

A time series analysis of pre- and post-pandemic monthly surgery trends in the English NHS

Mary Kariuki¹, Katharine Reeves¹, Sandra Remsing¹, Paul Bird¹, Laura Quinn², Richard Lilford²

¹ Institute of Translational Medicine, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK, ² Institute of Applied Health Research, University of Birmingham, Edgbaston, Birmingham, UK

Methods

Design: Retrospective time-series analysis using Hospital Episode Statistics (HES) data.

Period: January 2015 – December 2024.

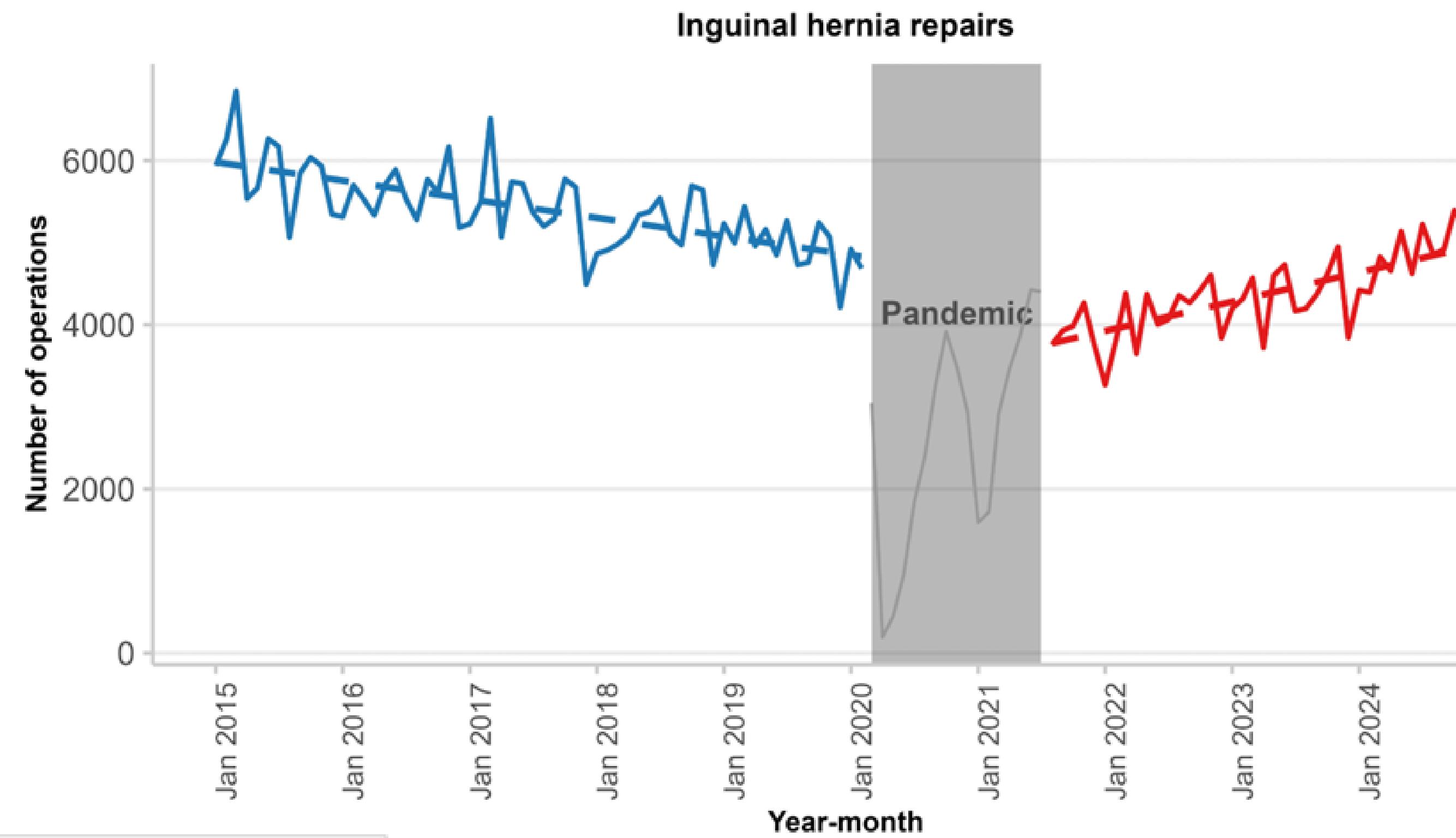
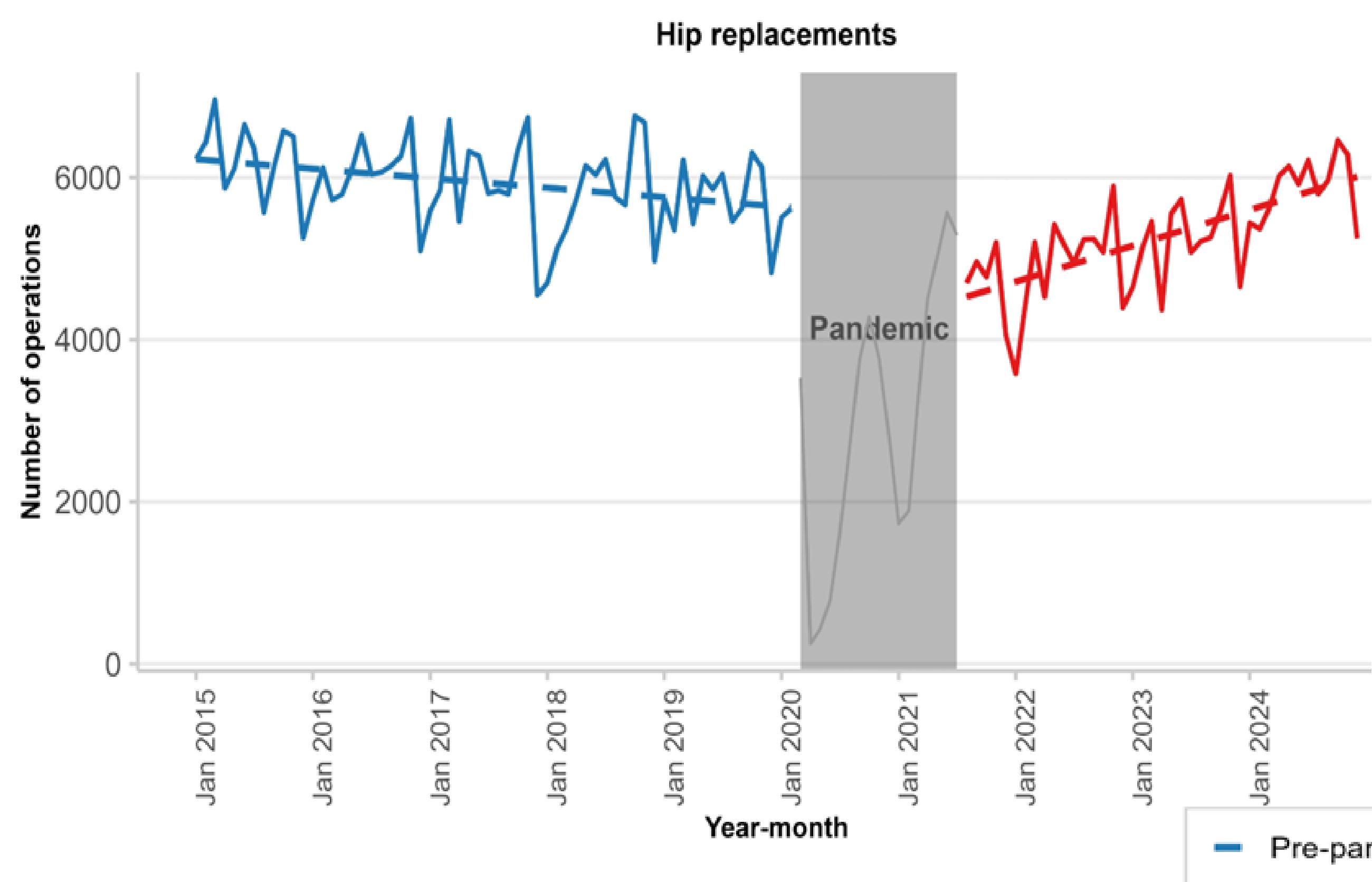
Procedure selection: Purposively chosen by urgency, clinical benefit, and complexity; routine surgeries included as a reference group

Analysis: Autoregressive Integrated Moving Average (ARIMA) models used to: estimate pre-pandemic trends, model post-pandemic recovery trajectories and quantify differences between pre- and post-pandemic periods.

