



# Data-Driven Strategies to Reduce NHS Missed Appointments

How Smarter Scheduling and Patient Engagement Can Improve Resource Utilization

Presented by  
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# NHS schedules up to 1.2M appointments per day

Missed appointments lead to wasted resources, longer wait times, and financial losses.

## Did You Know?

In 2019, the NHS lost around £216 million from missed GP appointments.

## ***How can we reduce these losses?***

By analyzing NHS appointment data, we identified patterns that reveal where improvements can be made.



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\*1.2M is used as a guideline  
for maximum capacity



# Business Problem: Demand Vs Capacity

1

**Has there been adequate staff and capacity in the networks?**

- **Appointment Modes & Staffing Needs:** Which appointment modes or HCP types require more staff resources?
- **Lead Time Demand:** What is the demand for different lead times?

2

**What was the actual utilisation of resources?**

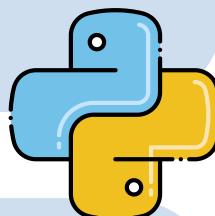
- **Resource Utilization:** How does actual appointment volume compare to planning capacity?
- **Efficiency Benchmarks:** How does utilization compare to the 85-90% healthcare target?
- **Missed Appointments:** Which appointment types have the highest Did Not Attend (DNA) rates?
- **Scheduling Impact:** Does lead time affect DNA rates?

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# Analytical Approach - How data answers these questions

**Tool:** Python (Libraries: Pandas, Matplotlib, Seaborn)



**Datasets Used:** National Categories (NC), Appointments Regional (AR) , ICB Codes

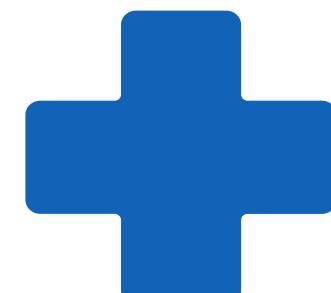
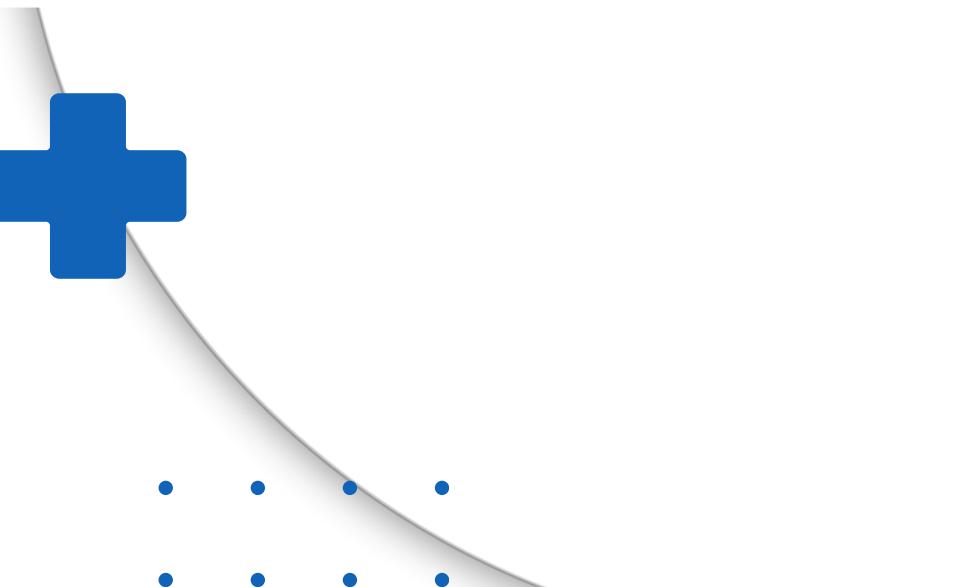


