

Causes of Emergency Hospital Admissions in People Living with Dementia

Population-based retrospective cohort study from 2017-2024 in North West London

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BACKGROUND

People living with dementia (PLWD) make up 1.3% of the population but 17% of unplanned hospitalisations¹.

PLWD experience frequent emergency admissions and poor post-discharge outcomes, however the causes and risk factors influencing them remain poorly understood.

Here we investigated the causes and consequences of emergency admissions in PLWD to inform targeted prevention and improve care planning.

METHODS

This is a retrospective cohort study using primary and secondary care electronic health records (EHRs) from 2017-2024 in the Discover-NOW Dataset² in North West London. Causes of admission were categorised using the Clinical Classifications Software Refined (CCSR) definitions.

Emergency admissions were propensity-matched 1:1 between PLWD and non-dementia controls. The first matching included age, sex, deprivation, ethnicity, and electronic frailty (EFI); the second also added cause of admission.

We estimated effects of dementia and demographic determinants on admission risk and bed days. A multi-state model was used to investigate impact of dementia on post-discharge outcomes.

RESULTS

52% of emergency bed days in dementia from infections and injury

Among 109,504 emergency admissions in PLWD over eight years, 966,565 bed days were recorded (Fig 1a-b).

On average, this equated to 120,821 bed days over 13,688 unplanned admissions annually; 25% higher than in controls over the same number of admissions.

Infections accounted for 37% of PLWD bed days, 9% higher than in controls. This effect was driven by admission frequency and length of stay. The second greatest cause of bed days in PLWD was injuries (15%).

North West London (Fig 1c) has ~2992 beds, just under 1.1 million annual bed-days³. In other words, PLWD occupy over 1 in 10 total available emergency beds, or 1 in 6 of those occupied by patients aged 50 and over.

Figure 1. Causes of emergency admissions in people living with dementia and matched controls

