

“Time toxicity” in poor prognosis cancer patients: A reproducible measure of care quality using routine health data

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Introduction

- Time is of paramount importance to people with poor prognosis cancer (PPC), whether receiving palliative anti-cancer treatment or Best Supportive Care (BSC).
- In this context, time spent in hospital is a potential source of ‘time toxicity’ if it does not add value to care based on what matters most to the person.
- An objective measure of good quality palliative care, with which to assess variation, has remained elusive.
- The proportion of remaining life spent as an inpatient (**%TimeIP**) could be explored as a metric reflecting the burden of hospitalisation and thus, potentially, allow commentary on the quality of certain aspects of this population's care experience.

Aims

- To analyse regional variation in the %TimeIP among patients with PPC who received BSC or palliative treatment across the four South East Scotland Cancer Network (SCAN) Health Boards, with a view to developing a quality metric to assess inequalities of care among diverse patient groups.

Methods

Study design: Retrospective cohort study.

Study population:

- Patients with lung cancer and upper gastrointestinal cancer diagnosed between 2015 and 2021, who met a ‘PPC’ definition at diagnosis, lived in the SCAN region, and died by 31 December 2022.

Definition of ‘Poor Prognosis Cancer’:

- Stage 4 disease (M1) at diagnosis, or received cancer treatment with palliative intent, or did not receive cancer treatment (either surgery, radiotherapy, chemotherapy, other therapy)

Outcome: The proportion of remaining life spent as an inpatient (%TimeIP)

Data sources: Regional Electronic Health Records data from the Scottish Cancer Registry, inpatient data, data on postcodes to derive the Scottish Index of Multiple Deprivation (SIMD), laboratory data to derive the Scottish Inflammatory Prognostic Score (SIPS), and treatment data.

Data linkage and analysis: Performed within NHS Lothian which hosts the regional cancer centre for the SCAN region.

Statistical analysis:

- To estimate the effect of Health Board (Fife, Lothian, Dumfries and Galloway [D&G], or Borders) on the %TimeIP, a generalised linear model with a quasi-binomial family and a logit link was fitted.
- The model was adjusted for the age at diagnosis, sex, deprivation (SIMD), inflammatory load (SIPS), pre-diagnosis length of stay, and tumour type.
- Estimated marginal means with 95% confidence intervals (95% CI) were produced to compare the predicted mean %TimeIP of each Health Board with the regional average.
- This analysis was replicated in the treated and BSC subgroups, and in overall observed survival (OS) subgroups (<3 months and ≥ 3 months).