**Methodology:** Data Cleaning, Data Wrangling, Trend Analysis, Visualisations



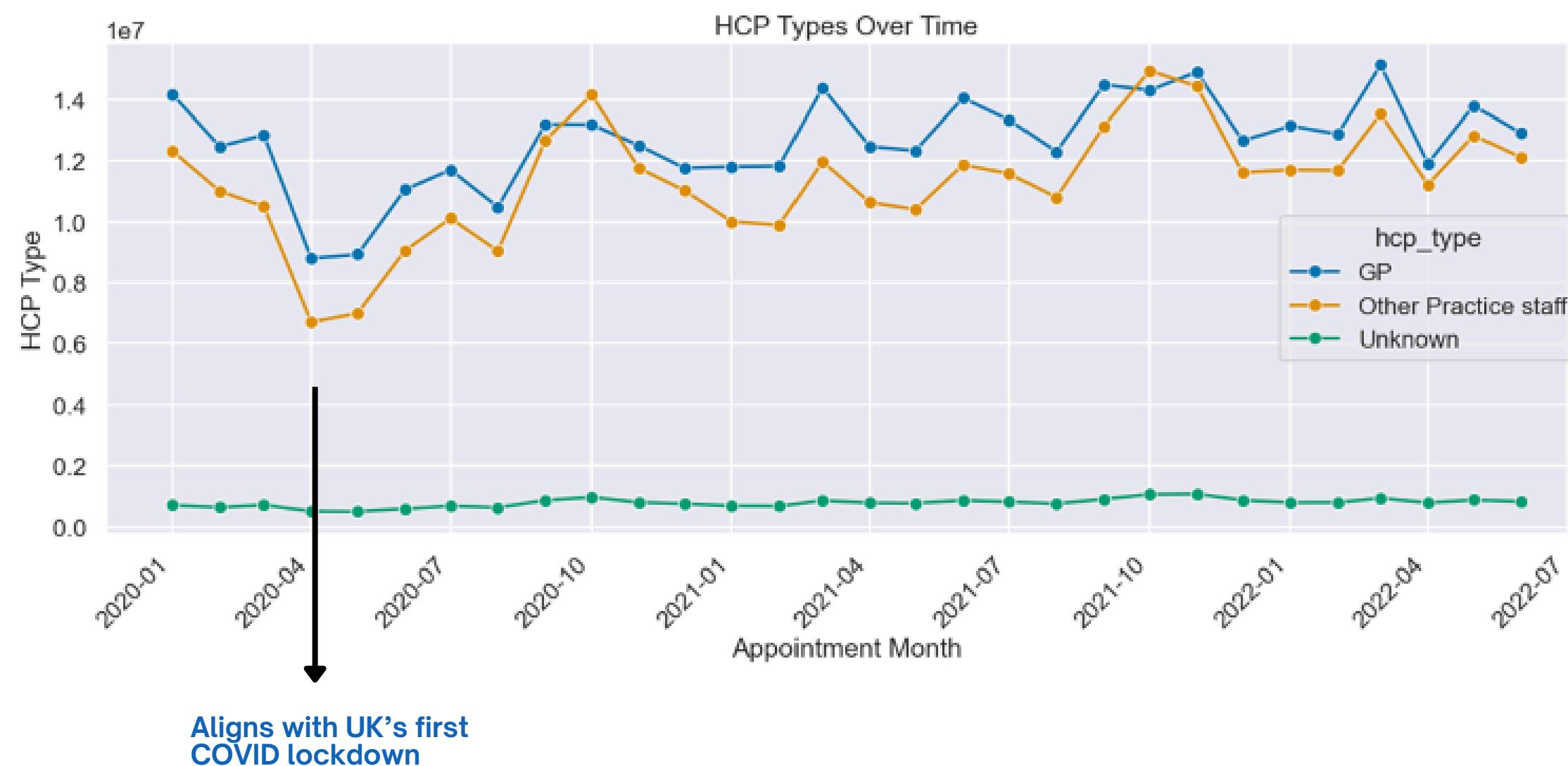
\*The AD dataset was not used in the analysis as it only covered a timeframe of 7 months which is insufficient to show a meaningful trend.

\*Social media data (Twitter) did not yield significant findings relevant to NHS appointment trends, so it was deprioritized.



