2023

Diagnostic Analysis using Python

IMPROVING NHS APPOINTMENTS REPORT

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Introduction

This report aims to analyse NHS and external datasets to address business questions about service utilisation, missed appointments, and the potential uses of using external data sources. The NHS aims to optimise its infrastructure and resources in order to tailor to an increase in population. Key concerns include understanding missed appointments and whether current resources are being utilised correctly. The questions intended to be answered in this report are:

- **Has there been adequate staff and capacity in the networks?**
- **What was the actual utilisation of resources?**
- **What other resources are available and how can they be used?**

Datasets

The dataset contains several CSV files providing thorough information about healthcare appointments in the NHS. The three main CSV files relating to the NHS are actual_duration.csv, appointments_regional.csv, and national_categories.csv. The metadata_nhs.txt file offers an overview of the dataset structure, highlighting columns such as sub_icb_location_code, appointment_date, actual_duration, appointment_status, service_setting, context_type, and national_category. The data structure provides a foundation for exploring trends, patterns, and potential correlations within the NHS. This data set was cleaned to remove unknown data in Excel so more concreate conclusions can be made.

Questions and Approach

Has there been adequate staff and capacity in the networks?

Through investigation aimed at assessing the adequacy of staff and capacity within the NHS, my focus centred on the total number of appointments and the percentage of missed appointments, vital indicators reflecting the effectiveness of healthcare service delivery.

By analysing the total number of appointments by service settings, to see where staff should be allocated, showed general practice as the leading category, with a total of 270 million appointments between December 2021 and December 2022 (Figure 1). This was significantly the largest service setting, meaning a focus on staff numbers should be placed in general practice to keep with demand.

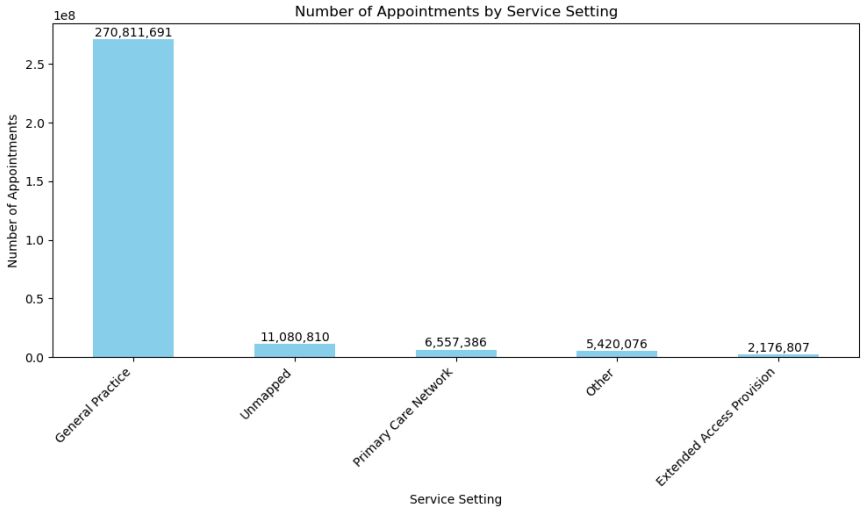

Figure 1: Bar chart showing number of appointments by service setting.

In addition, I also focused on the monthly distribution of appointments and percentage of missed appointments. A positive correlation was found which implies a potential shortage in staffing during peak demand. Furthermore, missed appointments highlighted an average percentage of 4.15% (Figure 2), meaning maximum capacity is not being met. To combat this, by overbooking appointments by the expected percentage of missed appointments, what is done similarly in the airline industry, can improve utilisation of capacity.

