

National Health Services (NHS)

Optimising Staff Levels and
Capacity in the NHS Networks

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May 2023



Methodology

- 1. Background/context of the business**
- 2. Analytical Approach, using Python**
 - A. Importing and exploring the data sets
 - B. Performing further analysis
 - C. Visualising and identifying initial trends
 - D. Analysing the Twitter data
 - E. Final Insights



1. Background/ context of the business



NHS's Business Problem

The NHS incurs in significant, potentially avoidable, costs when patients miss general practitioner (GP) appointments.

Why should the NHS try and solve this problem?

While it is frustrating when patients do not attend, the reasons why this happens should be investigated rather than simply resorting to punishing patients.

Financially penalising patients inevitably impact the poorest and most vulnerable in the community.

Therefore, **reducing or eliminating missed appointments would be beneficial financially as well as socially for the entire community.**

NHS's Business Objectives

1. Understand the staff level and capacity in the networks over time.
2. Identify trends in the utilisation of resources.





2. Analytical Approach, using Python

A. Importing and exploring the data sets

- **Identifying the five locations with the highest number of records.**
 1. **NHS North West London ICB – W2U3Z – 13,007 records**
 2. **NHS Kent and Medway ICB - 91Q - 12,637 records**
 3. **NHS Devon ICB – 15N – 12, 526 records**
 4. **NHS Hampshire and Isle Of Wight ICB - D9Y0V - 12,171 records**
 5. **NHS North East London ICB – A3A8R – 11,837 records**

B. Performing further analysis

- Date range of the provided data sets.

Actual Duration Data Set

First Day Registered: 01 December 2021

Last Day Registered: 30 June 2022

National Category Data Set

First Day Registered: 01 August 2021

Last Day Registered: 30 June 2022

Appointments Regional Data Set

First Day Registered: January 2020

Last Day Registered: June 2022

Number of records for each of the service settings available for NHS North West London ICB – W2U3

General Practice was the service setting that reported the most appointments from 1 January to 1 June 2022 for **NHS North West**.

- **Number of records for each of the service settings available for NHS North West London ICB – W2U3**

Service Setting	Count of Records
General Practice	4,609
Other	2,858
Primary Care Network	2,791
Extended Access Provision	2,415
Unmapped	334

What is the number of appointments per month?

Appointment Month	Total Monthly Appointments
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Nov-21	30,405,070
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Oct-21	30,303,834
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Mar-22	29,595,038
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Sep-21	28,522,501
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May-22	27,495,508
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Jun-22	25,828,078
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Jan-22	25,635,474
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Feb-22	25,355,260
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Dec-21	25,140,776
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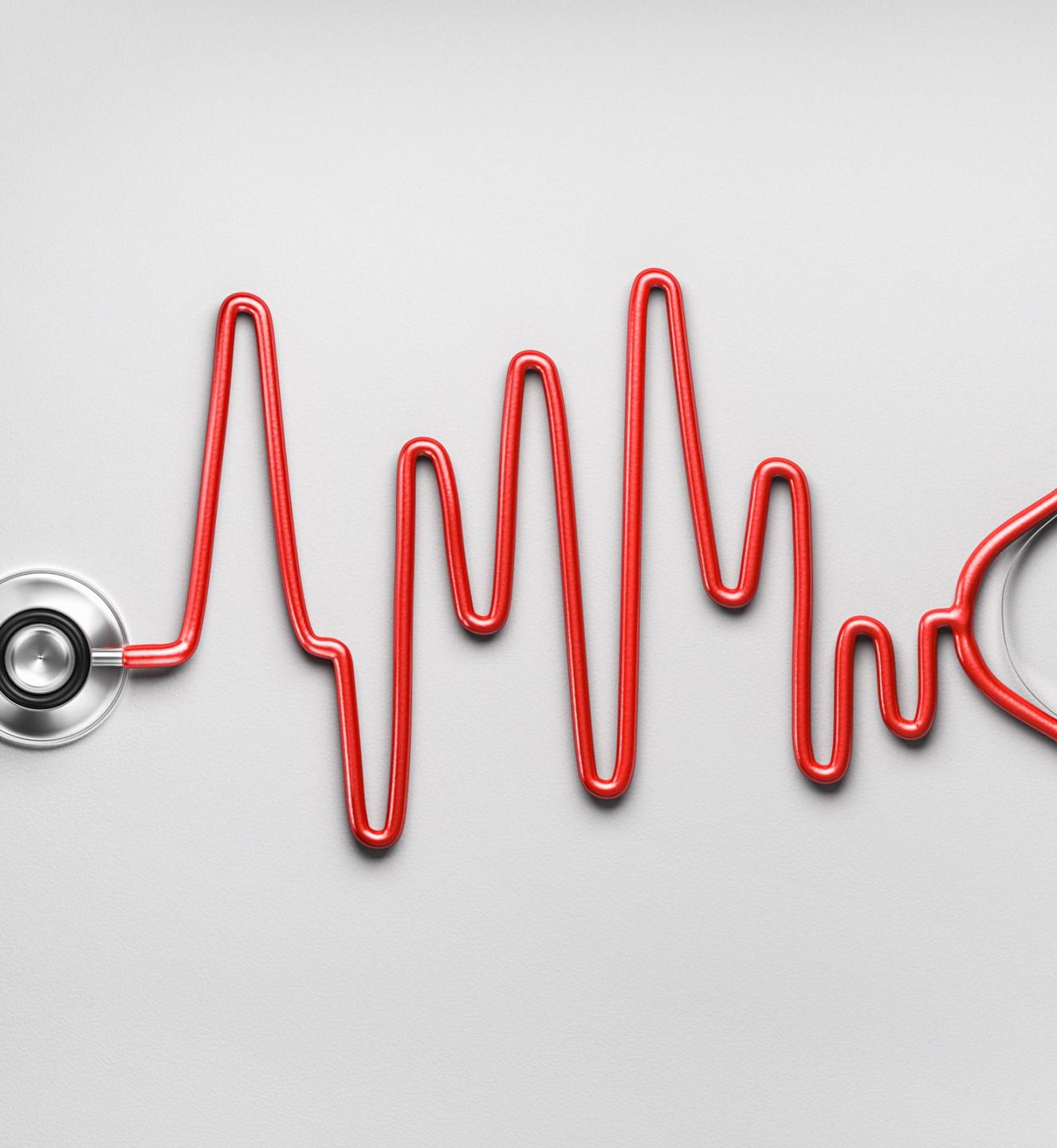
Apr-22	23,913,060
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Aug-21	23,852,171
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What is the number of records per month?