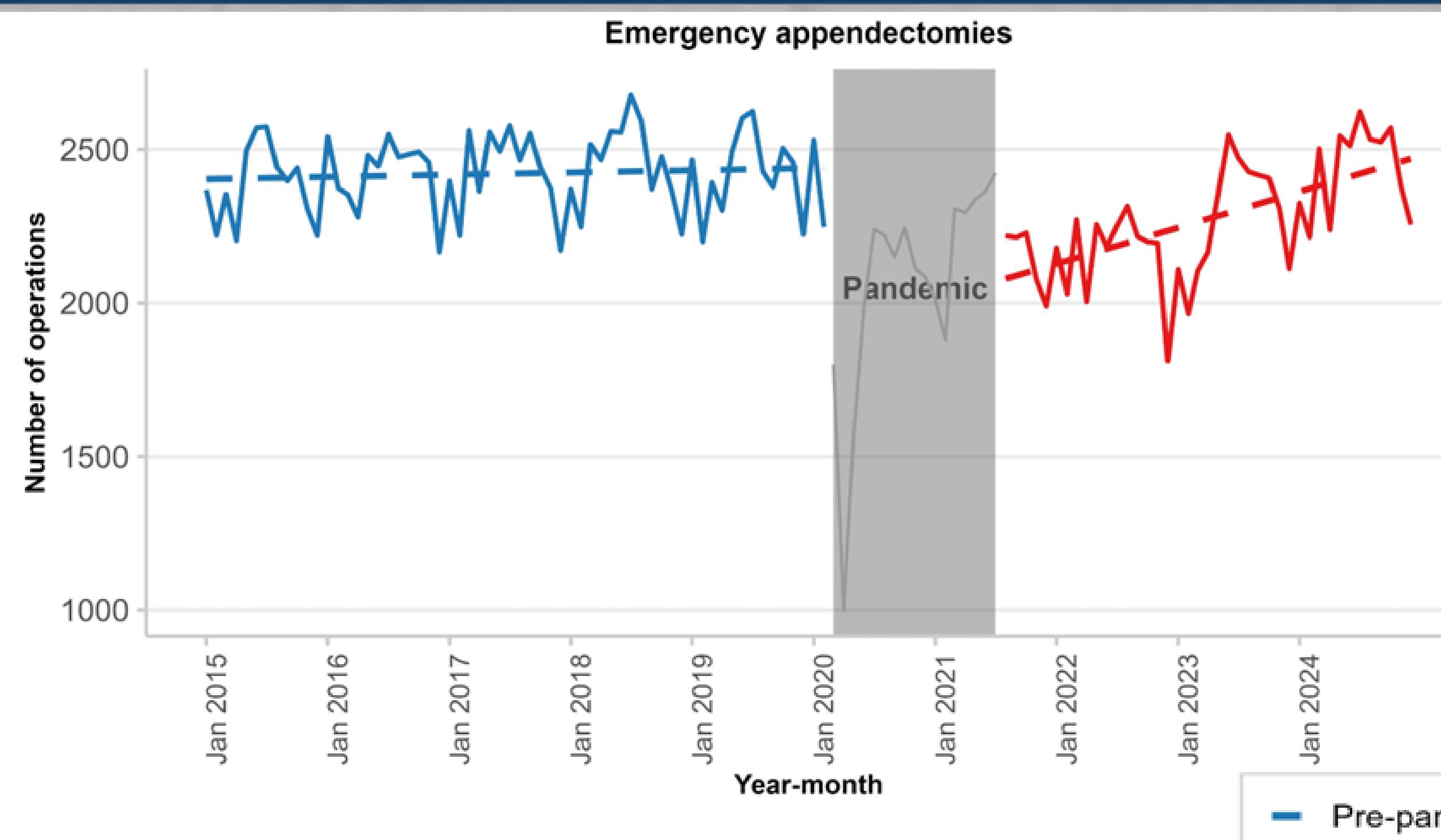
Funding and acknowledgements

- This work was funded by the National Institute for Health Research (NIHR) Applied Research Collaboration (ARC) West Midlands.
- The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social

