

Are bowel cancer surgery outcomes becoming less equal?

Analysis of time-series change in socioeconomic inequalities using data on all hospital inpatients in the English NHS from 1998 to 2009

Richard Cookson¹, Miqdad Asaria¹, Aurora Ortiz-Nunez², Stephen Martin¹, Steven Oliver^{1,3}, Eva Morris⁴, Shehzad Ali¹, Brian Ferguson⁵
1. University of York, 2. University of Lancaster, 3. Hull York Medical School, 4. University of Leeds, 5. Public Health England

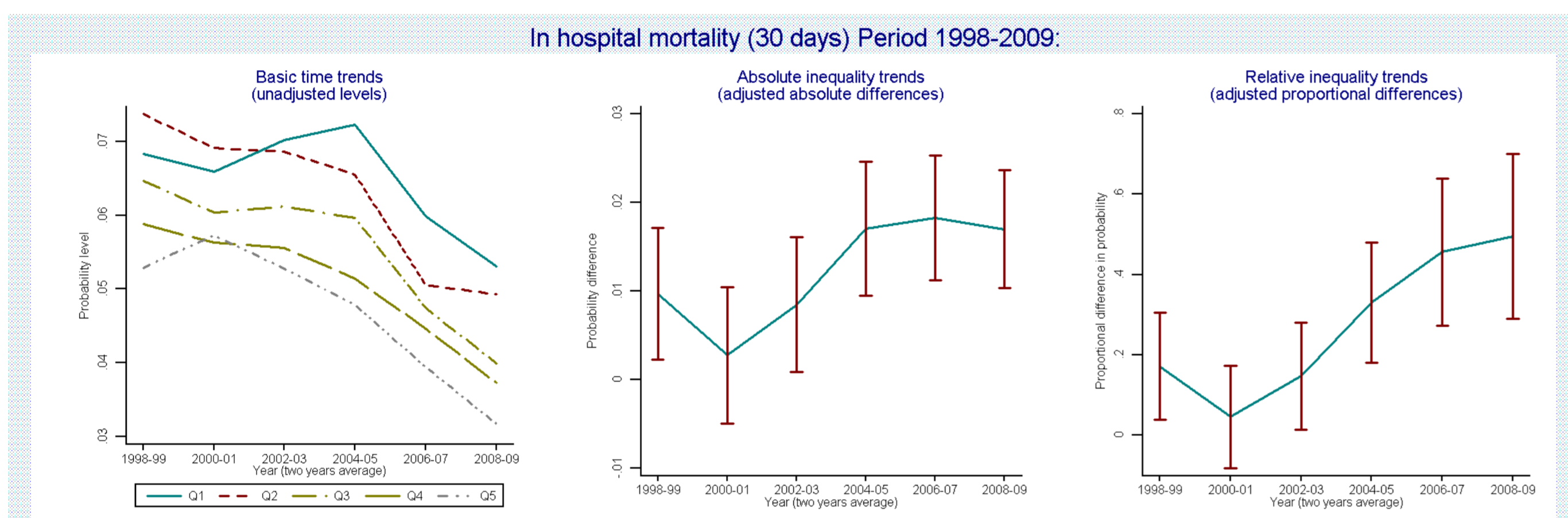
Introduction

- There are inequalities in the quantity, quality and outcomes of NHS bowel cancer care between rich and poor patients.
- The NHS needs to start monitoring how these inequalities change over time, in line with its new duty under the Health and Social Care Act 2012 to consider reducing healthcare inequalities.
- We examined changes in inequality related to small area deprivation for five bowel cancer surgery outcomes in the English NHS between 1998 and 2009 by looking at routinely collected hospital data.
- The degree of inequality showed a clear and sustained pattern of change for only one of the five outcomes – laparoscopic surgery rates increased slightly faster for patients in less deprived areas
- Inequality remained largely constant for two of the five outcomes (30-day emergency re-admission and length of stay), showed some sign of a small sustained reduction for one outcome (proportion of rectal surgery patients receiving abdominoperineal resection) and some sign of a small sustained increase for one outcome (30-day in-hospital mortality).
- All but one of the outcomes improved for all social groups throughout the period, with the exception of 30-day re-admission rates which increased for all social groups.