# GPs handle the Highest Appointment Demand

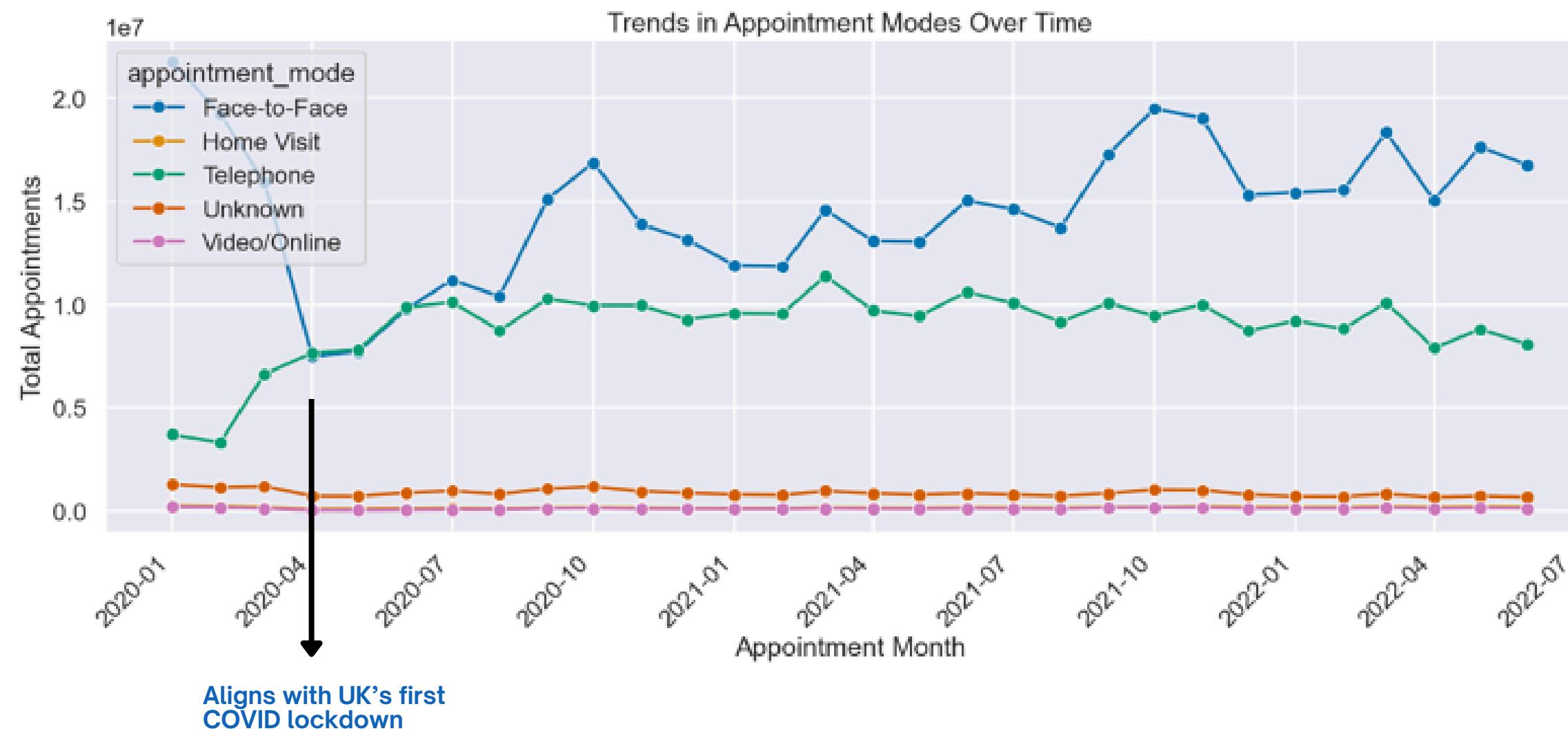
## How does this impact NHS Staffing?



- General Practice (GP) consistently handle more appointments than Other Practice Staff, indicating **higher demand for GP-led care**.
- Both roles follow similar trends, meaning **workforce shortages** in one group could **impact overall NHS capacity**.
- **Key takeaway:** NHS should ensure **balanced staffing strategies** to prevent overload on GPs while leveraging Other Practice Staff effectively.

