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References


To the Editor:—In a recent article1 describing their computer analysis of various operating room (OR) scheduling algorithms, Dexter et al. provided important additional insights into this vexing problem. I have questions regarding some of their assumptions and methods.

The duration of each simulated add-on case was generated by sampling from a log-normal probability distribution that fit the historical data for each OR suite. Each case thus selected was not then subjected to a second simulation designed to cause duration to vary around the result of the first selection according to the known probability distribution of the durations of individual add-on cases. This adjustment is necessary if the simulation is to mirror the true occurrence of individual variance because that variance is not revealed to the Monte Carlo simulation by the statistic describing the overall add-on case duration, as described in the Methods section. Omitting the case-duration variance as applied to the simulations could have an important impact on the results. The authors provide no data to justify the omission.

This impact may have been mitigated by the method used to gather data needed to generate the probability distribution of the “open time available for add-on cases in each OR,” although this is not made clear in the article. Were the open times taken from daily, projected next-day schedules available at the official cutoff time on the scheduling day? Or were they taken from the actual recorded open time available for each OR after the scheduled operations were completed and before handling of known add-ons was commenced on the day scheduled? If the latter, intuitively, the simulation results would be significantly more dependent on the probability distribution of the individual add-on case durations. Even in the former case, the effect on the results may be large. The authors touch on this issue only briefly in their discussion when, in another context, they state correctly, “The mean time to complete a series of consecutive cases approximately equals the sum of the mean times to complete each of the consecutive cases.”

In either case, it would have been suitable and not complex to include the effect of variation in case duration as part of the simulation.

In calculating use, did the authors account for overtime caused by the use of “fuzzy constraints” by including additional time in the denominator? If so, was this time overweighted to effectively penalize the algorithm for extending the schedule past 5 pm?

Long turnover times were truncated at 1 h. Did the authors test the effect of a different maximum? It could be important in assessing the results. Some long OR turnover times result directly from unplanned adverse effects that the scheduling methods can have on the behaviors of the personnel. Analyzing the causes of long OR delays was beyond the scope of the study and, therefore, properly omitted. But longer intervals between cases will have a direct bearing on the results of the analysis, and it would be helpful to know their magnitude.

Finally, the pressing question is whether any of the algorithms were tested in those same OR suites to provide the needed confirmation of theory. The authors have not provided evidence that the “variable-sized bin packing” model, notwithstanding that the tested algorithms have been extensively evaluated for that model by management scientists, behaves sufficiently like the OR scheduling problem to impart confidence that their results are applicable to real problems in the absence of real world testing.

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Reference


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