Methods

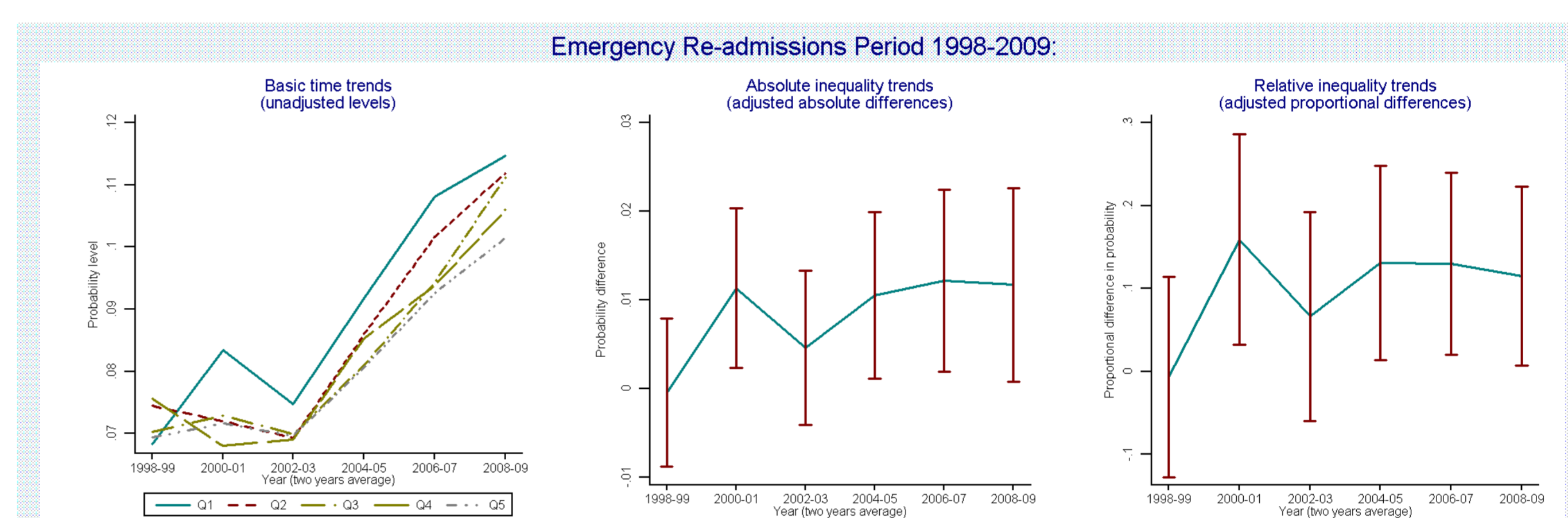
- Hospital episode statistics were used to examine five outcomes for patients undergoing primary colorectal cancer surgery in the English NHS from 1998 to 2009.
- For each outcome, we described unadjusted two-year trends by quintile groups of English small area income deprivation based on the index of multiple deprivation 2004 (IMD 2004), with Q1 representing the most deprived income quintile and Q5 the least deprived.
- We estimated adjusted values for these outcomes for each quintile after controlling for age, gender and co-morbidity based on the Elixhauser index outcomes of co-morbidity.
- Probit regressions were used to estimate adjusted values for the binary outcomes and OLS regression was used to estimate adjusted values for the continuous outcome (length of stay) for each quintile.
- Absolute inequality measures were calculated as the absolute gap between the least deprived and most deprived income quintile groups for each adjusted outcome.
- Relative inequality measures were calculated as the corresponding relative gap i.e. the ratio of the absolute gap to the value of the adjusted outcome in the least deprived income quintile, minus one.
- Inequality measures were presented for each time point along with 95% confidence intervals.

In Hospital Mortality



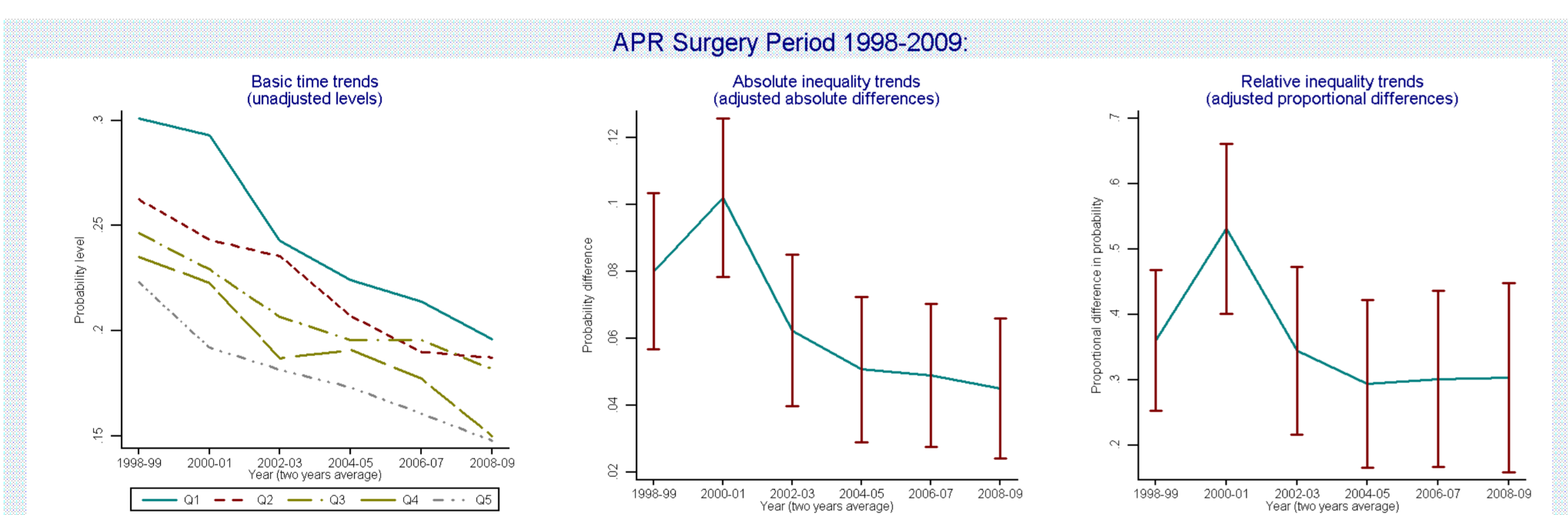
- This outcome measures the proportion of patients that die within 30 days of their primary resection.
- 30-day in-hospital mortality fell in all groups in almost all years, with the absolute inequality gap staying in the region of 1 to 2 percentage points throughout, though there was some sign of a small but sustained increase in inequality after 2000-2001 especially for relative inequality.

