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POSTER ABSTRACT

Clusters of medical specialties around patients with multimorbidity – employing fuzzy c-means clustering to explore multidisciplinary collaboration.

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Background: The increasing prevalence of multimorbidity challenges hospital care organization. Hospital care is structured around medical specialties and focused on separate treatment of individual organ systems. Consequently, patients with multimorbidity visit multiple healthcare professionals and have high healthcare utilization with a risk of interactions and contradictory treatments if multidisciplinary coordination is absent. Organizational structures for multidisciplinary collaboration between medical specialists in case of multimorbidity are, however, limited. To facilitate multidisciplinary, coordinated care and to prevent or minimize adverse health outcomes, it might be useful to organize hospital care around specific patterns of multimorbidity or medical specialties. Therefore, we hypothesized that the use of cluster analysis and real clinical data could be helpful to unravel groups of medical specialties who are simultaneously involved in hospital care for patients with multimorbidity.

Method: We performed a cross-sectional cohort study and used retrospectively collected electronic health record (EHR) from a Dutch hospital in 2017. We extracted EHR data of 22,133 patients with multimorbidity aged ≥18 years who had received outpatient clinical care for two or more chronic and/ or oncological diagnosis. We used a fuzzy c-means clustering algorithm and explored the patients' membership degree factors to each cluster to distinguish subgroups of patients with a specific pattern of involved medical specialties.

Results: The mean age was 67.9 years (interquartile range (IQR):20.9), and 56.0% was female. We identified six clusters and 22 subgroups. The clusters were: 1. dermatology/ plastic surgery, 2. six specialties, 3. pulmonology, 4. internal medicine/ cardiology/ geriatrics, 5. neurology/ rehabilitation/ anesthesiology, and 6. internal medicine. Most patients had a full or dominant membership to one cluster only (11 subgroups) and the remaining subgroups were combinations

of two clusters. The prevalence of specific diagnosis groups, patient characteristics and healthcare utilization seemed to differ between subgroups. For instance, patients of the subgroup with high involvement of internal medicine, cardiology and geriatrics; was characterized by cardiometabolic diseases. These patients had the highest average age (median:73 years, IQR:16.2), number of diagnoses (median:5, IQR:3), and number of outpatient visits (median:7, IQR:6). Patients of the subgroup with involvement of both the cardiologist and pulmonologist had lower number of diagnoses (median:3, IQR:1) and outpatient visits (median: 5:, IQR:4). This subgroup was mostly characterized by pulmonary and heart diseases, which can both represent with symptoms as dyspnea. Thus, the subgroups and their characteristics can provide clues about potential target populations that might benefit from (more) multidisciplinary collaboration, such as a formalization of a cardiometabolic or dyspnea outpatient clinic.

Conclusion: Our study shows that it is possible to use fuzzy c-means cluster analysis and real clinical data to identify clinically relevant clusters and subgroups of medical specialties simultaneously involved in hospital care for patients with multimorbidity. With this strategy hospitals, healthcare professionals, and data scientists can further analyze which of these subgroups are target populations with multimorbidity that might benefit from improved multidisciplinary collaboration or new models of care.