# Face-to-Face Appointments Still Dominate

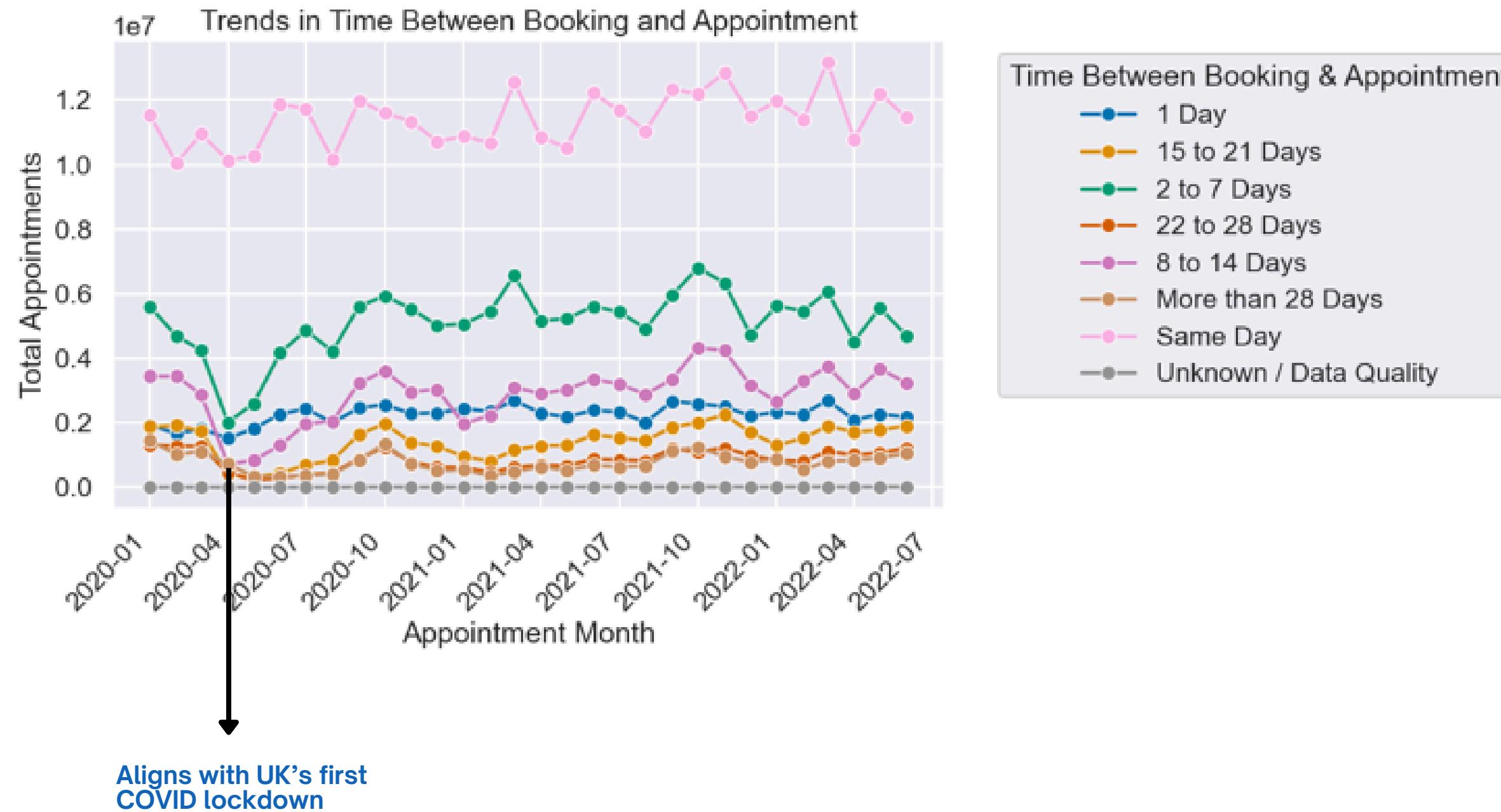
## What Does This Mean for NHS Remote Care?



- Despite increased availability of remote care, patients still **prefer Face-to-Face appointments**, suggesting in-person care is the primary mode of engagement.
- Telephone appointments surged during COVID but have since stabilized at a lower level, while Video/Online remains underutilized, possibly due to **accessibility issues**.
- Key takeaway:** Despite investment in digital health services, adoption remains low. Identifying **patient barriers** (e.g. tech literacy, accessibility) can **drive better utilization**.

