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Optimal spraying strategies for controlling re-infestation by Chagas disease vectors

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Chagas disease is a major health problem in rural South and Central America where an estimated 8 to 11 million people are infected. It is a vector-borne disease caused by the parasite *Trypanosoma cruzi*, which is transmitted to humans mainly through the bite of insect vectors from several species of so-called "kissing bugs."

One of the control measures to reduce the spread of the disease is insecticide spraying of housing units to prevent infestation by the vectors. However, re-infestation of units by vectors has been shown to occur as early as four to six months after insecticide-based control interventions.

I will present ordinary differential equation models of type SIRS with imperfect treatment that shed light on long-term cost-effectiveness of certain strategies for controlling re-infestation by vectors. The results show that an initially very high spraying rate may push the system into a region of the state space with low endemic levels of infestation that can be maintained in the long run at relatively moderate cost.