Results

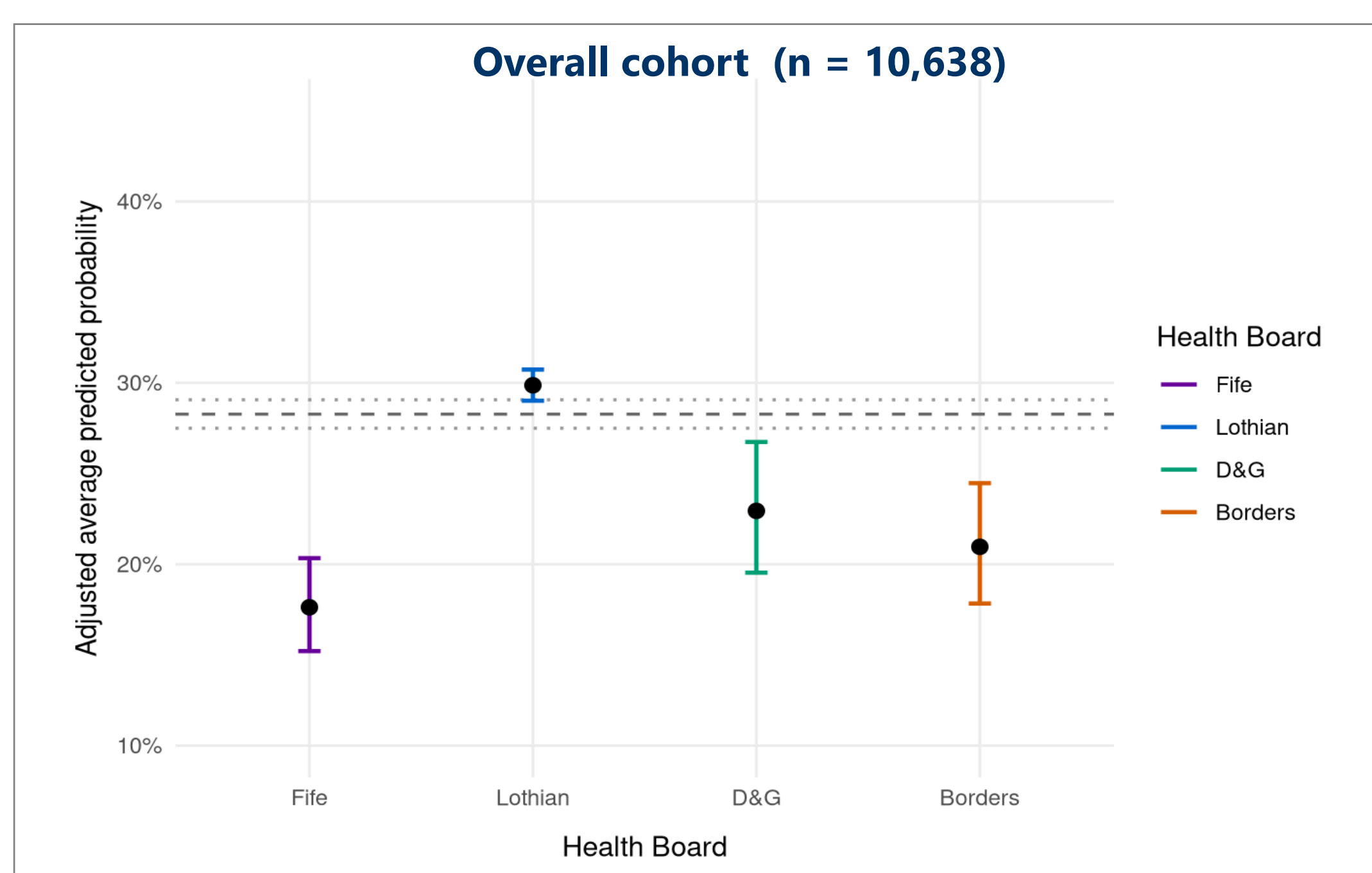


Figure 1 – Regional variation in %TimeIP in the SCAN region

- Overall, Lothian had the highest adjusted mean %TimeIP (29.9%, CI: 29.0–30.7), slightly above the regional average (28.3%, CI: 27.5–29.1) and significantly higher than all other Health Boards. (**Figure 1**)
- The adjusted mean %TimeIP was higher in the BSC subgroup than the treated subgroup, with regional averages of 35.9% (CI: 34.8–36.9) and 16.9% (CI: 16.1–17.8), respectively. (**Figure 2**)