Appointment Month Total Records

Mar-22	82,822
Nov-21	77,652
May-22	77,425
Sep-21	74,922
Jun-22	74,168
Oct-21	74,078
Dec-21	72,651
Jan-22	71,896
Feb-22	71,769
Apr-22	70,012
Aug-21	69,999

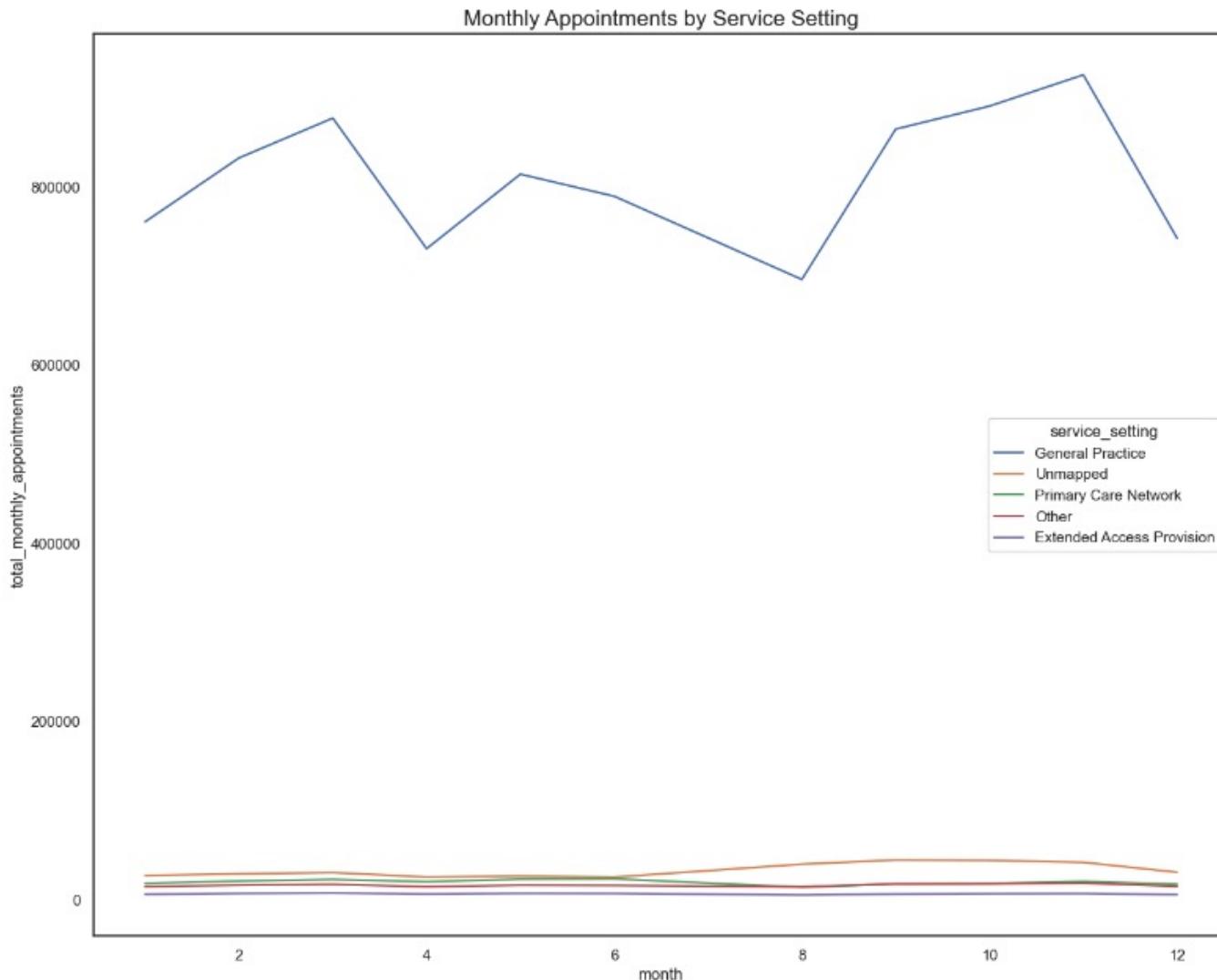


C. Visualising and identifying initial trends

- What monthly and seasonal trends are evident, based on the number of appointments for service settings, context types, and national categories?

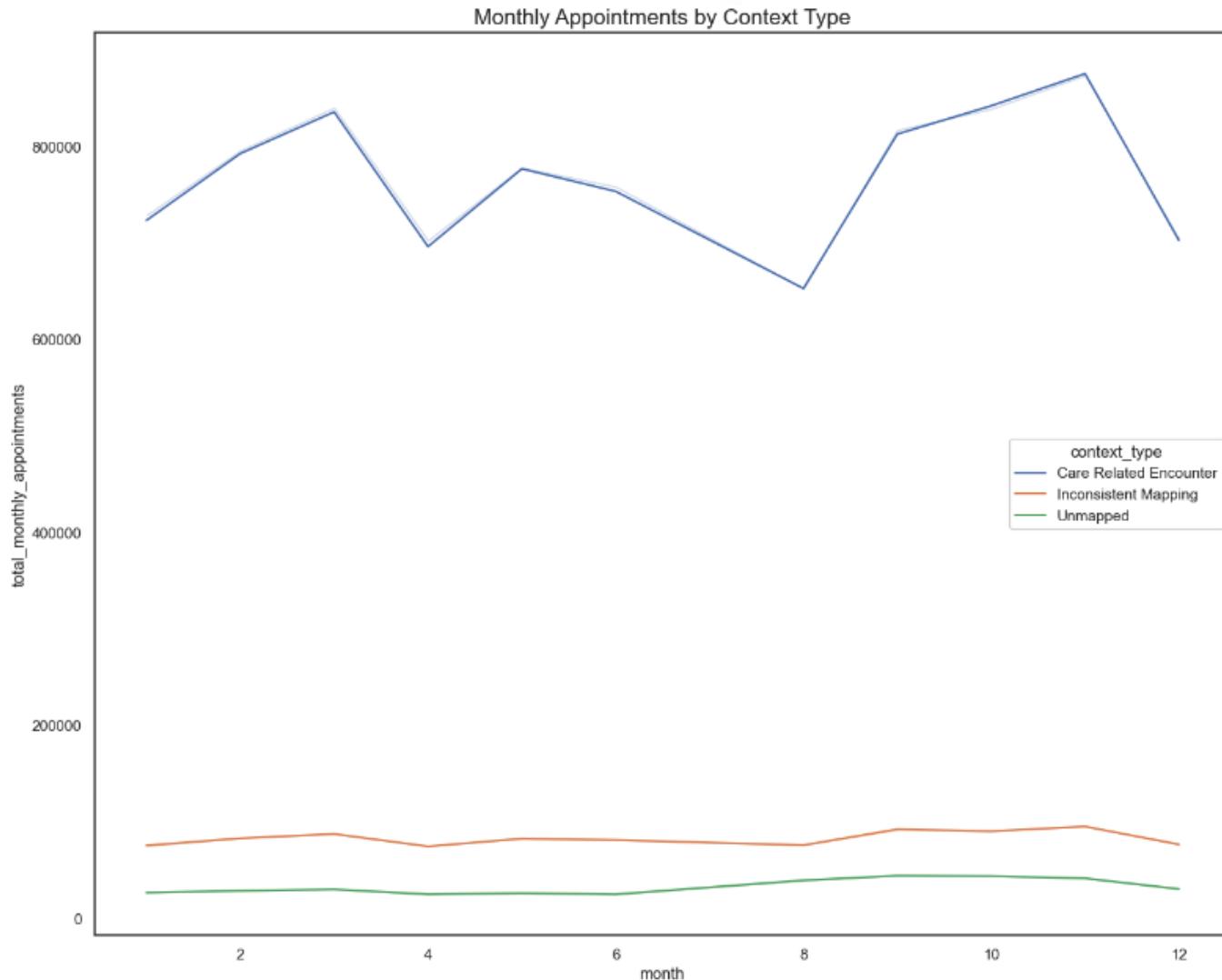
Monthly Appointments by Service Setting

General Practice seems to be the **service setting** with the highest number of records in the data sets and the higher number of appointments per month, over time.



