

### Reply to Deeny et al

TO THE EDITOR—We thank Deeny et al [1] for pointing out several differences between the 2 mathematical models [2, 3] that describe the spread of mupirocin-resistant strains in hospitals. We think that the key difference between the 2 models is the single admission reproduction number ( $R_A$ ) of methicillin-resistant *Staphylococcus aureus* (MRSA), which is defined as the average number of secondary cases caused by a colonized patient during a single admission [4]. In hospitals with appropriate hygiene, the per admission number is well below 1, for example, see Cooper et al [4]. In our study [3] we used an  $R_A$  value of 0.52. Deeny et al [2] estimated a daily probability of cross-transmission per source of 0.0106 for mupirocin-susceptible strains in intensive care units (ICUs); this may be biased as only wards with at least 2 patients identified with MRSA were included in the estimation procedure. If the ward size is  $N$  and a colonized patient stays an average of  $d$  days on the ward, the single admission reproduction number will be approximately  $R_A = 0.0106 \times d \times (N - 1)$ . In Deeny et al's study [2], the average length of stay for ICUs ranged from 3

to 27 and the effective ward size ranged from 3 to 21. The estimates of  $R_A$  ranged from 0.06 to 2.8, and in only 3 of the 7 ICUs was the  $R_A$  value below 1. Even if mupirocin-resistant strains are a factor 2.16 less transmissible [2], the  $R_A$  value for mupirocin-resistant strains is above 1 in one of their ICUs. Naturally, there will be spread of MRSA in such settings, and mupirocin-resistant strains will get a selective advantage due to the use of mupirocin, which will be larger with universal use compared with targeted use of mupirocin. This difference in  $R_A$  explains the difference in results between the 2 models. In our model, we focused on universal mupirocin use for surgical prophylaxis, in which most patients will not enter an ICU. In ICU settings, the focus of Deeny et al [2], bacteria are more likely to have higher cross-transmission rates due to differences in patient characteristics, higher contact rates, longer lengths of stay, and higher

readmission rates. We fully agree with Deeny et al [2] and with Calfee [5] that universal use of mupirocin should not be recommended in settings in which the level of hygiene is not sufficient to prevent ongoing transmission. On the other hand, evidence of an increase of mupirocin-resistant isolates is much more likely a marker of poor hygiene (facilitating cross-transmission) than the creation of new mupirocin-resistance due to horizontal gene transfer.

# Note

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