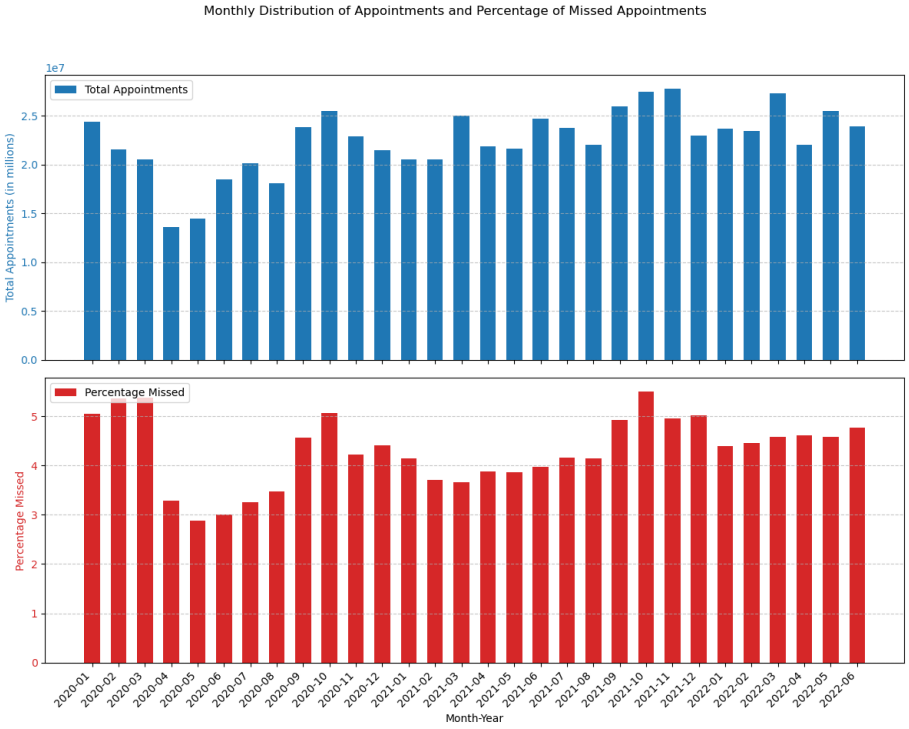

Figure 2: Bar chart showing distribution of appointments and percentage of appointments missed.

What was the actual utilisation of resources?

In my analysis of the utilisation of resources within NHS networks, I looked into appointment status and healthcare professional type, as well as appointment mode and appointment status. A consistent number of "did not attend" (DNA) cases were prominent across various appointment types, with an observation of higher non-attendance ratios among appointments involving other healthcare professional types. Further investigation revealed that video/online and home visit appointments had the lowest ratios of "did not attend" to "attended," indicating a more reliable utilisation of resources in these categories. (Figure 3)

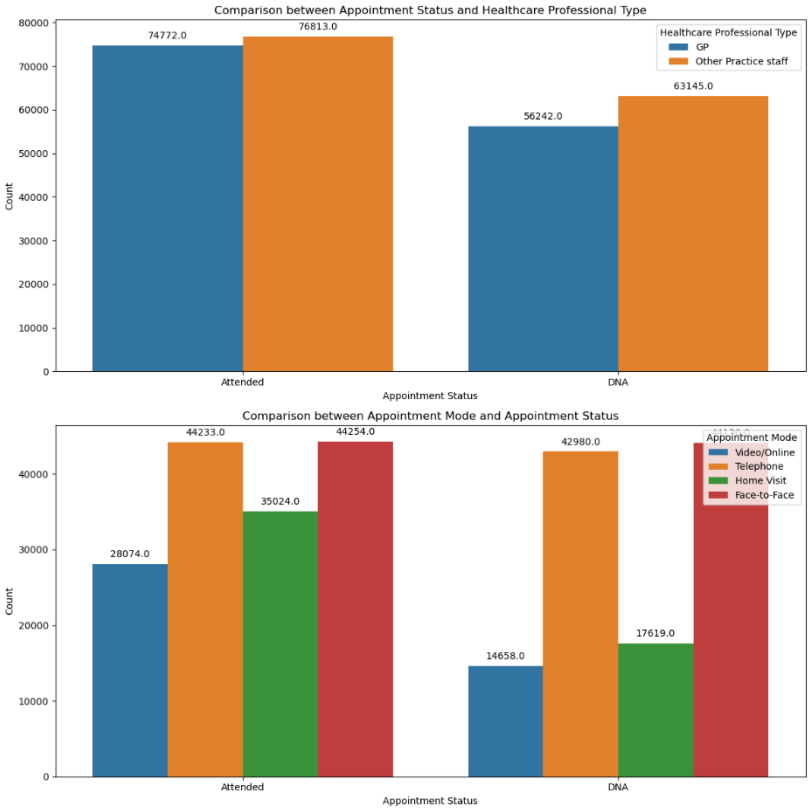

Figure 3: Bar chart showing comparison between appointment status and healthcare professional type and appointment status and mode.

The comparison between telephone and face-to-face appointments revealed nearly identical ratios of attended to did not attend, both being even. This suggests an opportunity for optimisation of resource allocation by potentially transitioning some face-to-face appointments to online formats, thereby reducing the likelihood of non-attendance.