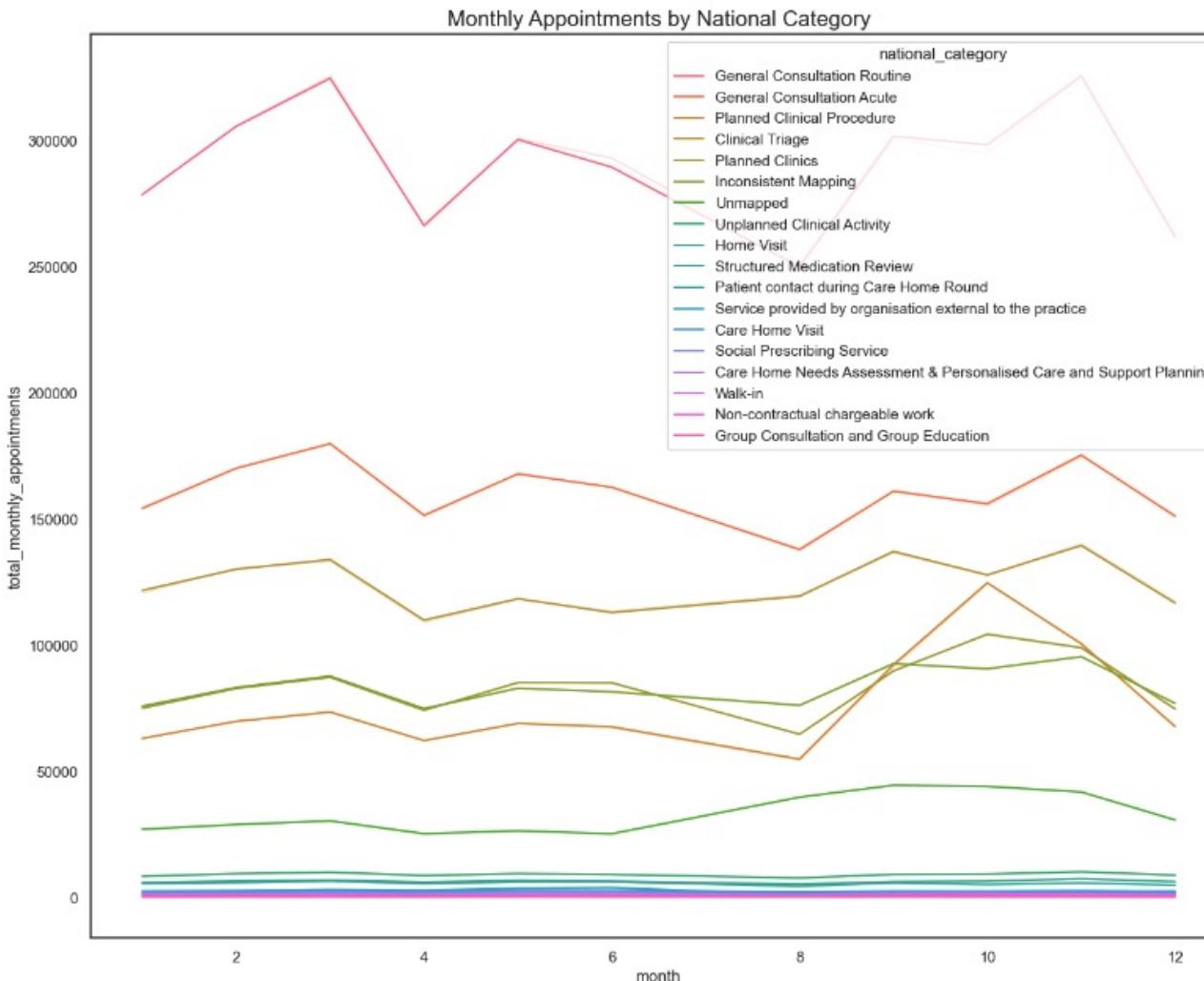
Monthly Appointments by Context Type

Care Related Encounter is the context type that reported the highest number of appointments per month.



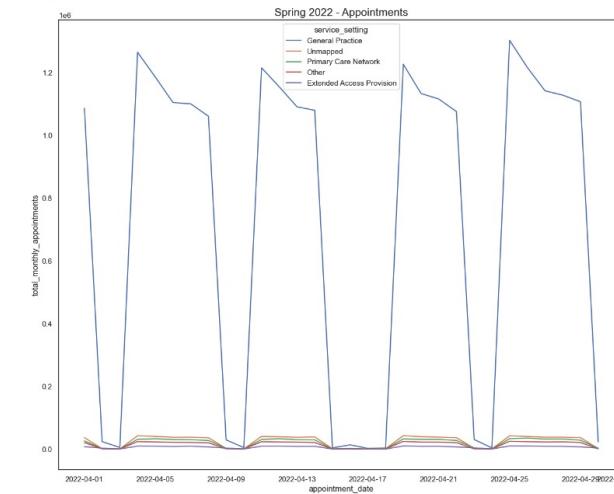
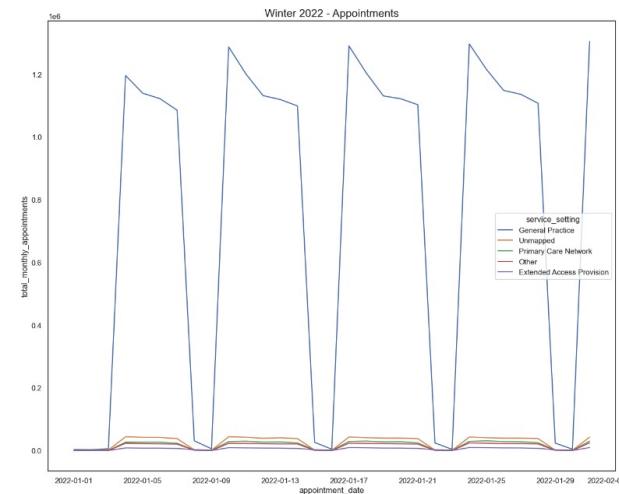
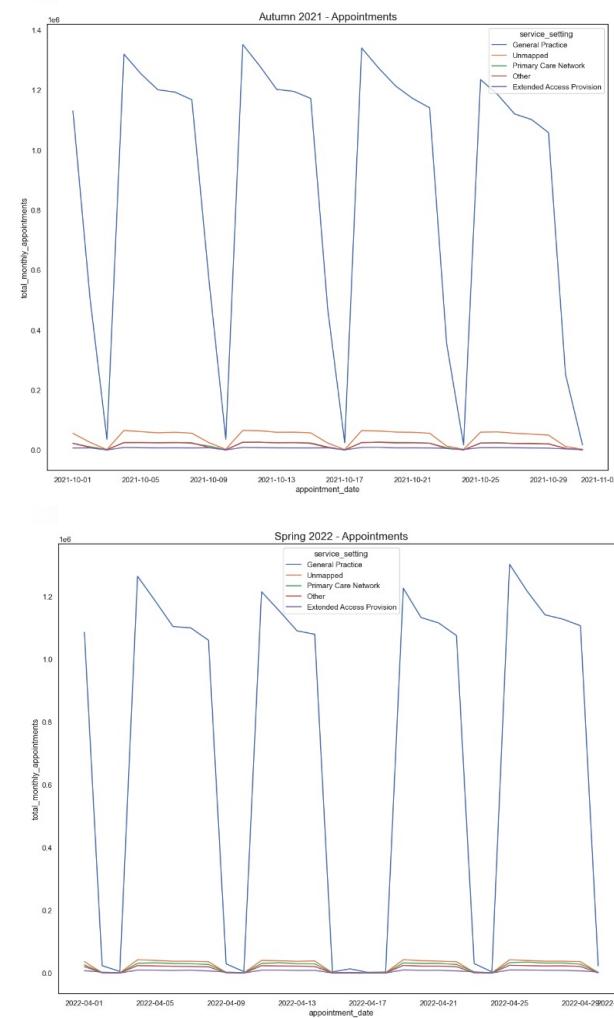
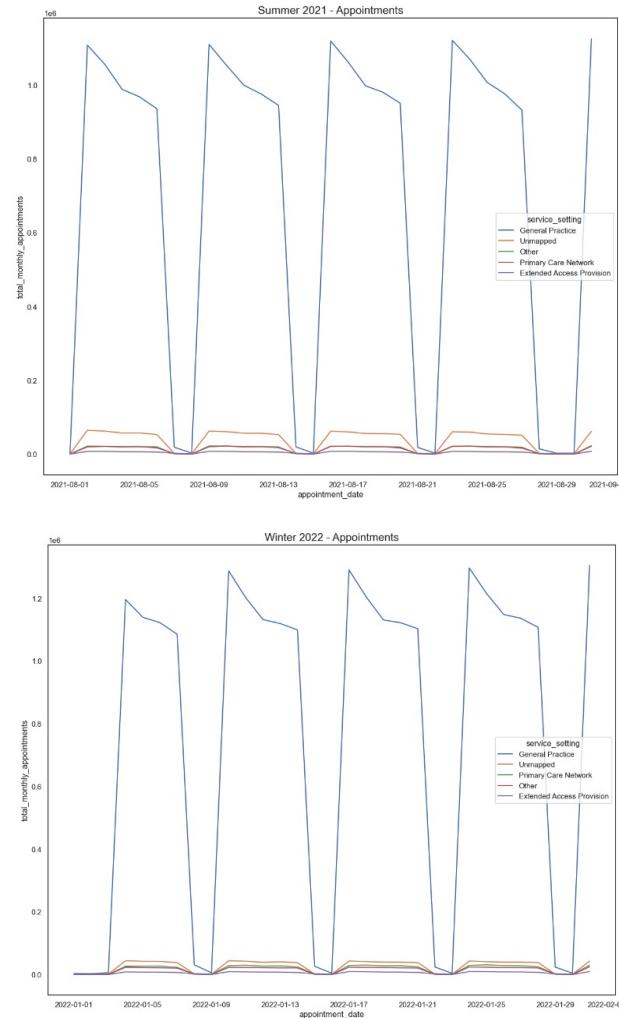
Monthly Appointments by National Category