# Same-Day Appointments Lead

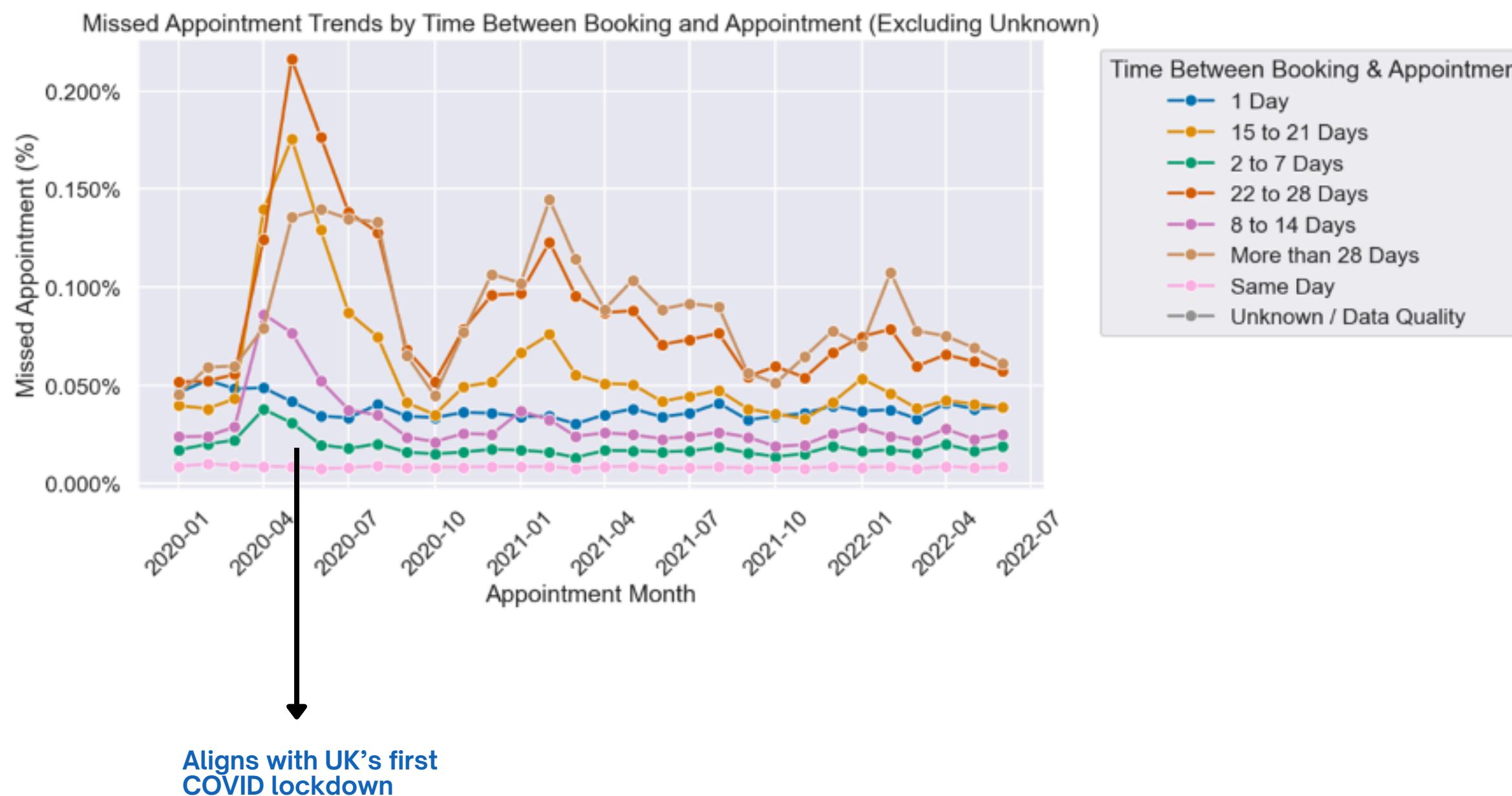
## How Should NHS Adapt Its Scheduling Strategies?



- Same-day bookings remain the most common, highlighting **patient preference for immediate care** and NHS's capacity for urgent needs.
- However, longer wait times (8+ days) persist, suggesting potential inefficiencies in long-term scheduling.
- **Key takeaway:** NHS should evaluate whether current scheduling **balances immediate demand with long-term resource allocation**.

