Simulation of a Contact Virus in Rectangular Rooms With Different Shapes and Constant Area

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This study presents a computer simulation of a contact virus being spread by carriers in rectangular rooms with different width-to-length shapes. The simulated scenario is one where a predetermined number of individuals travel randomly within a room at a constant speed. One of the carriers is an asymptomatic carrier, which upon contact with other individuals, transmits the pathogen. The simulation continues until all individuals are infected. If a simulated room changed in geometry while having the same area (m^2) then, in a wider room it would take less time for a subject to be infected because, subjects would be closer to each other since their vertical movement was limited. The simulation is coded in C++ and the visualization calls the Simple Direct Media Layer 2 library. Three rooms with a constant area of 250,000 square units are considered. All individuals travel randomly at a constant velocity following Euclidian distances. The dependent variable considered is the number of steps it took for all subjects to get infected in each type of room. The independent variables are the room shape (500 × 500, 250 ×1000 and 100 × 2500) and number of individuals. The results showed that the infection rate in the square shaped room (500 × 500) was faster in terms of steps. Therefore, the hypothesis was not supported. As the rooms got less symmetrical, the infection rate was slower. A potential application of this study is in the design of hospital waiting rooms. Future work could modify the simulation to consider different virus spread mechanisms and more realistic human travel patterns.

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