General Consultation Routine is the **national category** with the highest number of appointments per month, followed by **General Consultation Acute**.



Seasonal Trends

General Practice is the **service setting** that reported the highest number of appointments across the three seasons studied in this analysis, **Summer 2021, Autumn 2021, Winter 2022, Spring 2022**.



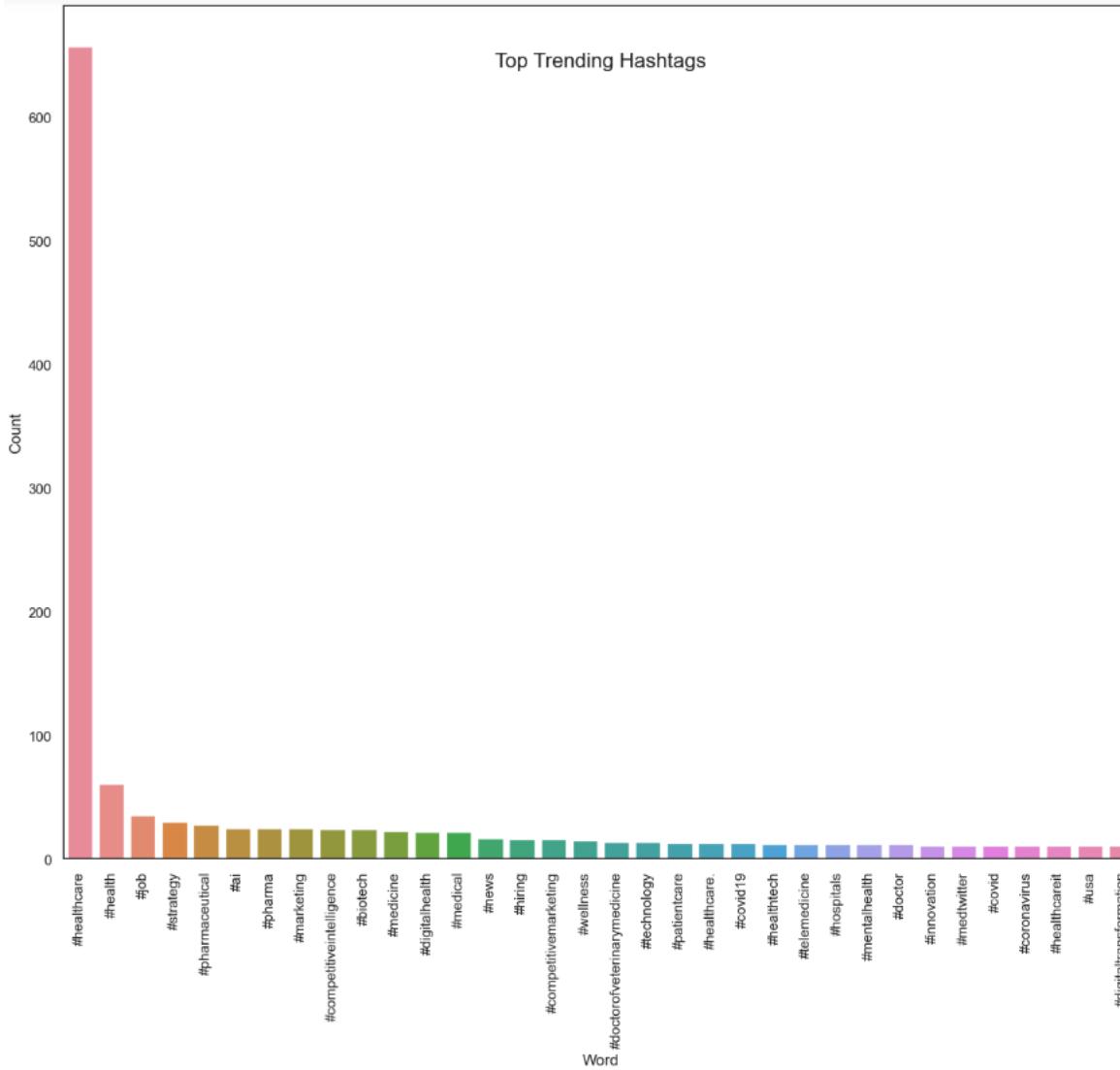


D. Analysing Twitter data

Focusing on the number of **retweets** and **the most liked tweets** related to healthcare in the UK.

Top trending hashtags (#) on Twitter.

#healthcare
#digitalcare
#patientecare
#telemedicine
#healthtech
#telemedicine
#medtwitter
#healthcareit



#covid
#hospitals
#medicine
#pharma
#doctor
#innovation

Top #healthcare hashtags with the highest retweets.

	tweet_id	tweet_full_text	tweet_entities	tweet_entities_hashtags	tweet_metadata	tweet_retweet_count
263	1.570000e+18	RT @UltimaLionsDen: Temitope is looking to boost efficiency in the Health industry with his app- \nWe-Care Africa. \n\nWas his pitch in good s...	{"hashtags": [], "symbols": [], "user_mentions": [{"screen_name": "UltimaLionsDen", "name": "Ultima Lions Den", "id": 973581329119039488, "id_str": "973581329119039488", "indices": [3, 18]}], "ur...	["UltimaLionsDen", "name": "Ultima Lions Den", "id": 973581329119039488, "id_str": "973581329119039488", "indices": [3, 18]]]}]	{"iso_language_code": "en", "result_type": "recent"} NaN	303
330	1.570000e+18	RT @khaleejtimes: .@BurjeelHoldings, a private healthcare services provider, has partnered with superstar @iamsrk as its new brand ambassador...	{"hashtags": [], "symbols": [], "user_mentions": [{"screen_name": "khaleejtimes", "name": "Khaleej Times", "id": 18860860, "id_str": "18860860", "indices": [3, 16]}], {"screen_name": "BurjeelHoldin..."}]	["khaleejtimes", "name": "Khaleej Times", "id": 18860860, "id_str": "18860860", "indices": [3, 16]}, {"screen_name": "BurjeelHoldin..."}]	{"iso_language_code": "en", "result_type": "recent"} NaN	208