# Missed Appointments Increase with Longer Lead Times

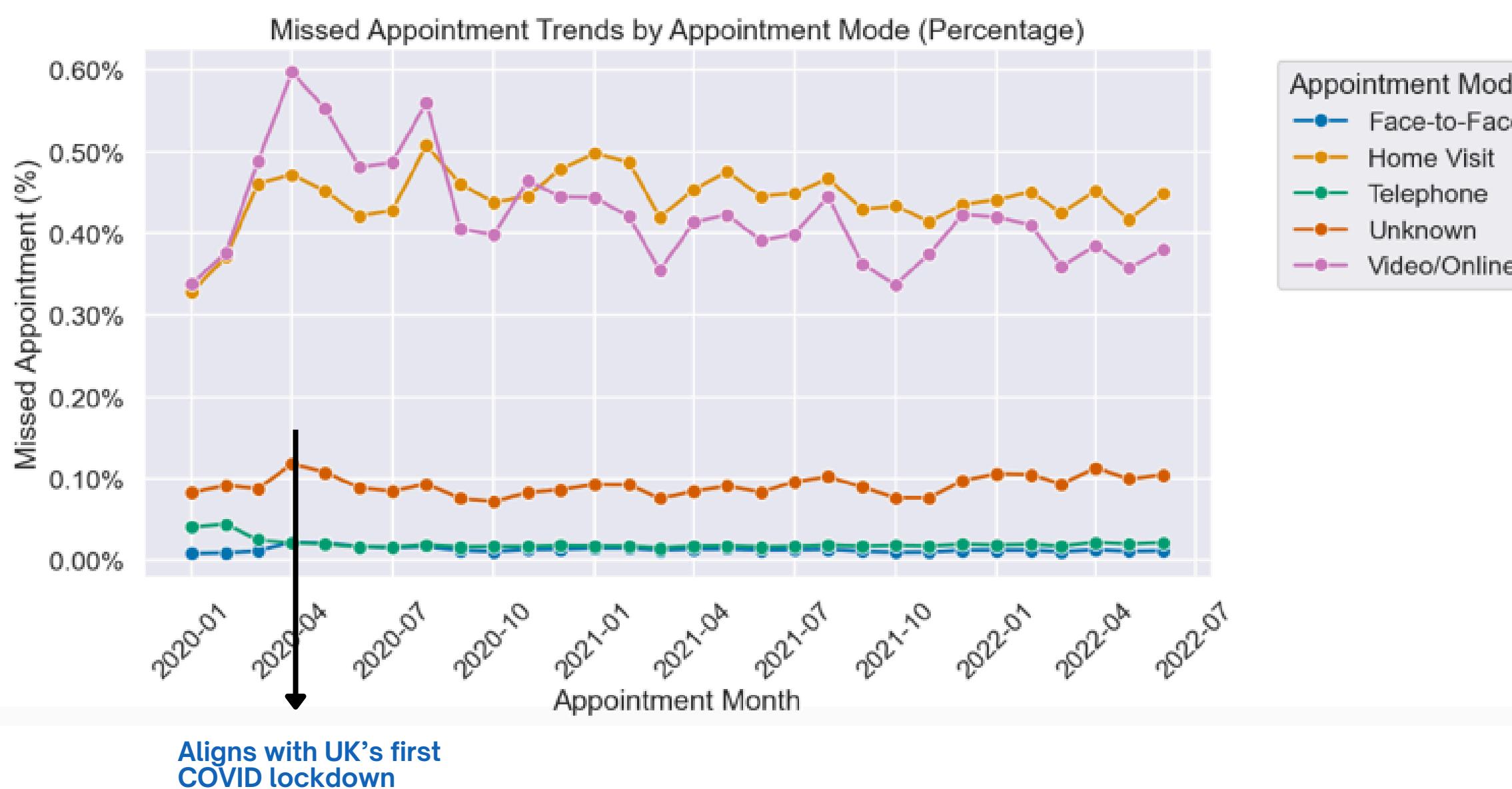
## How Can NHS Reduce No-Shows?



- Appointments booked more than 3 weeks ahead show the highest DNA rates, suggesting **patient disengagement** over time.
- Patients are more likely to **forget, cancel, or deprioritize** appointments booked far in advance.
- Shorter lead times improve attendance, but increasing same-day slots must be **balanced against staff capacity**.
- Next Steps:** Predictive analytics can optimize scheduling—by identifying **high-risk no-show** patients and dynamically **reallocating same-day slots**.

