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Paper:

Friedmann, Y., Gravenor, M., Bodger, O. & Temple, M. (2012). Impact of hand washing on bacteraemia rates. *BMJ*, 344(jun25 2), e4299-e4299.

<http://dx.doi.org/10.1136/bmj.e4299>

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LETTERS

CLEANYOURHANDS CAMPAIGN

Impact of hand washing on bacteraemia rates

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Stone and colleagues' results are consistent with mathematical models of hospital transmission of meticillin resistant *Staphylococcus aureus* (MRSA).¹ This can be shown using Cooper and colleagues' model, whereby transmission within hospital is described by an effective contact rate parameter between susceptible and infectious people. Improved hygiene conditions reduce the probability that contact between people results in transmission, thereby reducing this contact rate.

The figure² shows the typical relation between prevalence and the contact parameter for the long term system behaviour. The model predicts that the prevalence of MRSA is extremely sensitive to small changes in the contact rate, suggesting that comparatively small reductions in transmission, through programmes such as hand hygiene, can have a considerable impact on overall bacteraemia rates.

The observed delay in the efficacy of the intervention is not readily explained by the long term behaviour of the model alone, because the relation between reduction in transmission and equilibrium prevalence is roughly linear (for the parameters of

relevance here). The delay could simply be due to the transition time from one endemic equilibrium to another. Simulations show that this depends on the initial conditions (how close to equilibrium the system was before the intervention) and the magnitude of changes in the effective contact rate; however, delays of many months or several years, as seen in the study, can result from a range of reasonable scenarios, without changes in compliance during this time.

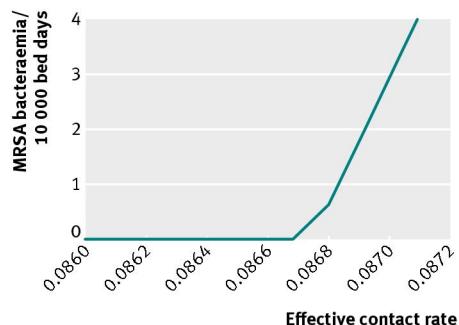
Competing interests: None declared.

- 1 Stone SP, Fuller C, Savage J, Cookson B, Hayward A, Cooper B, et al. Evaluation of the national Cleanyourhands campaign to reduce *Staphylococcus aureus* bacteraemia and *Clostridium difficile* infection in hospitals in England and Wales by improved hand hygiene: four year, prospective, ecological, interrupted time series study. *BMJ* 2012;344:e3005. (3 May.)
- 2 Cooper BS, Medley GF, Stone SP, Kibbler CC, Cookson BD, Roberts JA, et al. Methicillin-resistant *Staphylococcus aureus* in hospitals and the community: stealth dynamics and control catastrophes. *Proc Natl Acad Sci U S A* 2004;101:10223-8.

Cite this as: *BMJ* 2012;344:e4299

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Figure



Example of relation between prevalence and effective contact rate using basic framework,² modified to describe frequency dependent transmission in hospital. Parameters chosen reflect typical UK hospital size and typical basic reproduction number (R_0)