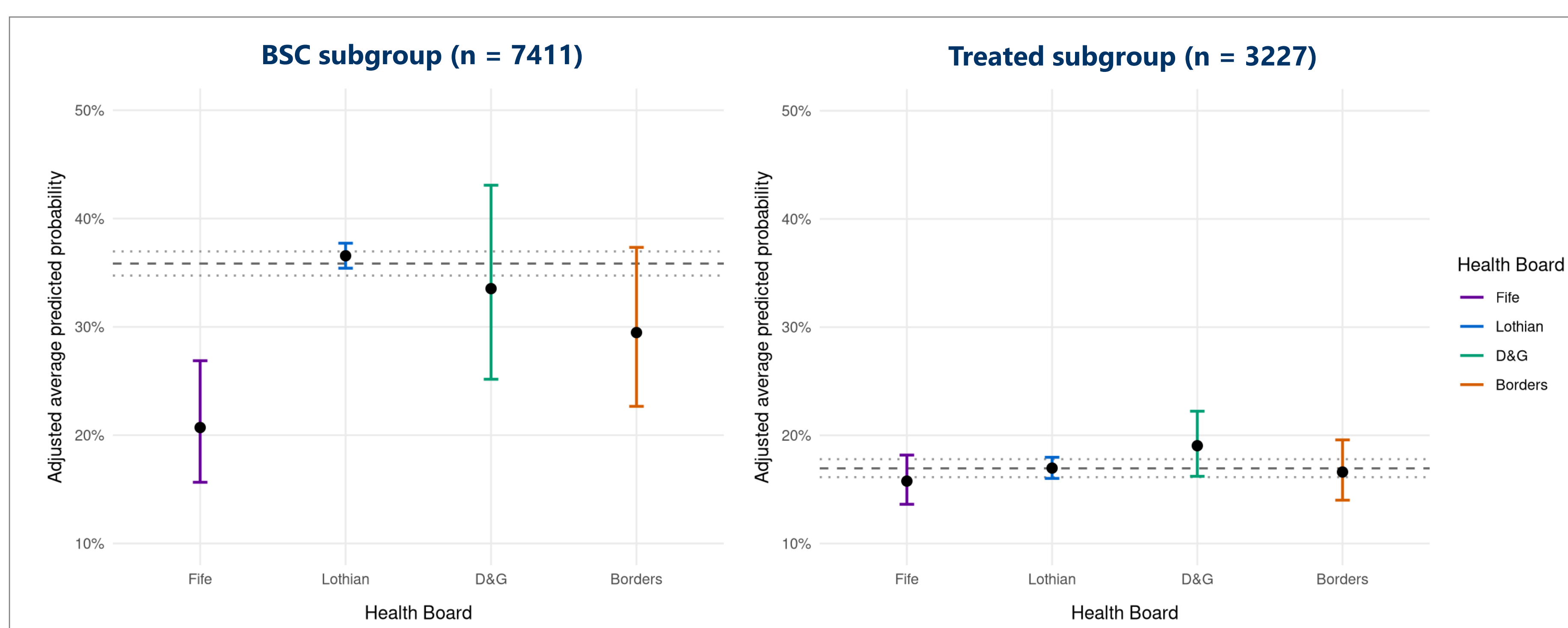


Figure 2 – Regional variation in %TimeIP in the BSC and treated subgroups

- In the BSC subgroup (median OS – 2.7 months), regional variation in the %TimeIP mirrored the pattern observed in the overall cohort, with a statistically significant difference between Lothian (36.6%, CI: 35.5–37.8) and Fife (20.2%, CI: 15.3–26.3). The median duration of remaining life spent as an inpatient was 18 days in the Lothian BSC cohort and 15 days in the Fife BSC cohort.
- In the treated group (median OS – 8.6 months), regional variation was not statistically significant.

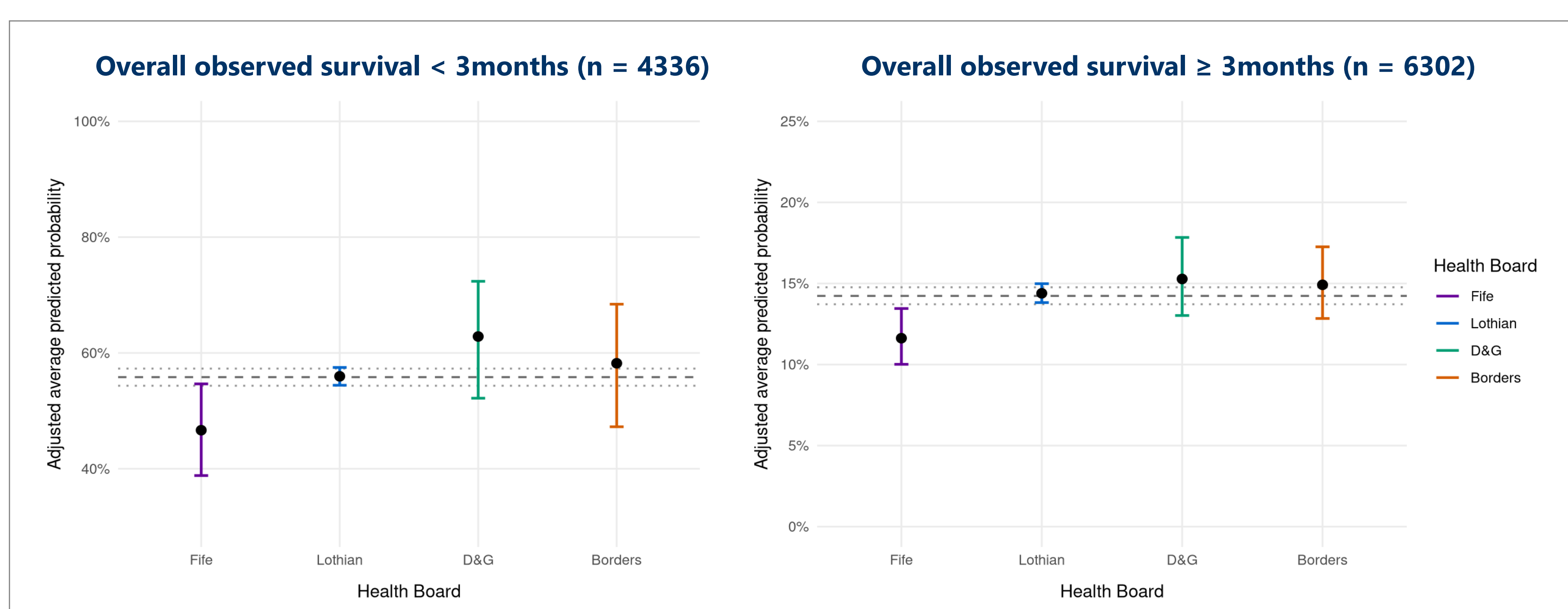


Figure 3 – Regional variation in %TimeIP in the overall survival subgroups (< 3 and ≥ 3 months)

- Within the OS subgroups, the adjusted mean %TimeIP was higher in D&G and Borders than the regional average, with no significant difference between Health Boards. (**Figure 3**)

Conclusions

- Patients could spend nearly one third of their remaining life in hospital following a diagnosis of PPC, particularly those receiving BSC, independent of the effect of observed survival.
- Regional variation in this ‘time toxicity’ measure could inform efforts to understand and improve the value and quality of care including community palliative care across diverse populations.

Acknowledgements

- Patients with poor prognosis cancer whose Electronic Health Records data were used for this analysis.
- I-Qual-PPC** (‘Improving Quality and value of care for people with Poor Prognosis Cancer’) project is a clinical service evaluation study supported by The Health Foundation.

