SUPPLEMENTARY MATERIAL

**Deducing the basic reproduction number**

From the original system of equations we have:

 (A-1)

Linearising system (A-1) around the trivial solution, that is, , we have:

 (A-2)

where the lower case letter represent proportions. System (A1) can then be re-written as:

 (A-3)

Now, making the determinant of the matrix  (*J* is the Jacobian matrix associate with system (A3) and I is the identity matrix), it is possible to calculate the associated eigenvalues . If the real parts of the eigenvalues are negative, the trivial equilibrium is stable, otherwise the equilibrium is unstable and the infection can invade the host population. For this it suffices that:

 (A-4)

The left-hand side of equation (A-4) is the so called Basic Reproduction Number, normally denoted , as in equation (6) of the main text.

**Sensitivity Analysis**

To estimate the sensitivity of a model variable in steady state, , to a parameter , we consider the relative variation in the parameter, . This variation will correspond to a variation  in the model variable  given by Massad et al.1:



Hence, the sensitivity of the total prevalence of colonized patients,, to, say the contact rate  is given by:



In the table below we show the percentual variation in the total prevalence of colonized patients due to a 1% variation in each of the model's parameters

|  |  |  |
| --- | --- | --- |
| Table A1: Result of the sensitivity analysis. Percentual variation in the total prevalence of colonized patients due to a 1% increasing in each of the model's parameters | | |
| Symbol | Parameter | Percentual variation in |
| λ1 | Admission rate of uncolonized patients | - 0.022% |
| λ2 + λ3 | Admission rate of colonized patients | - 0.022% |
| µ1 | Discharge rate of uncolonized patients | - 0.03% |
| µ2 + µ3 | Discharge rate of colonized patients | - 0.07% |
| *a* | Per capita contact rate (number of contacts between patients and HCW per patient per HCW per day | 0.91% |
| *b* | Probability of a patient becoming colonized after having contact with a colonized HCW | 0.04% |
| *q* | Compliance of HCW with contact precautions | 0.00% |
| *c*2 | Probability of a HCW becoming colonized after having contact with a colonized patient without adhering to contact precautions | 0.01% |
| *c*3 | Probability of a HCW becoming colonized after having contact with a colonized patient while adhering to contact precautions | -0.02% |
| ρ | Compliance of HCW with hand hygiene | - 0.12% |
| σ | Rate of opportunities of hand hygiene by HCW | - 0.08% |

It can be noted from the table that the parameter the model is most sensitive to in the contact rate between patients and the staff, followed by the compliance with hand hygiene.

**Reference**

1. Massad E, Behrens BC, Coutinho FAB, et al. Cost risk benefit analysis to support chemoprophylaxis policy for travellers to malaria endemic countries. *Malaria Journal* 2011; 10:130-138.