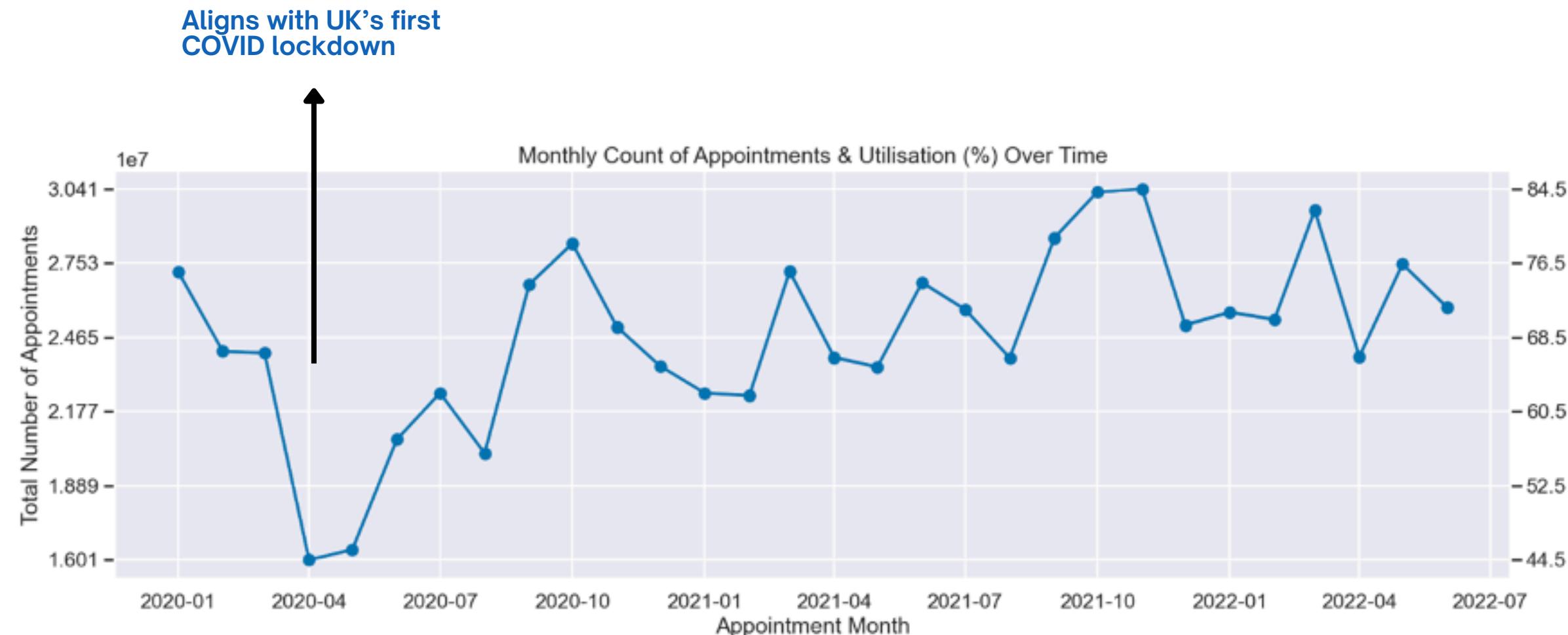
# Remote Appointments Have the Highest DNA Rates

## How Can NHS Improve Patient Engagement?



- Video/Online & Home Visits have the highest DNA rates—likely due to **tech barriers, lack of accountability, and patient disengagement**.
- Each missed slot leads to **inefficiencies**—delaying care for others and **straining capacity**.
- High DNAs in remote modes increase scheduling inefficiencies and can **cause longer wait times for other patients**.

# NHS Utilization – Are Resources Overloaded, or Is There Scheduling Inefficiency?



\*Utilisation is calculated with the 1.2M maximum planning capacity as a guideline.

## Note

Healthcare systems generally aim for 85–90% utilisation to balance efficiency and flexibility for demand surges.

- NHS utilization remains below 85%, meaning there is **no consistent resource strain or overload**.
- Instead of expanding capacity, **optimizing scheduling and reducing DNAs** would make better use of existing resources.

# Key Findings

1

**GPs** handle the highest appointment demand, emphasizing their central role in NHS capacity.

2

**Face-to-Face appointments** dominate, showing that despite remote care options, patients still prefer in-person consultations.

3

**Same-day bookings** are the most common, reflecting patient preference for immediate care and NHS's ability to handle urgent needs.