From previous data involving the assessment of staff and network capacity, which focused on total appointments and the percentage of missed appointments, capacity of resources can be increased by improved utilisation. An example solution would be to reduce face-to-face appointments and instead rely more on telephone appointments for cases that do not require a physical presence.

What other resources are available and how can they be used?

In my analysis of the Twitter dataset, I identified the top trending hashtags, with an observation that "healthcare" is the most frequently used hashtag, used 844 times and almost 10 times more than any

other hashtag relating to health (Figure 4). This insight highlights the impact that social media platforms has as a channel for public discussion on healthcare-related matters, as we can receive live opinions from the users of the NHS.

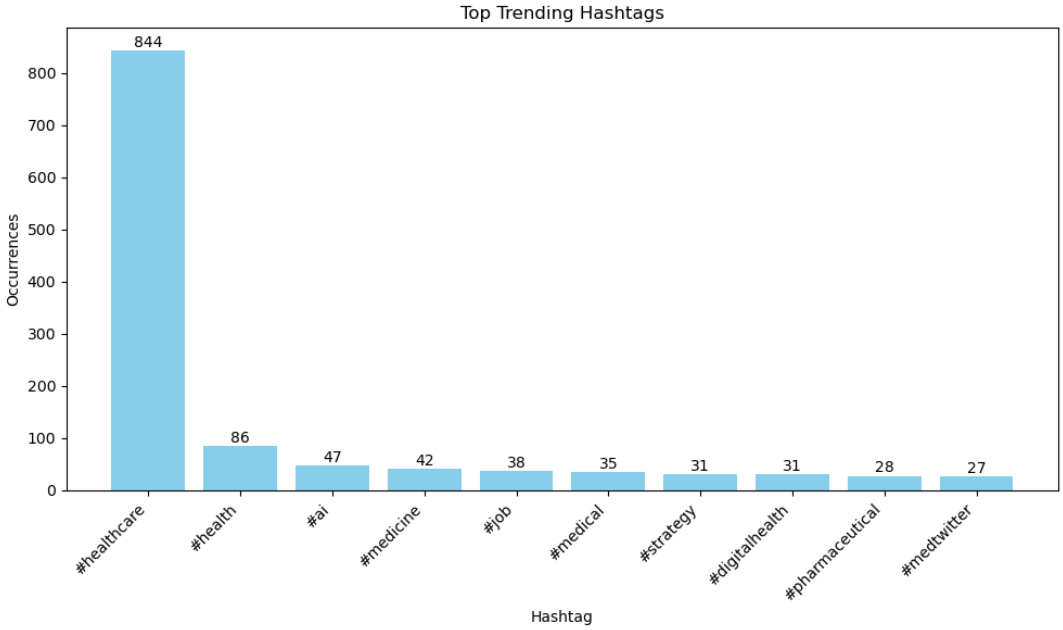

Figure 4: Bar chart showing the top treading hashtags from Twitter.

Social media platforms serve as tool for the general public to express feedback, concerns, and suggestions. By leveraging this resource, this allows the NHS to extract the collective opinion of its users.

From this data, I propose utilising social media platforms as a practical tool for collecting feedback and complaints. This approach not only provides real-time insights into public sentiments but also offers an understanding from the users the areas that require improvement within the NHS. Using the power of social media in this manner aligns with a patient-centric approach, promoting continuous improvement to the evolving needs of the healthcare system.

Conclusion

In conclusion, the data exploration and analysis conducted on the datasets provided valuable insights into various aspects of the NHS. Through analysis of appointment data and appointment statuses, an understanding of the NHS was obtained.

The analysis of staff and network capacity focused on total appointments and the percentage of missed appointments, revealed potential understaffing during high demand periods. Suggestions for improvement included hiring more staff during high demand periods and a reconsideration of what type of appointments the user can receive.

The analysis of resource utilisation considered the comparison between appointment status and healthcare professional type, revealing a significant amount of non-attendance across all appointment types. Recommendations included changing patient's appointment types to those with a higher attended type where appropriate and an increase focus of telephone appointments compared to face-to-face appointments.

The analysis of Twitter data identified the potential of social media in capturing public sentiments and feedback. Recommendations were made regarding the utilisation of social media for collecting feedback live.

In conclusion, the analysis provided actionable insights for the NHS, enabling decision-makers with data-informed recommendations to enhance the utilisation of resources and improvement in the understanding of capacity and staffing. These findings also highlight the importance of both internal and external data sources to gain a complete understanding of healthcare dynamics and advance continuous improvement in service delivery.