WP4 Model Implementation Wrapper Functions

1. Wrapper for overall function

currentVE = estimate_current_efficacy (VE0, decay_rate, time_since_vaccination, efficacy_type)

Inputs

VE0 = Peak starting efficacy against symptomatic disease
decay_rate = decay rate (in days) of the neutralising antibodies
time_since_vaccination = number of days since vaccine was administered
efficacy_type = an integer value from 1-5, where
1=transmission, 2=infection, 3= symptoms, 4= severe disease, 5=death

Outputs

currentVE = the current calculated vaccine efficacy for this efficacy type

Implementation

This function will use the helper functions described in section two. Pseudocode for the function is:

```
currentVE = estimate_current_efficacy (VE0, decay_rate,
                          time_since_vaccination, efficacy_type)
{
   init_neut = get_neut_from_efficacy(VE0, efficacy_type)
   current_neut = get_neut_over_time(init_neut, decay_rate,
                                time_since_vaccination)
   currentVE = get_efficacy_from_neut(current_neut, efficacy_type)
}
```

2. Wrappers for helper functions

neut = get_neut_from_efficacy(VE, efficacy_type)

Inputs

VE = current vaccine efficacy (for the particular efficacy type)
efficacy_type = an integer value from 1-5 (as described above)

Outputs

neut = the neutralising antibody level that corresponds to this efficacy

Implementation - This function will use the lookup table

VE = get_efficacy_from_neut(neut, efficacy_type)

Inputs

neut = current neutralising antibody levels
efficacy_type = an integer value from 1-5 (as described above)

Outputs

VE = the vaccine efficacy for this efficacy_type that corresponds to these neutralising antibody levels

Implementation - This function will use the lookup table

current_neut = get_neut_over_time(starting_neut, decay_rate, time)

Inputs

starting_neut = starting neutralising antibody levels (probably at time of vaccination)
decay_rate = decay rate (in days) of the neutralising antibodies
time = time elapsed since starting neuts (probably time since vaccination)

Outputs

current_neut = the neutralising antibody level that corresponds to this efficacy

Implementation - This function will require basic exponential decay