Cancellation Rates of Hospitals and Health Boards Across Scotland

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1 Overview

2 Introduction

Context and motivation   This study will analyse the cancellation rate of planned operations across hospitals and health boards across Scotland. As cancellations of operations could be caused by various reasons, we are trying to dive deeper into trends and causes of reasons behind the cancellation.

Previous work   Cancelled operations: a 7-day cohort study of planned adult inpatient surgery in 245 UK National Health Service hospitals [**wong_harris_moonesinghe_2018**], a paper that looked through reasons for cancellation of surgery in the UK over a 7-day period across 245 NHS hospitals in March 2017.

Assessing the Rates and Reasons of Elective Surgical Cancellations on the Day of Surgery: A Multicentre Study from Urban Indian Hospitals [**sarang_bhandoria_patil_gadgil_bains_khajanchi_kizhakkeveetil_dutta_shah**] examines the frequency and causes of elective surgical cancellations in 10 hospitals across India. They found that most of the cancellations were avoidable and more preparation could decrease the cancellation rate to a more acceptable rate.

Reasons for cancellation of elective operations at a major teaching referral hospital in Jordan [**mesmar_shatnawi_faori_khader_2011**], studied the rate and reasons for cancellations of scheduled operations in King Abdullah University Hospital between August 2005 and July 2006.

Objectives   We are setting out to answer the following:

- Explain fluctuations in cancelled operations over time, especially before and after COVID-19.

- Investigate seasonal variations in non-clinical cancellations.

3 Data

Data provenance   The data used in this project was created by the PHS Waiting Times Team and was aggregated by the NHS Board. It is easily accessible on the Scottish Health and Social Care Open Data website [**public_health_scotland**]. We downloaded the data in CSV format and were able to use it for our project because it falls under the Open Government License [**the_national_archives_2019**]. We can adapt and publish the information as long as we give credit to the original source.

Data description There were 3 datasets downloaded from the website, Cancellations by Hospital, Cancellations by Health Board, and Cancellations in Scotland.

For Cancellations by Hospital, there are 4502 entries and 14 columns: Month (Month and Year of the entry (YYYYMM)), Hospital (Unique hospital code for a NHS Hospital), TotalOperations (Total number of scheduled elective operations), TotalOperationsQF, TotalCancelled (Total number of cancelled operations), TotalCancelledQF, CancelledByPatientReason (Total number of cancelled operations by patients), CancelledByPatientReasonQF, ClinicalReason (Total number of cancelled operations due to clinical reasons), ClinicalReasonQF, NonClinicalCapacityReason (Number of operations cancelled due to non-clinical reasons), and NonClinicalCapacityReasonQF.

For Cancellations by Health Board, there are 1575 entries and 14 columns: Mont h(Month and Year of the entry (YYYYMM)), HBT (Unique code to identify each Health Board), TotalOperations (Total number of scheduled elective operations), TotalOperationsQF, TotalCancelled (Total number of cancelled operations), TotalCancelledQF, CancelledByPatientReason (Total number of cancelled operations by patients), CancelledByPatientReasonQF, ClinicalReason (Total number of cancelled operations due to clinical reasons), ClinicalReasonQF, NonClinicalCapacityReason (Number of operations cancelled due to non-clinical reasons), and NonClinicalCapacityReasonQF.

For Cancellations in Scotland, there are 105 entries and 14 columns: Month (Month and Year of the entry (YYYYMM)), Country (9-digit code for country of treatment), TotalOperations (Total number of scheduled elective operations), TotalOperationsQF, TotalCancelled (Total number of cancelled operations), TotalCancelledQF, CancelledByPatientReason (Total number of cancelled operations by patients), CancelledByPatientReasonQF, ClinicalReaso n(Total number of cancelled operations due to clinical reasons), ClinicalReasonQF, NonClinicalCapacityReason (Number of operations cancelled due to non-clinical reasons), and NonClinicalCapacityReasonQF.

Data processing Some cleaning was required for the three datasets. About half of the columns in each dataset were useless and needed to be dropped. These were columns that ended with a QF. In the Cancellations by Health Board dataset, one entry was missing, and there was a month when a Health Board entry had no value. We collected all the health boards for that particular month and concluded that the missing entry belonged to one of the health boards that also did not have an entry for that specific month.

The data type of the Month column needed to be changed because the format of the entry was YYYYMM, which made it difficult to create graphs. To resolve this issue, the values in this column were converted to a pandas datetime object using $pandas.to_{d}atetimefunction$.

According to the website, there appears to be a discrepancy in the data obtained from NHS Orkney, and efforts are being made to resolve the issue. The statistics are subject only to basic quality assurance by PHS. As a result, these datasets may not present a complete overview of cancellations throughout Scotland, and the data should not be trusted entirely.

After conducting a comprehensive review of the datasets, we discovered that the Cancellations by Hospitals dataset contains information for only 49 hospitals, which is only half of the total NHS hospitals in Scotland [**hospital_scotland**]. Out of these 49 hospitals, only 30 have complete data available from May 2015 until January 2024.

4   Exploration and analysis

In Figure 1, we can observe the trend of operations and cancelled operations from 2015 to 2024. The graph is plotted on a logarithmic scale, which allows us to see the changes in the number of operations and cancellations with greater precision.

Based on Figure 1, it is evident that Covid-19 had a significant impact on the number of operations and cancellations in Scotland. On April 30th, 2022, PCR COVID-19 testing in Scotland ended, testing sites were closed, and the legal requirement to wear face coverings in most indoor settings and public transport was lifted [**williams_bbc_scotland_2023**]. This date marks the end of Covid-19 measures in Scotland.

From Figure 1, it is evident that the number of operations and cancellations across Scotland did not return to their original levels even after Covid-19 measures ended. Before Covid-19, the average number of operations was 23213213213 with 324324324324 cancellations. In contrast, after Covid-19, the average number of operations was 3432434 with 349204 cancellations. The percentage of cancellations before Covid-19 was 21323

5   Discussion and conclusions

Summary of findings

Evaluation of own work: strengths and limitations

Comparison with any other related work

Improvements and extensions