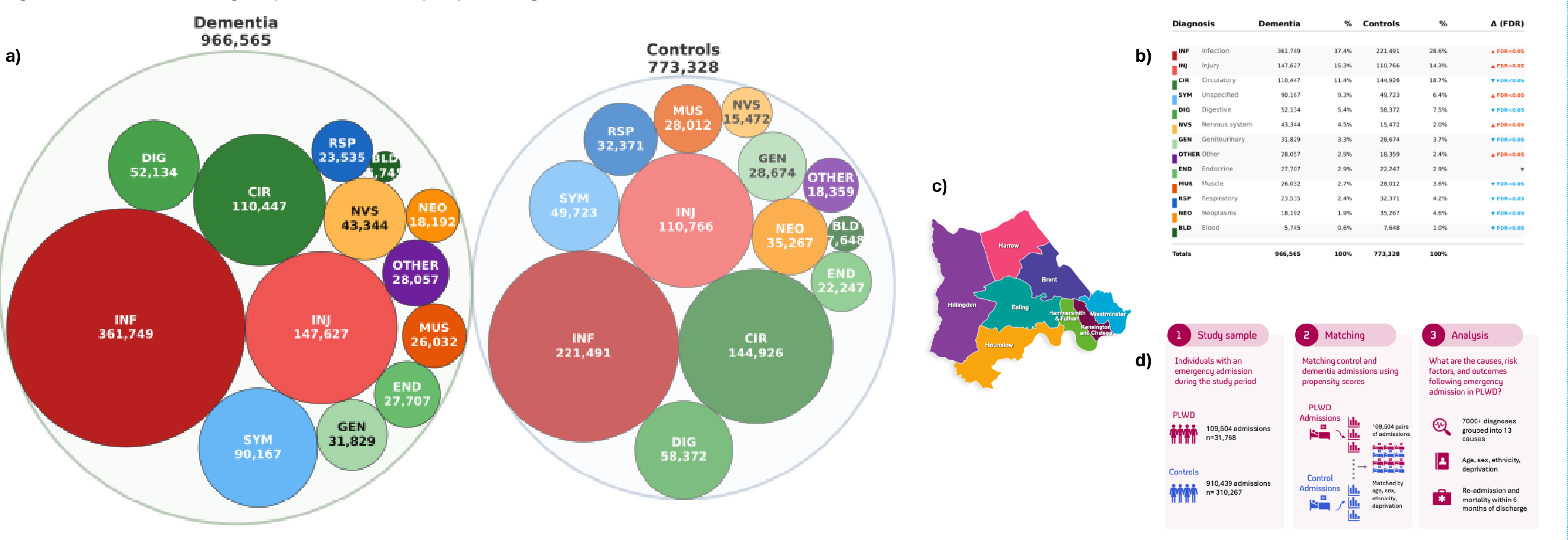


Figure 1a) Total bed days observed in dementia vs controls over the same number of matched admissions (109,504) from 2017-2024. Coloured circles depict relative proportion of bed days in each group attributed to 13 primary causes of admission. For abbreviations, please see Figure 1b. **b) Counts and proportions of bed days by primary cause**, with G-test results showing frequencies across causes in dementia compared to controls. P-values are FDR-adjusted. **c-d) Data coverage and methods.** Data were extracted from the De-identified Whole Systems Integrated Care (WSIC) Dataset², covering 2.8 million individuals across eight boroughs in the North West London Integrated Care System (NWL ICS). From the total eligible sample of 1.1 million aged 50 and over, we identified 109K admissions in people with dementia and 910K in controls. Admissions were propensity-matched 1:1.

Socioeconomic and ethnic disparities

There was a step-wise effect of deprivation in the total (unmatched) population, where more deprived individuals had significantly higher risk of admission (Fig 2a). Black, Asian, and Mixed individuals had greater risk of admissions than white individuals.

In the admitted and matched sample, dementia significantly influenced frequency of admission (Fig 2b) and length of stay (Fig 2c). Deprived individuals had more admissions, but minoritised ethnic individuals did not have more admissions than white individuals.

Examining effects of ethnicity on cause-specific bed day rates, white individuals had the highest overall bed day rates, with the lowest rates observed in Mixed and Asian individuals (Fig 2d). Black PLWD and controls recorded the lowest bed days due to infections and injuries.