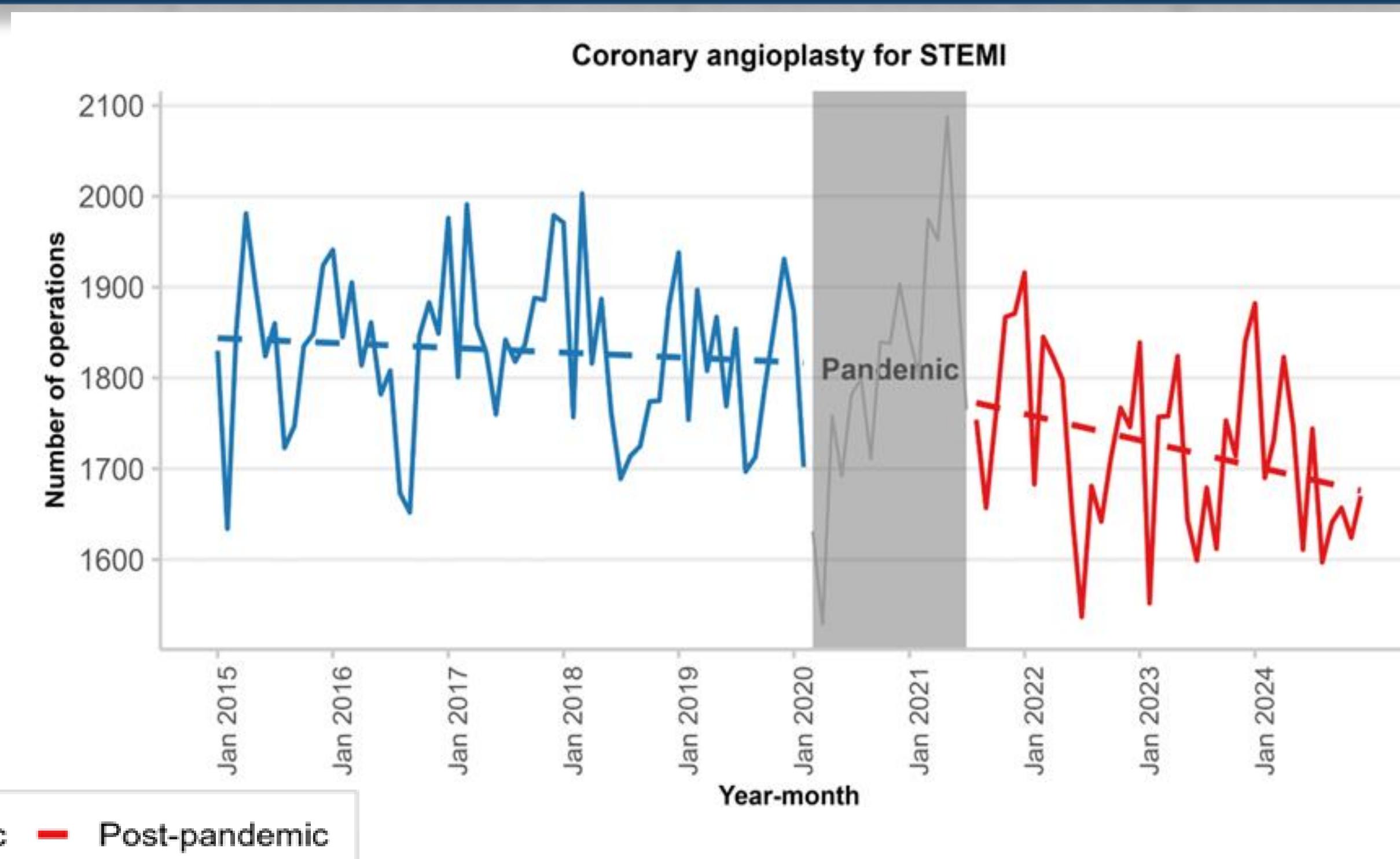
Findings and discussion



The recovery in hip replacements and inguinal hernia repairs were primarily driven by increased use of independent sector and surgical hubs.



Appendectomy activity reflects recovery from the pandemic-era shift toward non-operative (antibiotic) management.



Declines in coronary angioplasty for STEMI likely reflect coding and epidemiological changes, not reduced service capacity.

Other procedure recovery themes

- Less complex cancer procedures (mastectomies, lumpectomies, bowel resections) and complex cancer procedures (oesophagectomies, hepatectomies and pancreatectomies), patterns suggests that services have largely been able to meet demand for both routine and complex cancer surgery.
- Renal transplants, particularly from deceased donors, remain below pre-pandemic levels, suggesting lasting system-wide constraints despite the opt-out organ donation policy.

Conclusion

- Surgical activity in England is gradually recovering following the COVID-19 pandemic, but progress remains slow and uneven across procedures.
- The prolonged recovery underscores the magnitude of the COVID-19 shock and its interaction with pre-existing NHS pressures.

Limitations

No adjustment was made for case mix or trust-level variation, so observed trends may reflect differences in risk or service delivery.