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Yaso Shan examines current issues surrounding MRSA infection and advocates alternative ways of tackling the problem

Using herbal supplements to fight MRSA

Methicillin-resistant *Staphylococcus aureus* or MRSA infection is currently a major cause for concern throughout the UK. Figures from the ONS (Office for National Statistics) showed that the number of death certificates implicating MRSA rose from 487 in 1999 to 955 in 2003 (Womack 2005). Death rates were highest among the over-85s, who are more susceptible to infection, with twice as many men than women dying; 16.3 per million of the male population in 2003 compared to 8.5 per million of the female population. The National Audit Office (NAO) has estimated that healthcare-acquired infection rates, including MRSA, were as high as 5,000 a year in England and Wales (Womack 2005).

Fears over being targeted for criminal liability (BBC News, May 2005), particularly in fatal cases, makes the MRSA issue a highly controversial one and a priority for action in terms of the implementation of stringent hygiene practices within the NHS and all private healthcare services through education, training and dissemination of accurate information. The latest RCN guidelines (RCN 2005) emphasise 'prevention and control measures'. MRSA policies based on these revised guidelines focus on hygiene practices including hand hygiene, initial risk assessment, screening,

procedures for isolation, treatment options and education and training (Wilcox 2005).

There is also a community strain of the MRSA, called Community MRSA or C-MRSA, which has been confirmed in England and Wales over the past three years and which many of us may be harbouring without any observable clinical features (Health Protection Agency 2005). This strain has been found in previously healthy individuals who have no recognised risk factors associated with MRSA (for example, no previous hospitalisation, surgical procedures or prolonged antibiotic treatment). The Health Protection Agency has identified approximately 100 cases of C-MRSA over the last three years (HPA 2005). C-MRSA is genetically distinct from the strains prevalent in hospitals, and can cause infections in young people with no connection to healthcare environments (Penn 2005).

C-MRSA is not just a national problem; it has been described in several well-defined populations such as children, prisoners, Alaskan natives, Native Americans, Pacific Islanders, athletes and military personnel (Weber 2005). More epidemiological studies are needed into this problem and although there is still much to learn about C-MRSA, the Health Protection Agency requests

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- healthcare staff to be vigilant and to report any suspected clinical manifestations of MRSA infections, particularly in children and young adults (Wilcox 2005).
- The true community strain appears to be more sensitive to antibiotic treatments such as vancomycin, rifampicin, gentamicin and linezolid. This is good news, particularly in light of recent reports of new mutated strains of MRSA becoming increasingly resistant to vancomycin, the only effective antibiotic treatment that can currently be used against healthcare-acquired MRSA. Vancomycin-resistant *Staphylococcus aureus* or VRSA has already acquired resistance to a drug that is considered 'last-line of defence' in the fight against MRSA. Moreover, the UK has also seen several cases of GISA (glycopeptide-intermediate *Staphylococcus aureus*), a kind of intermediary between MRSA and VRSA that has now developed a resistance to the vancomycin family of antibiotics (BBC News, February 2005).

Impact on patients

The cost implications for community care in patients who have been infected by MRSA infections have a knock-on effect on resources in general within community nursing. The effects of MRSA on a patient include loss of earnings, pain, scarring, anxiety, depression, loss of self-esteem, stigma, reduced quality of life and morbidity. The psychological effects may be profound and will inevitably have a long-lasting impact in some patients. Community nurses must then deal with some of the prolonged effects that MRSA infection has on some individuals.

The demographic changes relating to the ageing populations in Western nations mean that the incidence of MRSA will continue to rise due to the increased susceptibility of older people to infections owing to their weakened immunity compared to the younger population. Moreover, older people spend longer periods in hospital, increasing their exposure to MRSA (Makoni 2002).

Cause and effect

MRSA is a mutated version of the ordinary *Staphylococcus aureus* bacterium that normally resides in our bodies as part of our natural (microbial) fauna and to some extent conferring protection against a host of common pathogens. Prescription patterns have created an over-reliance on antibiotics with an inevitable consequence of creating drug resistance within ordinary microbes (Department of Health 2003). According to the

Darwinist evolution theory, all microbes possess the remarkable capacity to mutate and to transfer drug resistance to other strains as a means of survival. Further, strains that manage to carry two or three 'resistance genes' have extraordinary powers of resistance to antibiotics, hence the birth of bacterial 'superbugs'. The recent identification of these 'resistance genes' is an important step in attempting to curb the alarming increase in MRSA cases (Hiramatsu et al 2004, Holden 2005).

Another theory into the aetiology of MRSA makes an association with the emergence of highly contagious clones (Enright 2005). Two particular strains, clones 15 and 16 are thought to be more transmissible than the others and account for 96 per cent of MRSA bloodstream infections in the UK (BBC News, 24 Feb 2005), enabling them to spread from patient to patient, or via hospital staff or equipment. One of the reasons that MRSA thrives in a healthcare environment may be the fact that many different strains are being thrown together with so many doses of antibiotics, vastly accelerating the natural selection process. Experts have so far uncovered 17 strains of MRSA with differing degrees of immunity to the effects of various antibiotics (BBC News, 24 Feb 2005).

