaning methods.

'So we gave up,' says Dr. Gant. 'I am not a businessman.'

When it comes to copper surfaces, hospitals often cite expense as a reason not to replace existing fittings, says Dr. Tony Worthington, a microbiologist at Aston University in Birmingham.

Stainless steel currently trades for between £1,800 and £2,400 a tonne, while copper fetches nearly £4,500. But as Dr Worthington points out: 'We've got stainless steel which doesn't work and copper which does. It's a no-brainer.'

The costs of installing copper in hospital wards could be recouped within two months, due to fewer infections and patients leaving hospital sooner, according to a report in June 2013 by the York Health Economics Consortium, which is part of York University. They looked at installing copper in an intensive care unit on surfaces such as bedrails and chairs. But can copper fabrics have the same benefits?
'Yes,' says Professor Keevil. 'When bacteria come into contact with copper in the clothing, it kills them.' Tests suggest that washing the fabric at any temperature doesn't weaken its effect.

'Copper fabrics are now being looked at for wound healing,' adds Professor Keevil. 'Copper stimulates several enzymes that promote healing. It has great potential for things such as diabetic ulcers that won't heal.'

Gemma Wilby found her copper pyjamas through a friend who works for the supplier Copper Clothing. Within days of her Caesarean at Croydon University Hospital, it was clear her wound was infected. Two weeks later Gemma was discharged, on high-dose antibiotics, as it was thought she would do better at home.

However, her GP sent her back for urgent hospital treatment. Under general anaesthetic, she was given a 'debridement', where rotting flesh is removed. But they couldn't remove all the affected tissue and, as a last resort, Gemma was given maggot therapy. Usually the maggots live for about five days: Gemma's wound was so toxic, they died within a day. In desperation, after a month on antibiotics she turned to the copper pyjamas, which are made from 40 per cent copper-infused yarn and a fabric derived from bamboo.

Gemma wore the pyjamas virtually round the clock, and after two weeks she noticed that the wound was gradually shrinking.

'I was very cynical about them at the beginning, and the infection control nurses who came to my house warned it could take a year for the wound to heal properly.

'They were amazed at the speed of my recovery. After a few weeks, when there was no longer any sign of infection, they thought they must have made a mistake.'

Croydon University Hospital is now carrying out experiments with copper clothing for staff and bedding for maternity patients.

Experts agree that copper fabrics won't help most healthy people. But it may be worth investing in them if you need surgery and fear picking up a hospital infection.