EMIF Deliverable 2.4: Prediction model for cognitive decline

Executive summary

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Background: Understanding the drivers of heterogeneous progression in dementia has huge implications for recruitment to clinical trials and care planning. One way to investigate the factors contributing to this heterogeneity is to stratify subjects by similar patterns of change and compare the characteristics of the sub-populations identified. We applied this approach to routinely collected electronic health records from the South London and Maudsley NHS Foundation Trust (SLAM), a mental health services provider in South London.

Methods: This retrospective study selected patients using Mental Health of Older Adults (MHOA) services within SLAM between January 2007 and December 2014 where Mini-Mental State Examination (MMSE) scores were available for research through the SLAM case register interactive search system (CRIS). The total population was previously described (Stewart 2009). 3441 patients with at least three MMSE scores recorded and who were followed for a maximum of 5 years were included; without a specified time restriction over which these tests were administered. The study excluded subjects diagnosed with Parkinson's disease, Huntington's disease and Creutzfeldt-Jakob disease.

A Latent Class Growth Analysis was used to identify key trajectories of decline, based on MMSE. A number of variables were obtained to describe characteristics of the identified trajectory subpopulations in a multinomial logistic regression analysis. These included information on age, gender, ethnicity, age at leaving school, cohabiting status, retirement status, the twelve items of the Health of Nation Outcome Scales (HoNOS), and medications previously described as potential repurposed agents for dementia and prescribed within SLAM (Appleby et al 2013).

Results: We identified six trajectories of cognitive decline (Figure 1). Four of these trajectories differed in initial MMSE score, and showed increased rate of decline with lower initial MMSE. Two trajectories had very similar initial MMSE scores but differed in the rate of decline. Exploring differences between these two trajectories further, the HoNOS item for severity of cognitive problems at baseline and proportion of subjects prescribed either Donepezil or Amlodipine prescription were higher in the slower declining trajectory. In the faster declining trajectory, the HoNOS item for severity of behavioral disturbances and proportion of people prescribed sertraline were higher.

Conclusions: Most of the trajectories differed by initial MMSE and thus likely represented patients at different disease stages, however differences in behavioral disturbances, anti-hypertensive, antidepressant and dementia medication prescription may also be influencing future rate of decline. Further information is required on depression and hypertensive comorbidities to explore these findings in greater detail.

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