Top #healthcare hashtags with the highest number of likes.

tweet_full_text	tweet_entities	tweet_entities_hashtags	tweet_metadata	tweet_favorite_count
Lipid-Lowering Drugs\n\n#TipsForNewDocs #MedEd #MedTwitter #medicine #medical #medicare #health #healthcare #FOAMed #ClinicalPearl #clinicaltips #MedStudents #medstudenttwitter #lipid \n\nCredit: ...	{"hashtags": [{"text": "TipsForNewDocs", "indices": [22, 37]}, {"text": "MedEd", "indices": [38, 44]}, {"text": "MedTwitter", "indices": [45, 56]}, {"text": "medicine", "indices": [57, 66]}], "symbols": [], "user_mentions": []}	#TipsForNewDocs, #MedEd, #MedTwitter, #medicine, #medical, #medicare, #health, #healthcare, #FOAMed, #ClinicalPearl, #clinicaltips, #MedStudents, #medstudenttwitter, #lipid	{"iso_language_code": "en", "result_type": "recent"}	42
You ready for JCO @_JennyCo ❤️\n\n#Healthcare data powered by @Conste11ation DAG 🔥	{"hashtags": [{"text": "Healthcare", "indices": [33, 44]}], "symbols": [{"text": "JCO", "indices": [14, 18]}, {"text": "DAG", "indices": [76, 80]}], "user_mentions": [{"screen_name": "_JennyCo", "name": null}]}]	#Healthcare	{"iso_language_code": "en", "result_type": "recent"}	28
How health insurance works 😅\n\n#comedy #adulting #healthcare https://t.co/ciksdeoAkb	{"hashtags": [{"text": "comedy", "indices": [31, 38]}, {"text": "adulting", "indices": [39, 48]}, {"text": "healthcare", "indices": [49, 60]}], "symbols": [], "user_mentions": [], "urls": [{"url": "https://t.co/ciksdeoAkb"}]}	#comedy, #adulting, #healthcare	{"iso_language_code": "en", "result_type": "recent"}	20



E. Final Insights

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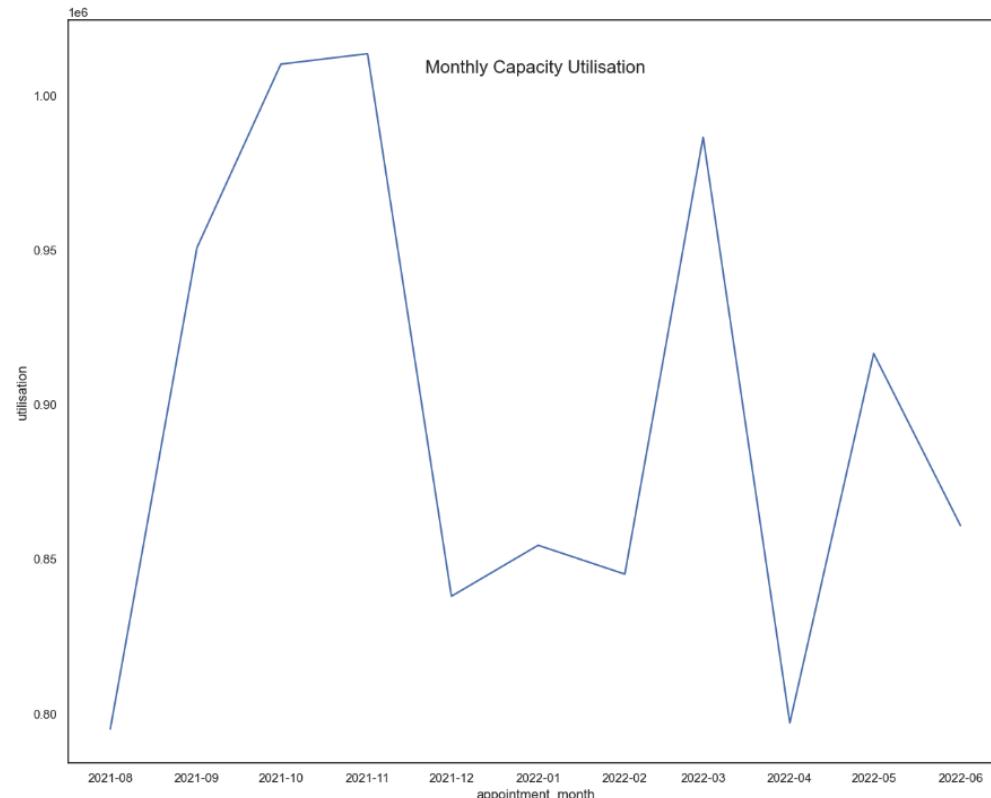


Using Twitter to leverage NHS customer service.

- Twitter is an excellent tool for sharing updates, engaging with patients and sharing links to relevant NHS posts, updates.
- Using hashtags to improve health updates visibility on Twitter.
- Use Twitter to handle customer service issues to solve their problems and keep them informed.
- Using graphics and polls for more entertaining, interactive tweets with the latest NHS updates.
- Use third-party Twitter tools to keep the NHS twitter account organized.
- Using [Google Analytics](#) to keep track of how your tweets perform over time.

What was the actual utilisation of resources? Should the NHS start looking at increasing staff levels?

