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Preference-Based Allocation of Patients to Nursing Homes

Problem definition: In many countries, the rapid aging of the population leads to an additional burden on already stretched long-term care systems. This often manifests itself in excessive waiting times for long-term care centers, and to abandonments (e.g., patients passing away while they are waiting). In current practice, long waiting times are not only caused by a lack of the total available capacity. Personal preferences of patients, often related to geographical location, and system inflexibility greatly contribute to the current excessive waiting times. Although the OR community is explicitly called to develop models for effective health care waiting list management, to our knowledge this work is the first to introduce an allocation model for long-term care centers.
Methodology/results: We propose a model to allocate patients-in-need to nursing homes, incorporating the individual patients' preferences and levels of flexibility, with respect to geographical location and waiting time. We validate the model for a real life use case of allocating somatic patients to nursing homes in the Amsterdam area. We have found that by exploiting the heterogeneity of individual preferences, dramatic performance improvements can be realized: the allocation model can reduce the abandonment fraction in Amsterdam from 30.2% under the current policy to 7.9%, while the waiting time until placement and the time until preferred placement are reduced from 211 to 50 days, and from 232 to 177 days, respectively.
Managerial implications: The elderly care domain strongly benefits from the easy-to-implement allocation model by reduced waiting times and efficient bed use while patient preferences can be met simultaneously. This way, the model provides a powerful means to face the increasing need for patient-centered and sustainable long-term care solutions. Moreover, it reveals that coordination of patient allocation based on individual preferences is a crucial element in effective solutions for waiting list management.