



Better Management of ICU Beds



An article published in *Health Care Management Science* describes how a new mathematical simulation model can help an intensive care unit (ICU) manage bed occupancy more effectively. The new mathematical model makes it possible to predict ICU bed occupancy with more accuracy — compared to other methods previously used for this purpose — by providing for variability in terms of admissions and length of stays, according to the report.

The new method was developed by Dr. Julio Barado, a critical care specialist of the Intensive Care Service at the Hospital Complex of Navarre (Spain), as part of his PhD thesis read at the NUP/UPNA-Public University of Navarre.

ICUs are costly due to their technological and healthcare staffing requirements. “In Navarre the daily cost of an ICU bed is reckoned to be about 1,431 euros,” said Dr. Barado. “The recovery options for those patients needing to be admitted to an ICU are reduced, but they cannot recover unless there is a bed available for them.”

According to Dr. Barado, there are two sides to the problem about the choice of the number of beds in an ICU: on one hand, a high number of beds entails excessive expenditure; on the other hand, an insufficient number could cause a healthcare problem.

To find a solution to this problem, Dr. Barado has developed a mathematical simulation model to predict bed occupancy in the ICU-A section of the Hospital Complex of Navarre, based on admittance and length of stay data from 6,300 patients treated over a nine-year period in that unit.

When building this model, he noted, problems remaining in other simulation models were resolved, such as the adjusting of prolonged stays and, above all, the incorporation of medical decisions geared towards modifying the length of stay of certain patients.

These decisions are manifested in the reduction of the stay of some patients in the ICU when they have reached a level of recovery allowing them to continue their process in a regular hospital ward, because their beds are needed by other patients in a more serious state; whereas when occupancy is lower, the discharging of these patients would be delayed for a certain time.

“In this respect, the doctor acts simultaneously as a doctor and as the manager of a common resource which, on occasions, is in short supply,” explained Dr. Barado. “Incorporating this behaviour into a mathematical simulation model has been an unprecedented fact that has allowed the occupancy of ICU-A section beds at the

Hospital Complex of Navarre to be correctly represented.”

He says the methodology followed in this research can be adapted to other ICUs to make bed occupancy prognoses.

Source and image credit: [NUP/UPNA-Public University of Navarre](#)

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