The effectiveness of such treatment tended to decrease with time even in the short-term follow-up of 98 days despite addition of maintenance therapy with azathioprine. The long-term effectiveness, avoidance of colectomy and side-effects need to be ascertained by following up the patients included in this study. The various limitations notwithstanding, the current study generated the much needed evidence for rescue medical therapies in patients with severe acute UC refractory to i.v. steroids.

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Preventing infection in the intensive care unit: Targeted or universal decolonization

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SUMMARY

This study—the Randomized Evaluation of Decolonization versus Universal Clearance to Eliminate Methicillin Resistant *Staphylococcus aureus* (REDUCE MRSA)—a pragmatic, cluster-randomized trial of 74 256 patients, compared three strategies to prevent MRSA clinical isolates and infections in 74 adult intensive care units (ICUs) in the USA. In group 1 (screening and isolation), MRSA screening of the nares was performed on admission to ICU and, if positive, contact precautions were implemented. In group 2 (targeted decolonization), in addition to contact precaution, patients who had colonization or infection with MRSA underwent daily bathing with chlorhexidine-impregnated clothes and were given intranasal mupirocin twice-daily for 5 days. In group 3 (universal decolonization), no MRSA screening was done and all patients were given intranasal mupirocin for 5 days and daily bathing with chlorhexidine-impregnated clothes.

For the primary outcome of ICU-attributable MRSA-positive clinical cultures, when compared with the baseline period (12 months), the modelled hazard ratios for MRSA clinical isolates during the intervention period (18 months) was 0.92 for group 1 (crude rate 3.4 isolates per 1000 days during the baseline period *v.* 3.2 isolates per 1000 days during the intervention period), 0.75 for group 2 (4.3 *v.* 3.2 isolates per 1000 days) and 0.63 for group 3 (3.4 *v.* 2.1 isolates per 1000 days). For the secondary outcomes, ICU-attributable bloodstream infections caused by MRSA and ICU-attributable infections caused by any pathogen, targeted or universal decolonization did not significantly impact MRSA bloodstream infections, although a significant reduction in bloodstream infections by any pathogen was demonstrated with both universal and targeted decolonization. The number needed to treat with decolonization to prevent one MRSA-positive clinical culture was 181 and for bloodstream infection by any pathogen it was 54. Adverse effects with chlorhexidine were mild and occurred in only 7 patients.

COMMENT

Healthcare-associated or hospital-acquired infections are not uncommon. They contribute to increased healthcare cost and result in morbidity and mortality. Nosocomial infections are associated with a higher mortality, not only in acute care and long-

term care units,[1] but also in ICUs where an increased risk of death has been observed with ventilator-associated pneumonia,[2–4] bloodstream infections[3] and catheter-associated urinary tract infections.[3] These nosocomial infections, often due to drug-resistant bacteria, also impact hospital stay and cost.[5,6] It is, therefore, appropriate that strategies to reduce hospital-acquired infections should be explored in order to improve outcome.

There has been recent interest in the transmission dynamics of infections between patients, healthcare workers and the environment, particularly with reference to MRSA.[7,8] The focus on MRSA has largely been due to it being the most common aetiological agent of ventilator-associated pneumonia and surgical-site infection and the second most common cause of catheter-associated bloodstream infections in developed countries.[9] Thus, strategies have focused on either horizontal interventions or vertical interventions or a combination of both.[10] Vertical interventions involve active detection and isolation, are usually pathogen-focused, involve specific screening tests and result in reduction in colonization and/or infection with the specific pathogen.[10] A horizontal strategy, that uses interventions such as hand hygiene, chlorhexidine bathing and care bundles, on the other hand, is universally applied and uses interventions that are effective in controlling all pathogens transmitted by the same mechanism.[10]

Over the past decade, there has been an increased emphasis on the importance of simple strategies such as hand hygiene in the control of spread of infections. However, the impact of this strategy on hospital-acquired MRSA infection is debatable with many studies suggesting that MRSA infection rates have remained unchanged despite improved hand hygiene compliance.[11,12] Nevertheless, this simple practice is considered one of the most important infection control measures. 'Bundled care' incorporating several components that include hand hygiene, contact precautions, nasal surveillance for MRSA, control of specific classes of antibiotics, etc. have shown a significant reduction in healthcare-associated MRSA infections.[12,13] Although such bundled care is predominantly a vertical strategy for control of hospital infection, measures such as hand hygiene and antibiotic stewardship are more universal strategies.

In the REDUCE MRSA trial, the authors set out to assess the impact of universal decolonization using chlorhexidine bathing and nasal mupirocin. They showed not only a significant reduction in ICU-attributable MRSA-positive clinical cultures, but also a significant reduction in ICU-attributable bloodstream infections caused by any pathogen. The concept of decolonization or decontamination is not new with selective digestive decontamination (SGD) and selective oropharyngeal decontamination (SOD) being used as strategies to reduce nosocomial infections.[14,15] These decolonization and decontamination techniques certainly seem to have impacted nosocomial infections. However, concerns have been raised as to whether these interventions—some of which use antibacterial agents and antibiotics—increase the incidence of drug resistance.[10,16] Recent evidence from meta-analyses seems to suggest that SGD and SOD do not favour the development of antimicrobial resistance in pathogens in patients in the ICU.[14] However, this aspect needs to be assessed for patients treated with universal decontamination with nasal mupirocin and chlorhexidine baths.

The applicability of this study by Huang et al. to the Indian and Southeast Asian context merits discussion. Unlike many ICUs in western countries where MRSA is the most important aetiological agent for hospital-acquired infections,[9] in the Indian subcontinent,

at many centres, the burden of MRSA infection is relatively low and largely overshadowed by that of resistant Gram-negative organisms. The reason for this difference in the aetiology of nosocomial infections is unclear. In a randomized trial comparing two suctioning strategies in mechanically ventilated patients in southern India, <10% of the isolates in those with ventilator-associated pneumonia were due to Gram-positive organisms.[17] In a study from Singapore on ICU-acquired infections, Staphylococcus aureus accounted for only 16.4% of the isolates.[18] In Malaysia, in a report on nosocomial device-associated bacteraemia in three adult ICUs, bacteraemia occurred in 10.7% (23 of 215) patients.[19] Of these, only 3 isolates (13%) were MRSA.[19] In another study of MRSA transmission in a medical ICU in India, only 72 MRSA infections were observed over a 50-month period;[8] of these, 56 (78%) were classified as nosocomial. During that 50-month period, there were 2926 admissions (personal data). Assuming an average length of stay of 7 days, the crude number of ICU-acquired MRSA infections is 2.73 events per 1000 ICU days. The average prevalence of MRSA in the medical ICU during the study was 2.1%.[8]

In the light of the above observations, how do we approach the control of hospital-acquired MRSA infection? Screening for MRSA and isolation, which is currently practised, should be replaced by 'a bundled approach' that could incorporate more cost-effective universal decontamination coupled with hand hygiene and antibiotic stewardship. This would not only reduce the burden of MRSA infections but also that of other pathogens. Such a universal approach is particularly important in India where nosocomial infections due to other Gram-negative, drug-resistant bacteria are probably equally or more important than MRSA.

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Oxygen saturation targets in extremely premature neonates

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