Trimethoprim treatment; removes sensitive strains

Transmission; sensitive strains transmit faster than resistant strains

Clearance; removes all strains

$$X = 1 - (S + R + S_r + R_s)$$
$$\lambda_S = \beta(S + S_r)$$
$$\lambda_R = (1 - c)\beta(R + R_s)$$
$$\tau(t) = p_{UTI} \cdot p_{treat} \cdot p_{trim}(t) \cdot \tau$$

$$\frac{dS}{dt} = \lambda_S X - \lambda_R S - (\mu + \tau(t))S$$
$$\frac{dR}{dt} = \lambda_R X - \lambda_S R + \tau(t)(S_r + R_s) - \mu R$$
$$\frac{dS_r}{dt} = \lambda_R S - (\mu + \tau(t))S_r$$
$$\frac{dR_s}{dt} = \lambda_S R - (\mu + \tau(t))R_s$$