Company News Feature

Source: Wikimedia Commons and undefined

# INNOVATIVE SCHEDULING MODEL RAISES PRODUCTIVITY

**Elizabeth Hofheinz, M.P.H., M.Ed. • Mon, December 10th, 2018** **Print this article**

Researchers from the University of Miami (UM) have developed a peer-reviewed model that, they say, addresses all outpatient scheduling issues at once.

Their work, "Multimodularity in the Stochastic Appointment Scheduling Problem with Discrete Arrival Epochs," has been accepted for publication in *Management Science*.

Regarding appointment scheduling, co-author Christos Zacharias, Ph.D., assistant professor of Management Science at the University of Miami Business School, told *OTW*, "Increased variability stemming from all sources (e.g., emergency walk-ins, consultation times, no-shows) is associated with worsened operational outcomes, as measured by a weighted sum of the typical performance measures—waiting time, overtime and idleness."

"As the operational environment becomes more and more stochastic, it becomes harder to strike the right balance between efficient resource utilization and short waiting times."

"In the presence of variability, eliminating idle time and containing waiting times are conflicting goals. Our model is versatile and can capture the relative importance between these goals. As waiting time weighs more in our scheduling decisions, we might have to compromise patient throughput and/or idle time/overtime. We recommend that practitioners try different configurations and pick the one that strikes the right balance between their operational goals."

Co-author Tallys Yunes, Ph.D., associate professor of Management Science at the University of Miami Business School, told *OTW*,"We found that in a highly stochastic environment, optimal schedules tend to be front-loaded and with the last slot empty in order to hedge against probable patient no-shows and/or overtime workload."

"Our model, by properly balancing the involved trade-offs, can provide precise scheduling guidelines tailored to stochastic clinical environments. On a broader level, we demonstrate that outpatient clinics should take into consideration all sources of variability in their scheduling decisions and take measures to contain this variability in order to better achieve their operational goals."

"For example, our analysis indicates that, even in an ideal scenario where the no-show rate is zero and there are no walk-ins, outpatient clinics might have to sacrifice some of their patient throughput in order to handle service time variability and its impact on waiting times and overtime workload."

"Most schedulers book appointments according to a slot-based system (e.g., one appointment slot equals 30 minutes). Typically, this slot duration is equal to the expected consultation time. However, in practice there is variability in consultation times due to patient heterogeneity and other factors."

"Is there a significant benefit in refining the timescale of a slot's duration? We studied the impact of different timescales on the system's overall performance. We found that outpatient clinics can benefit from a more refined timescale in their scheduling decisions by improving their daily patient flow."

"In particular, when the appointment duration time is divided into multiples of 5-minute increments (e.g., 5 minutes, 10 minutes, 15 minutes). We have found that a more refined timescale can reduce waiting times and/or achieve a higher patient throughput in optimality by having the flexibility to strategically fit extra patients into the schedule. Achieving these benefits, however, is dependent on patient adherence to the schedule."

"It is often optimal to overbook certain parts of the schedule in order to address variability and its impact on the clinic's productivity. Overbooking can be done in two informed ways: by double-booking certain slots or by separating consecutive patients' appointment times by less than the average consultation time. The former type of overbooking should mainly be used earlier in the day, whereas the latter can be spread out later, throughout the day."

Asked about an application to orthopedics, the professors advised, “We used their mathematical/computer models in a UM-affiliated urology clinic. However, the model can be applied to any type of outpatient clinic, including an orthopedic one; the staff would just need access to their historical data in order to do so.”