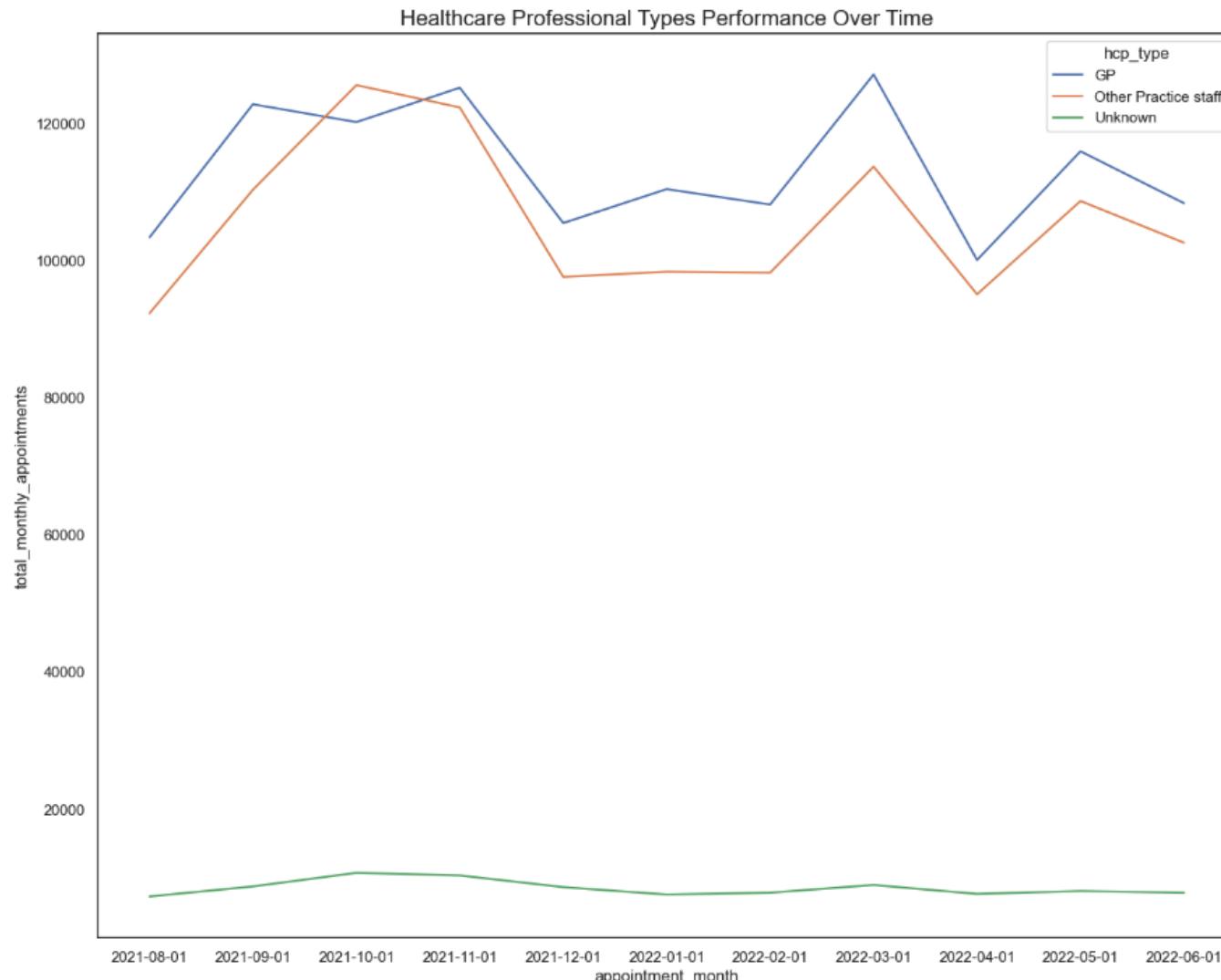
If we consider the capacity of the NHS to accommodate a maximum of 1,200,000 appointments per day, we do not think it is needed at this point to increase the staff levels. However, this should regularly be monitored and control.



Appointment Month	Total Monthly Appointments	Utilisation
Aug-21	23,852,171	795,072
Sep-21	28,522,501	950,750
Oct-21	30,303,834	1,010,128
Nov-21	30,405,070	1,013,502
Dec-21	25,140,776	838,026
Jan-22	25,635,474	854,516
Feb-22	25,355,260	845,175
Mar-22	29,595,038	986,501
Apr-22	23,913,060	797,102
May-22	27,495,508	916,517
Jun-22	25,828,078	860,936

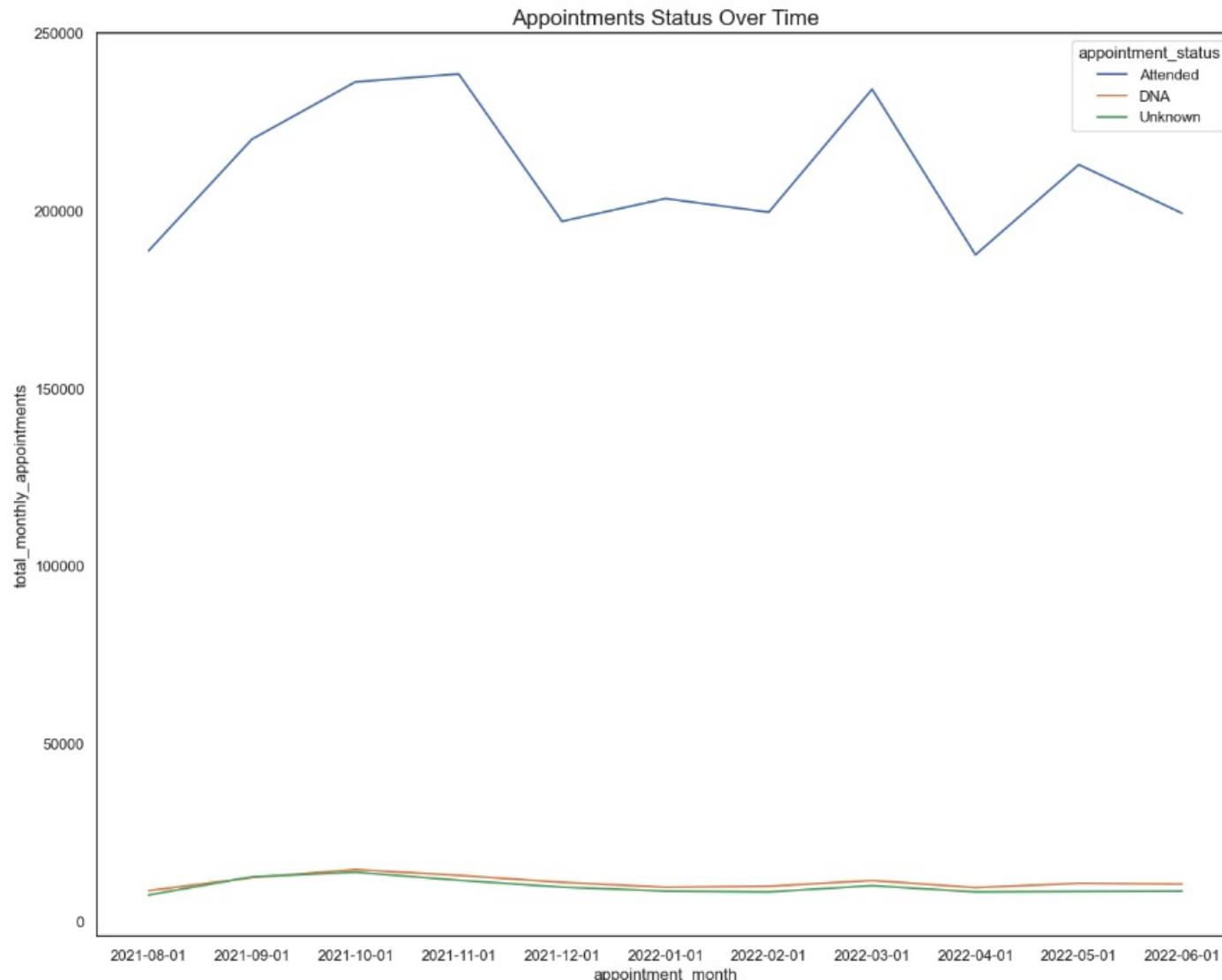
How do the healthcare professional types differ over time?

GP is the healthcare professional with the most appointments over time.



