**Multiscale Modeling of Surgical Flow in a Large Operating Room Suite: Understanding the Mechanism of Accumulation of Delays in Clinical Practice**

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**keywords:** Surgery, Multiscale Modeling, Agent-based Model, Operating Room Management

**Abstract:**

 Improving operating room management in large hospitals has been a challenging problem that remains largely unresolved. Fifty percent of hospital income depends on Operating Rooms (OR) activities and among the main concerns in most institutions is to improve efficiency of a large OR suite that. We advocate that optimizing surgical flow in large OR suites is a complex multifactorial problem with an underlying multiscale structure. Numerous components of the system can combine nonlinearly result in the large accumulated delays observed in daily clinical practice. We propose a multiscale agent-based model of surgical flow. We developed a smartOR system that utilizes a dedicated network of non-invasive, wireless sensors to automatically track the state of the OR and accurately computes major indicators of performances such as turnover time between procedures. We show that our model can fit these time measurements and that a multiscale description of the system is possible. We will discuss how this model can be used to quantify and target the main limiting factors in optimizing OR suite efficiency.

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