

TITLE: A statistical analysis on the impact of COVID-19 on hospital activity

Introduction: As part of its role in setting hospital prices, the Independent Health and Aged Care Pricing Authority (IHACPA) has been monitoring changes in hospital activity, as the average cost per episode is influenced by the amount of activity that takes place within the hospital system. Changes to the average cost then have a bearing on the prices set by IHACPA.

Australia offers a unique case study into the impacts of COVID-19 on the hospital system. This is due to a small number of community cases, relative to the rest of the world, early in the pandemic, and the subsequent heterogeneous incidence of COVID-19 and resulting public health responses across Australia's eight states and territories.

This work presents IHACPA's approach to understand how COVID-19 has impacted hospital activity. Specifically, we ask the question if hospital activity has or is returning to pre-COVID-19 trends. Of particular interest is whether activity in 2021-22 is different to existing trends, as this is the year for which the most recent cost data is available that will determine the next national efficient price for hospital activity.

Methods

Australia has well-established data collections which allow us to analyse historical trends in hospital activity to understand the impact of COVID-19 on hospitals, and how it has evolved since the onset of the pandemic.

Population activity for each Australian state and territory from July 2015 to June 2023 is analysed using a series of regression models. The dependent variable is the natural logarithm of monthly weighted separations across each state and territory. We employ interrupted time series analysis to examine the impact on hospital activity at the start of the pandemic on hospital activity as well as compare time trends in the pre- and post-COVID-19 eras. The model controls for lockdowns, seasonal effects, Omicron onset, and state/territory locations.

We built the model in four steps to illustrate the impact that additional variables have on our main outcome of interest.

Results

During the early phases, COVID-19 is associated with a significant decline in hospital activity, but this is primarily explained during periods where regions were in lockdown. After the middle of 2021, the impact of lockdowns on hospital activity are close to zero. Activity in 2021-22 was significantly below trend and this is partially explained by the onset of Omicron variant.

Discussion

COVID-19 related lockdowns explain the national decrease in hospital activity only shortly after the onset. While the last lock-down finished in November 2021, activity remained subdued for the entire 2021-22 year. This was somewhat explained by the onset of the

Omicron wave at the start of the 2022. Growth in national activity throughput remains consistent throughout the COVID-19 era with pre-COVID-19 trends.

This work has been instrumental in developing IHACPA's approach for setting the national efficient price for hospital activity. It has allowed IHACPA to account for changes in the average cost of hospital care that are due to changes to transient shifts in activity.