Emergency Re-admission



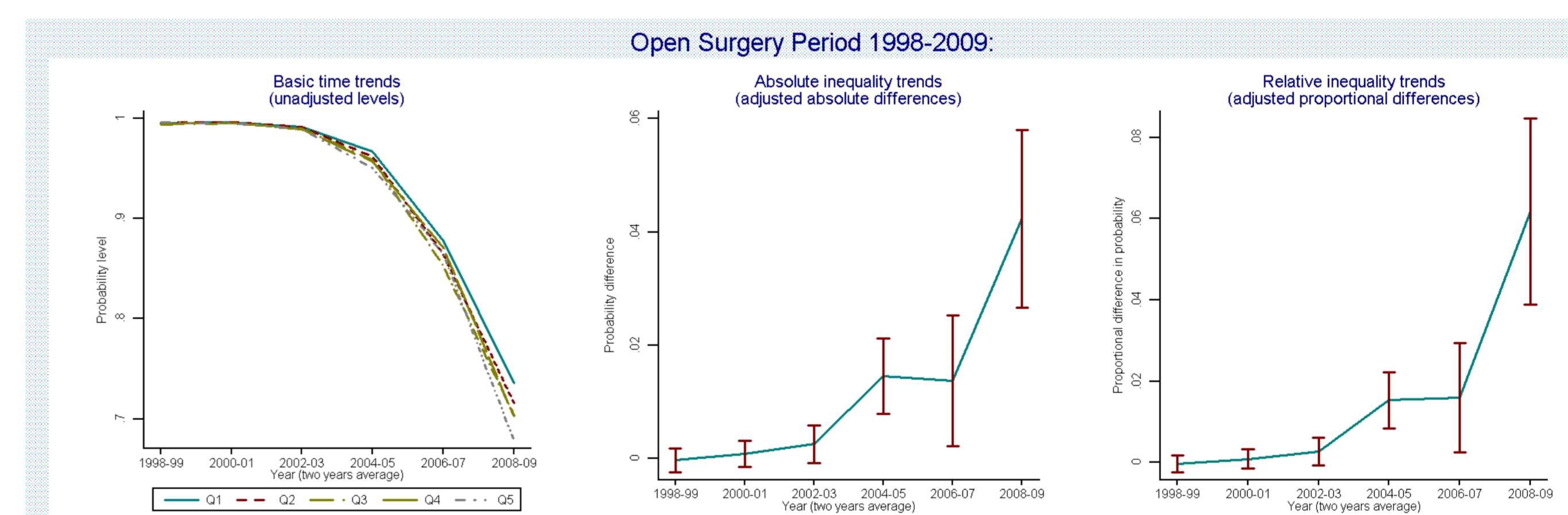
- This outcome measures the proportion of patients that have an emergency re-admission to hospital within 30 days of leaving hospital following their primary resection.
- 30-day emergency re-admissions increased at a similar rate in all groups, from an average of about 7% to about 11%, with an absolute inequality gap of about one percentage point throughout.