Figure 2. Impact of demographic determinants on outcomes

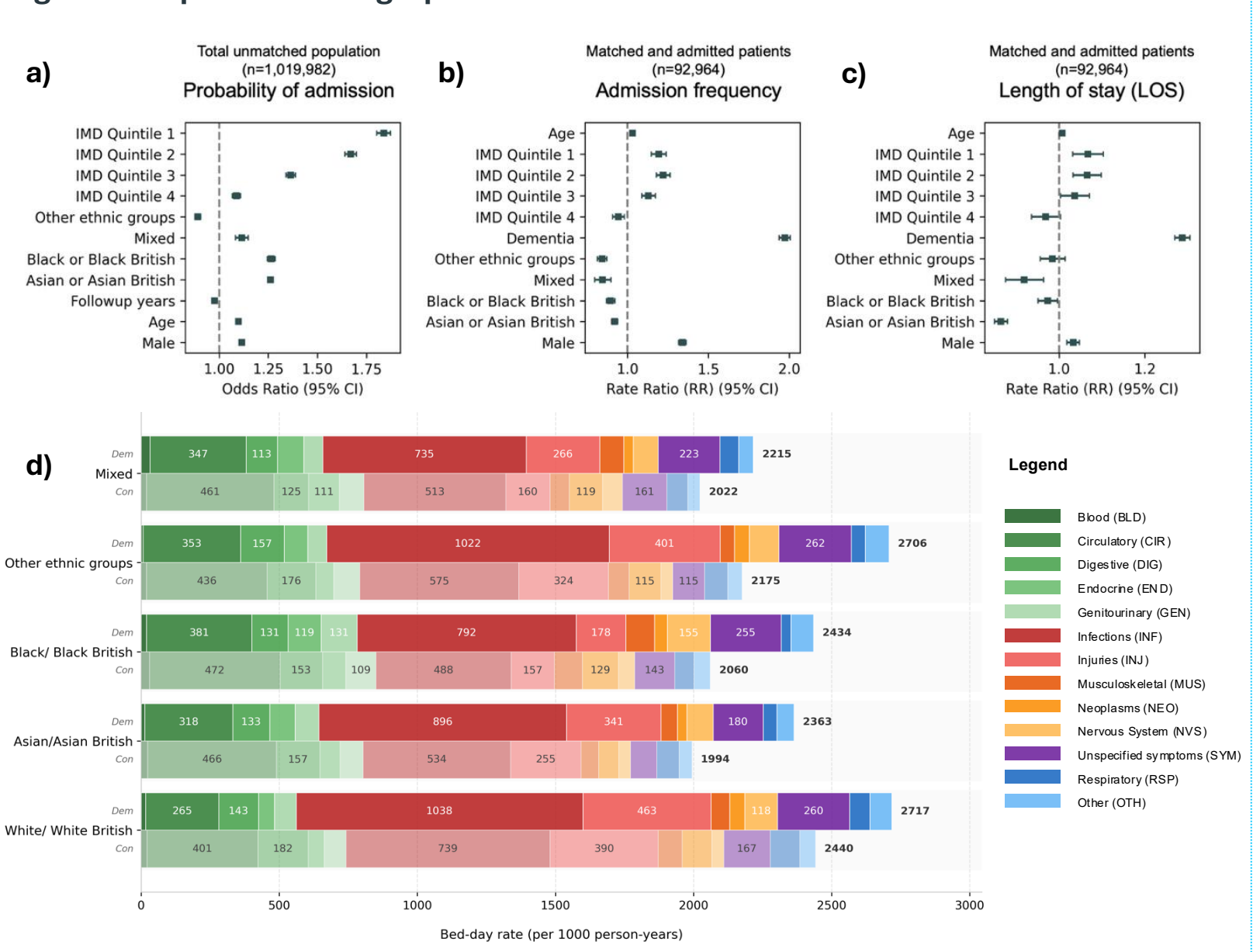


Figure 2a) Risk of admission in the total eligible, unmatched sample of individuals aged 50+. **b-c) Admission frequency/length of stay** in the matched sample of admitted individuals with/without dementia. Referents used: Q5 (least deprived), white, female; age and follow-up years were fitted as continuous variables. **d) Bed day rate by ethnicity and cause of admission.** Paired bars depict PLWD (top) and matched controls (bottom).

Infections drive differences in post-discharge trajectories in dementia

Post-discharge trajectories at 1, 3, and 6 months were examined using a three-state framework, with the three states as follows: Home (Alive and out of hospital), readmission (in-hospital after discharge), and death.

Across all causes of admission, PLWD spent less time alive and out of hospital and had higher death probabilities than matched controls (Fig 3).

Infection-related admissions showed the greatest post-discharge divergence between PLWD and controls. Difference in the at home state widened from -5.5% at 30 days to -8.8% at 180. For the death state, this widened from +5.1% at 30 days to +8.8% at 180.

Re-admission state differences were smaller than the home and death states, indicating that the divergence in post-discharge state trajectories between PLWD and controls was driven primarily by differences in mortality.

Figure 3. Observed post-discharge state occupation differences by primary cause of index admission