Natural immune boosters

Much is dependent on the general health status of the patient prior to any acute treatment but equally, in 'healthy' individuals, their ability to counteract the C-MRSA may be critical in preventing the spread of MRSA or indeed the spread of mutated infections and the transfer of drug-resistant genes between hospitals and the wider community. In addition to a healthy, balanced diet plus an appropriate lifestyle that includes adequate exercise and measures to combat the stress effects of modern living, the following herbs may be taken as appropriate supplementation to boost general immunity in preparation for a planned hospital visit:

Astragalus (*Astragalus membranaceus*) is a herb native to China where it is grown commercially. It is a powerful immunostimulant with many studies confirming its immune-boosting, antiviral, antibacterial and tonic properties. The herb shows great promise in restoring T-cell function in cancer patients and in preventing the growth of cancerous cells (White and Foster 2000). It is available in tablet and capsule form.

Siberian ginseng (*Eleutherococcus senticosus*) is another potent immune booster. It increases the number of T-helper cells and is useful in viral

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Further reading

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infections, but it also increases the efficacy of some antibiotics. In addition, it helps to reduce the harmful effects of free radicals. It is thought to prevent immune suppression that is associated with strenuous exercise, particularly in trained athletes thereby enabling the body to recover quicker from infections acquired through weakened immune responses. It is sold in convenient tablet and capsule form (Mills and Bone 2000).

Echinacea (*Echinacea purpurea*) is popular in herbal medicine and is ostensibly used to boost immunity and fight infection. It is thought to do this by stimulating the T-killer cells and the macrophages of the immune system. It also increases the production of interferon, an important part of the body's response to viral infections. It too is sold in convenient tablet and capsule form (Mills and Bone 2000).

Goldenseal (*Hydrastis canadensis*) contains high levels of berberine, one of nature's most potent antimicrobial agents. Berberine is an alkaloid which has been extensively studied within pharmacology, both in experimental and clinical settings, because of this property. Berberine is considered to possess broad-spectrum antibiotic activity and has shown antibiotic activity against a host of pathogens including the *Staphylococcus* bacteria (Murray 1995). Moreover, this herb is also anti-infective and immuno-stimulating thus supporting its historical use in infections of the mucous membranes such as the linings of the oral cavity, throat, sinuses, bronchi, GU tract and GI tract. It is available in tablet and capsule form.

Allicin is the main antibacterial agent isolated from garlic (*Allium sativum*), a powerful and natural antibacterial herb. Recent research on allicin has shown that it can be used effectively in treating patients with MRSA-infected wounds within weeks (Cutler and Wilson 2004). Developments into new treatments to prevent MRSA infection have resulted in trials using a nasal cream, oral capsules and soaps that have proved effective against both MRSA and GISA. Additionally, several NHS hospitals in London and the South East are currently participating in a major clinical trial involving around 200 volunteers including healthcare workers and patients. The trial intends to examine the efficacy of these allicin preparations in combating MRSA and some of the initial findings in volunteers have already been published. In one study patients had reported an improvement in their condition after two to six weeks of treatment with resolution of their infection in three to four months (Cutler et al 2005).

Conclusions

Current anxieties and future uncertainties regarding MRSA are driven by the similarities in increased mortality rates with the number of reported cases of MRSA infections. This has been compounded by recent reports that a new strain of *Clostridium difficile* could result in a similar 'superbug' crisis with older patients being more at risk. With a strong possibility of MRSA being resistant to all known antibiotics appearing imminently on the horizon, the prospect looks distinctly bleak. However, there is a concerted effort being made at all levels of preventative medicine, clinical care, hygiene practices, education and training to ensure and give the confidence that the problem is very much under control and being competently addressed.

Boosting the immune system naturally prior to entering hospitals, combined with other practices, appears to be a safe and positive way in limiting the impact of infection. Patients can help themselves by taking herbal supplements prior to acute episodes of care to ensure that their immunity offers maximum resistance to such infections. This would also optimise the function of their immune responses to all other pathogens by boosting non-specific resistance.

I would strongly recommend that herbal supplements that naturally boost the immune system be made available on NHS prescription as part of the pre-hospital preparation and planned patient episodes. This would go hand-in-hand with the campaigns currently being waged on healthcare associated infections and would benefit the patients in the long-term. Rather than the NHS spending millions on cleaning agents after the event, surely it would be better invested in boosting patients' immunity as a wider and more effective strategy within preventative medicine?

Moreover, there should be real investment in new drug development supported by government funding in addition to initial findings of research into herbal extracts and natural alternatives. This would show great promise in the race to combat this growing and immediate problem within hospitals and the wider community ■

Yaso Shan MNIMH is a Consultant Medical Herbalist and can be contacted at the Brackenbury Natural Health Clinic (www.brackenburyclinic.co.uk) on 0208 741 9264 or visit www.centellaherbal.co.uk for more information on herbal medicine