Abdominoperineal versus Lower Anterior Resection



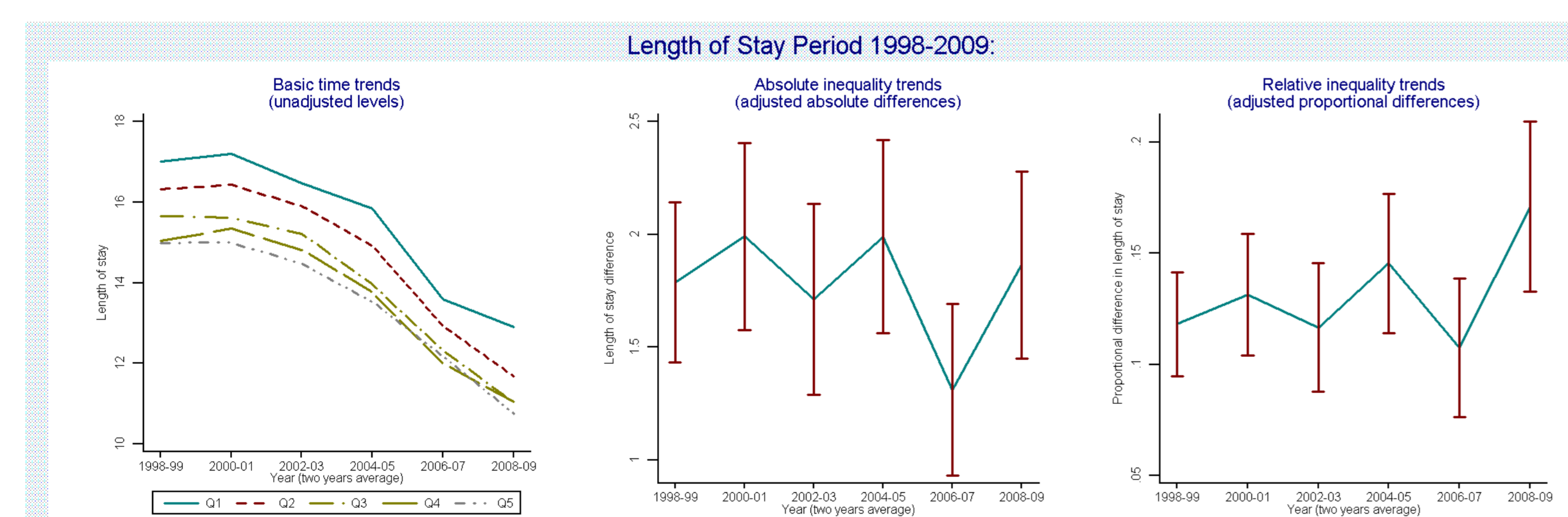
- This outcome focuses on rectal resections and describes the proportion of abdominoperineal resections (APR), which involve removal of the anus, as opposed to lower anterior resections (LAR), which preserve bowel continuity.
- Relative inequality gaps changed little, with the most deprived group 30 to 35% more likely to have APR in most years apart from 2000-2001, though in absolute terms the rate of APR fell furthest among deprived groups (from around 30% to just under 20%).

Open Surgery versus Laparoscopic Surgery



- This outcome looks at the proportion of patients receiving open as opposed to laparoscopic surgery.
- It is recommended to offer laparoscopic surgery as an option for patients with a BMI under 30kg/m², no history of major abdominal surgery, tumours of T3 or less, and rectal cancers not requiring a TME.
- Laparoscopic surgery rates increased more rapidly among affluent groups (from zero to 30%), with an initial inequality gap of zero rising to four percentage points in 2008-2009.

Length of Stay



- This outcome measures the number of days that a patient stays in hospital following their primary resection. On average, a shorter length of stay is assumed to indicate a better outcome.
- Length of stay fell at similar rates in all socio-economic groups, from approximately 16 days to 11 days, with an absolute gap of approximately two days throughout.

Conclusions

- Since the late 1990s, inequality in NHS bowel cancer surgery outcomes related to small area deprivation has changed little despite substantial and sustained improvements for all social groups in all outcomes apart from the rate of emergency re-admissions within 30 days of discharge.
- Previous research has found that inequalities in cancer surgery outcomes are partly if not exclusively attributable to underlying health inequalities outside the control of the surgical team, in particular inequalities in tumour progression and co-morbidity at the time of surgery, which in turn are partly attributable to inequalities in overall cancer services (e.g. early awareness, screening, primary care and hospital services) and partly to inequalities in lifestyle and healthcare-seeking behaviours.
- The findings therefore suggest there may have been little change since the late 1990s not only in (1) inequality in the quality of NHS cancer surgery services but also in (2) inequality in overall NHS bowel cancer services and (3) inequality in health behaviours related to bowel cancer.
- Natural experiment studies using large observational datasets are needed to disentangle these factors and test hypotheses about how far inequalities respond to changes in particular NHS services.
- Research is also needed to understand potential causes of the increase in 30-day readmission rates – for example, the reduction in GP out of hours services, the fall in length of stay, or other factors.