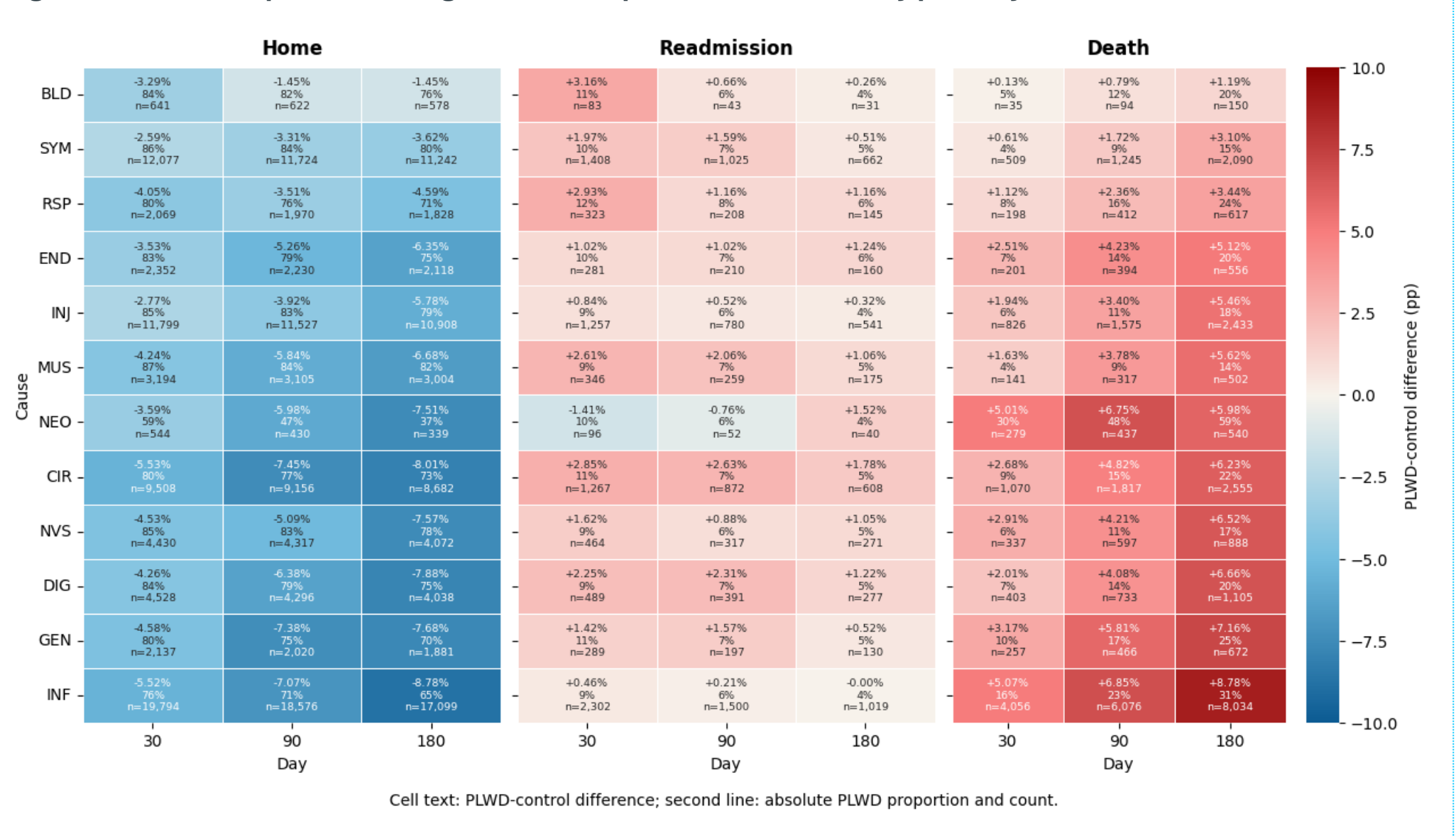


Figure 3. Heatmap showing absolute differences in observed state occupation probabilities between people living with dementia and matched controls, calculated as dementia minus control and expressed in percentage points. State occupation probabilities were calculated at daily resolution from interval-level trajectories and are reported at 30, 90 and 180 days after discharge. Negative values indicate lower probability among people living with dementia, while positive values indicate higher probability. Rows are ordered by the 180-day death difference.

TAKE HOME MESSAGE: >50% of emergency admissions in diagnosed PLWD are due to potentially preventable infections and injuries; socioeconomically deprived individuals are disproportionately vulnerable.

REFERENCES

¹Alzheimer's Society (2021). Dementia UK: Update, 2nd edition. London: Alzheimer's Society.
²Bottie A, Cohen C, Lucas A, Saravanakumar K, Ul-Haq Z, Smith W, et al. How an electronic health record became a real-world research resource: comparison between London's Whole Systems Integrated Care database and the Clinical Practice Research Datalink. BMC Med Inform Decis Mak. 2020 Apr 20;20(1):71.
³Healthwatch Ealing, Winter Pressures: Acute & general bed occupancy in North West London [Internet]. London: Healthwatch Ealing; 7 April 2017. Cited 3 Dec 2025. Available from: https://nds.healthwatch.co.uk/sites/default/files/reports_library/20170407_Ealing_-_NW_London_Hospital_Winter_Pressures_Summary_RHD.pdf

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