Approach to clustering of clinical departments in large hospitals

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With rising healthcare costs, resources have to be used as efficiently as possible to maintain adequate patient care. In hospitals this holds especially true for the availability of beds for stationary patients. We propose a model where we cluster clinical departments to level out associated bed requirements over time, hereby incorporating seasonal effects of individual departments. This will reduce the probability of not being able to admit patients or having to search for available beds within other parts of the hospital as well as optimally allocate ward capacity to departments.

To optimally cluster departments we consider medical prerequisites as well as staffing constraints. Medically, certain combinations of departments will not be allowed. For example, immunocompromised and infectious patients should not be sharing the same ward as well as children should not be sharing wards with adults. In terms of staffing constraints, we consider additional qualification and controlling cost of nursing staff due to increased requirements for clusters with multiple departments. Furthermore, next to allocating adequate ward capacity to each cluster of clinical departments we also consider relative distances within clusters as well as absolute distances between clusters and relevant infrastructure. This assures both, minimal walking distance between patients for physicians as well as proximity to important cluster-specific facilities such as the OR or radiology department.