Generalized S-I-R model

1 Equations

These are the equations for the model:

$$\frac{dS}{dt} = -\mu S + \omega_1 R_1 + \omega_2 R_2 + \omega_3 R_3 - \delta_1 - \delta_2 - \delta_3$$

$$\frac{dE_1}{dt} = -\nu_1 E_1 + \Lambda S + \delta_1 + \Lambda R_1$$

$$\frac{dE_2}{dt} = -\nu_2 E_2 + \Lambda S + \delta_2 + \Lambda R_2$$

$$\frac{dE_3}{dt} = -\nu_3 E_3 + \Lambda S + \delta_3 + \Lambda R_3$$

$$\frac{dI_{pre1}}{dt} = -\gamma_1 I_{pre1} + \nu_1 E_1$$

$$\frac{dI_{pre2}}{dt} = -\gamma_2 I_{pre2} + \nu_2 E_2$$

$$\frac{dI_{pre3}}{dt} = -\gamma_3 I_{pre3} + \nu_3 E_3$$

$$\frac{dI_{symps1}}{dt} = -\gamma_1 I_{symps1} + \gamma_1 I_{pre1}$$

$$\frac{dI_{symps2}}{dt} = -\gamma_2 I_{symps2} + \gamma_2 I_{pre2}$$

$$\frac{dI_{symps3}}{dt} = -\gamma_3 I_{symps3} + \gamma_3 I_{pre3}$$

$$\frac{dI_{sympm1}}{dt} = -\gamma_1 I_{sympm1} + \gamma_1 I_{pre1}$$

$$\frac{dI_{sympm2}}{dt} = -\gamma_2 I_{sympm2} + \gamma_2 I_{pre2}$$

$$\frac{dI_{sympm3}}{dt} = -\gamma_3 I_{sympm3} + \gamma_3 I_{pre3}$$

$$\frac{dI_{asymp1}}{dt} = -\gamma_1 I_{asymp1} + \gamma_1 I_{pre1}$$

$$\frac{dI_{asymp2}}{dt} = -\gamma_2 I_{asymp2} + \gamma_2 I_{pre2}$$

$$\frac{dI_{asymp3}}{dt} = -\gamma_3 I_{asymp3} + \gamma_3 I_{pre3}$$

$$\frac{dHOSP_{m1}}{dt} = -\theta_1 HOSP_{m1} + \gamma_1 I_{sympm1}$$

$$\frac{dHOSP_{m2}}{dt} = -\theta_2 HOSP_{m2} + \gamma_2 I_{sympm2}$$

$$\frac{dHOSP_{m3}}{dt} = -\theta_3 HOSP_{m3} + \gamma_3 I_{sympm3}$$

$$\frac{dHOSP_{s1}}{dt} = -\theta_1 HOSP_{s1} + \gamma_1 I_{symps1}$$

$$\frac{dHOSP_{s2}}{dt} = -\theta_2 HOSP_{s2} + \gamma_2 I_{symps2}$$

$$\frac{dHOSP_{s3}}{dt} = -\theta_3 HOSP_{s3} + \gamma_3 I_{symps3}$$

$$\frac{dR_1}{dt} = -\omega_1 R_1 + \gamma_1 I_{symps1} + \gamma_1 I_{sympm1} + \gamma_1 I_{asymp1} + \theta_1 HOSP_{m1} + \theta_1 HOSP_{s1} - \Lambda_1 R_1 - \delta_1$$

$$\frac{dR_2}{dt} = -\omega_2 R_2 + \gamma_2 I_{symps2} + \gamma_2 I_{sympm2} + \gamma_2 I_{asymp2} + \theta_2 HOSP_{m2} + \theta_2 HOSP_{s2} - \Lambda_2 R_2 - \delta_2$$

$$\frac{dR_3}{dt} = -\omega_3 R_3 + \gamma_3 I_{symps3} + \gamma_3 I_{sympm3} + \gamma_3 I_{asymp3} + \theta_3 HOSP_{m3} + \theta_3 HOSP_{s3} - \Lambda_3 R_3 - \delta_3$$