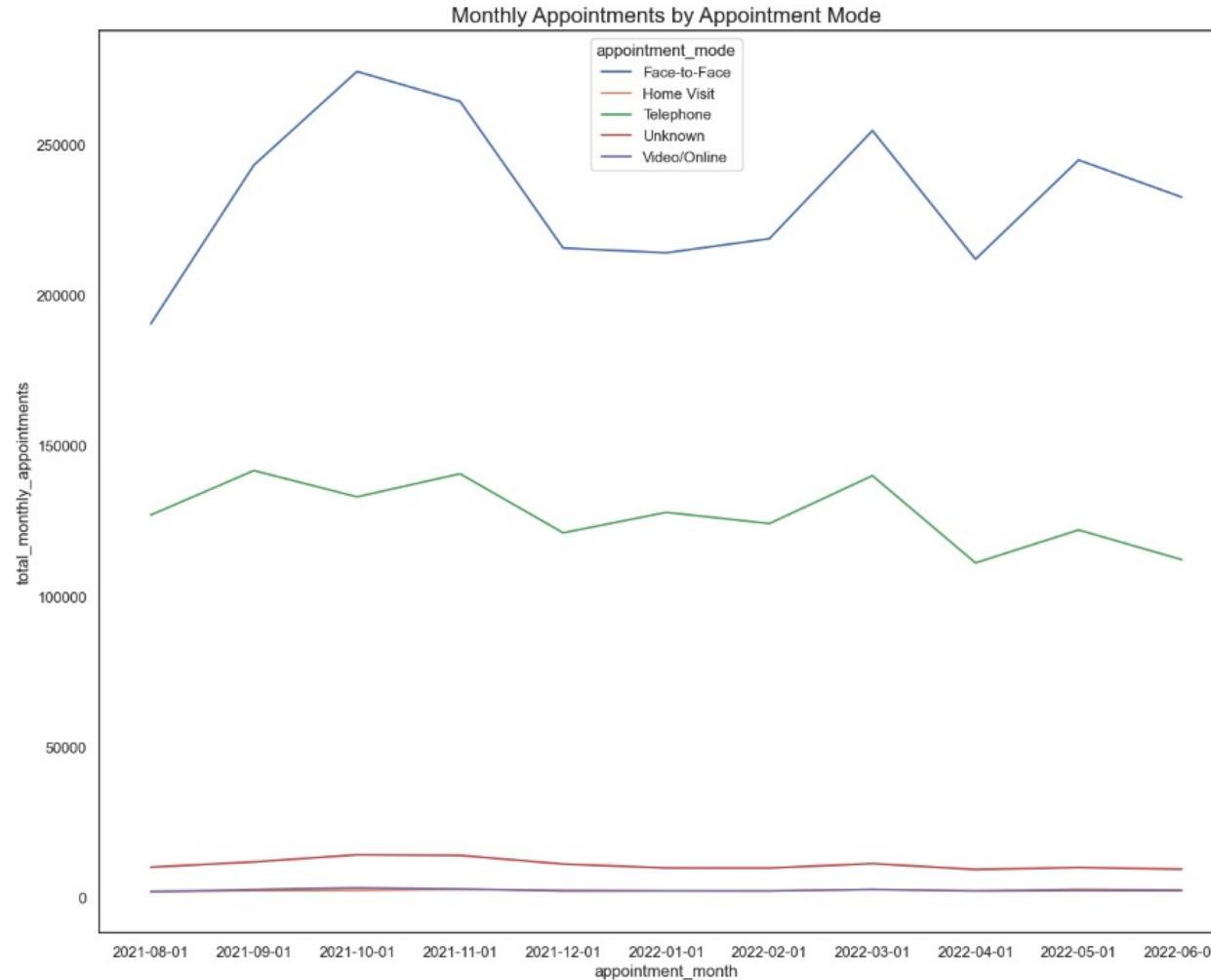
Are there significant changes in whether or not visits are attended?

There are not significant changes in the appointment type over time by looking at the busiest months.



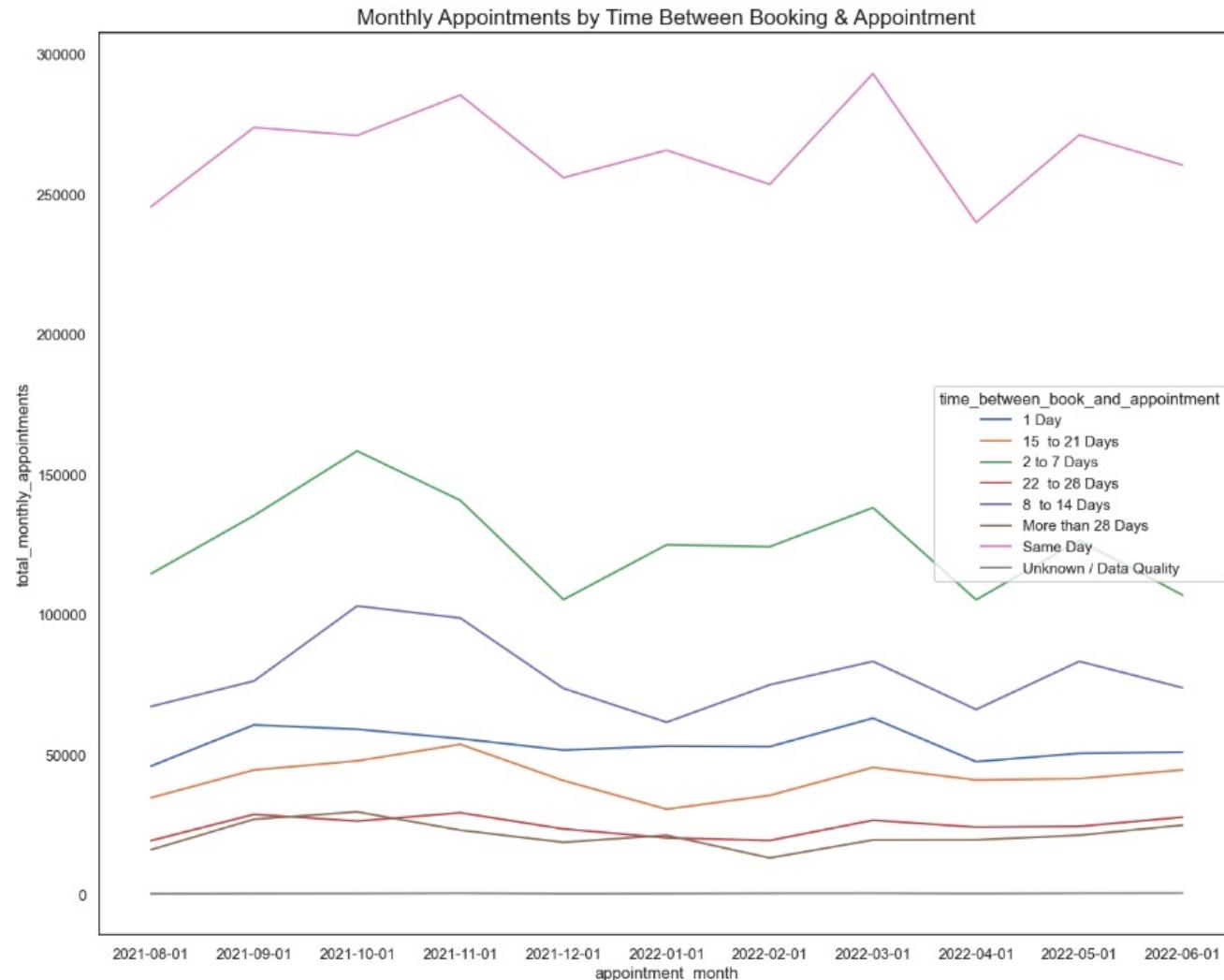
Are there changes in terms of appointment type and the busiest months?

Most of the appointments are attended **face to face**, followed by **telephone appointments**.



Are there any trends in time between booking an appointment?

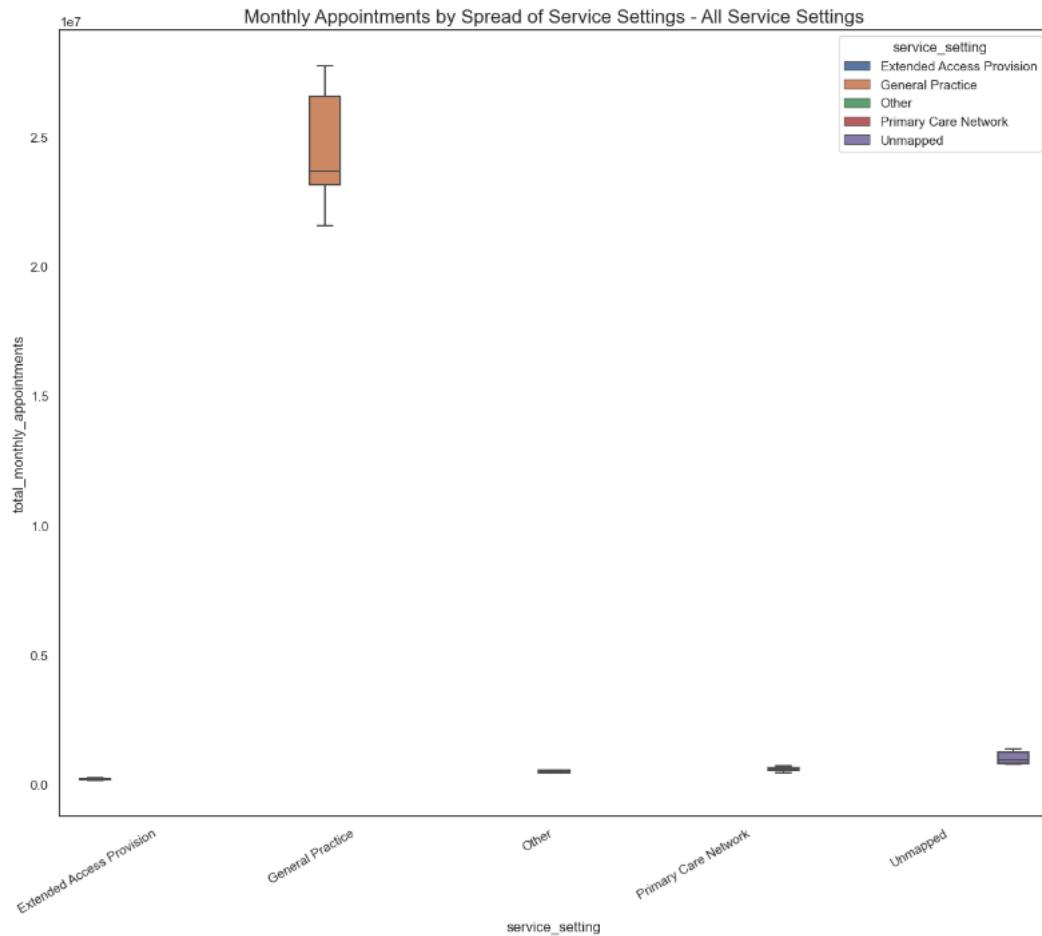
Most of the appointments are attended on the **same day** of the booking, followed by appointments that took between **2 and 7 days** in being attended.



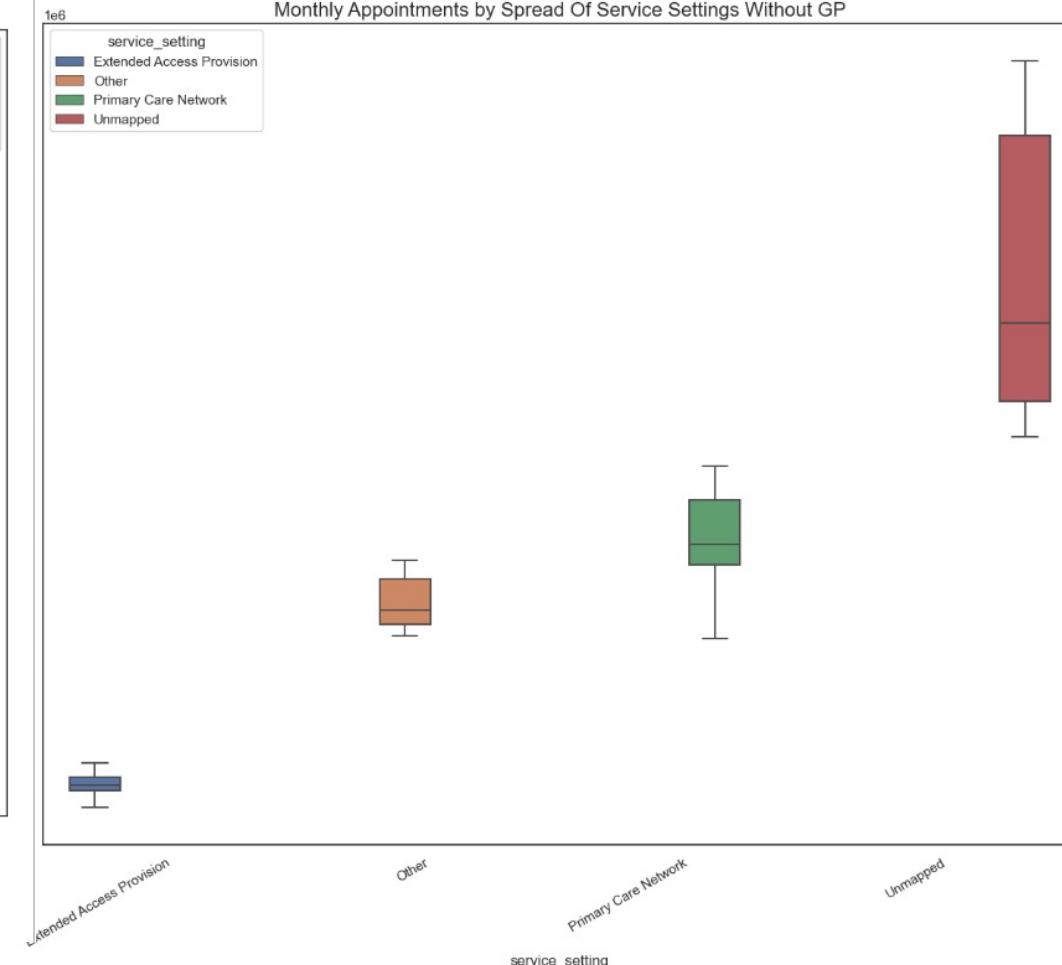
How do the spread of service settings compare over time, with and without the GP category?

General Practice is by far the service setting that recorded the highest number of appointments by month.

Monthly Appointments by Service Settings – All Service Setting



Monthly Appointments by Service Settings – Without GP



Final Insights



November and October 2021, were the months that recorded the highest number of appointments per month, followed by **March, 2022**.



March, 2022 and November 2021, recorded the highest number of records per month too.



General Practice seems to be the **service setting** with the highest number of records and the higher number of appointments per month.



Care Related Encounter is the **context type** that reported the highest number of appointments per month.



General Consultation Routine is the **national category** with the highest number of appointments per month, followed by **General Consultation Acute**.

Final Insights

General Practice is the **service setting** that reported the highest number of appointments across the three **seasons** studied in this analysis, **Summer 2021, Autumn 2021, Winter 2022, Spring 2022.**

Top trending #healthcare (#) on Twitter.

- #healthcare
- # digitalcare
- #patientecare
- #telemedicine
- #healthtech
- #telemedicine
- #medtwitter
- #healthcareit

Final Insights

If we consider the **maximum capacity** of the NHS to accommodate a **maximum of 1,200,000 appointments per day**, we do not think it is needed at this point to increase the staff levels. However, this should regularly be monitored and control.

Most of the **appointments** are **attended** by the patient over time. **GP** is the healthcare professional with the most appointments over time.
There are not significant changes in the appointment type over time by looking at the busiest months.

Most of the **appointments** are attended on the **same day** of the booking, followed by appointments that took between **2 and 7 days** in being attended.
General Practice is by far the service setting that recorded the highest number of appointments by month.

4. Next Steps

Data Sets | Recommendations

01

There are some erroneous data in the data sets that should be corrected in the future.

02

It is advisable to use the same **date range** across all data sets.



Q & A



Thank You

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