4

**Longer wait times** (8+ days) persist, indicating inefficiencies in long-term scheduling.

5

Appointments booked **more than 3 weeks** ahead show the highest DNA rates, suggesting **patient disengagement** over time.

6

**Video/Online & Home Visits** have the **highest DNA rates**, likely due to tech barriers, lack of real-time accountability, and lower patient commitment.

7

NHS **utilization remains below 85%**, meaning there is no consistent resource strain or overload.

8

Instead of expanding capacity, **optimizing scheduling and reducing DNAs** would maximize NHS efficiency.

# Recommendation 1: Reducing DNAs in Remote Appointments (Engagement Strategies)

**KPI:** Decrease missed appointment rate for Video/Online consultations by **15% over 6 months.**

## Implement Automated Reminders:



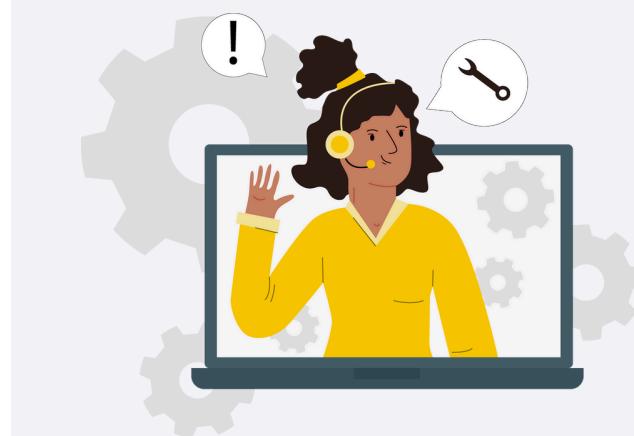
Send SMS or email reminders 24-48 hours before video or online appointments to reduce no-shows.

## Introduce Confirmation Incentives:



Patients who confirm their appointments via SMS or the NHS app may receive priority booking for future slots.

## Enhance Access to Online Consultations:



Ensure that technical issues (e.g., unstable connections) are minimized by providing clear instructions and technical support.

## Recommendation 2: Optimizing Scheduling to Reduce No-Shows

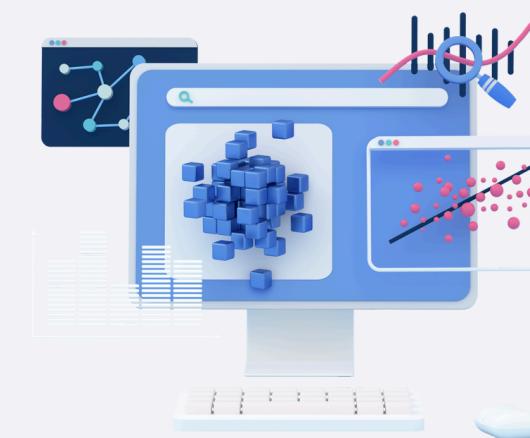
**KPI:** Reduce missed appointment rate for appointments booked **more than 7 days in advance to below 0.05%.**

### Increase Same-Day and Next-Day Appointments:



Data shows shorter booking times lead to lower DNA rates. NHS should allocate more slots for immediate or next-day consultations.

### Use Predictive Analytics for Scheduling:



Identify high-risk missed appointment patients (e.g., those with a history of DNAs) and adjust scheduling strategies to reduce missed visits.

## Recommendation 3: Data Quality Fixes to Improve Insights

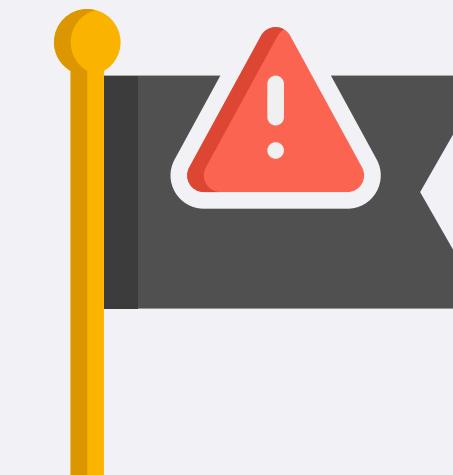
**KPI: Reduce 'Unknown' entries in appointment\_mode and hcp\_type fields by 30% in 12 months.**

### Mandate Drop-Down Selection for Appointment Modes:



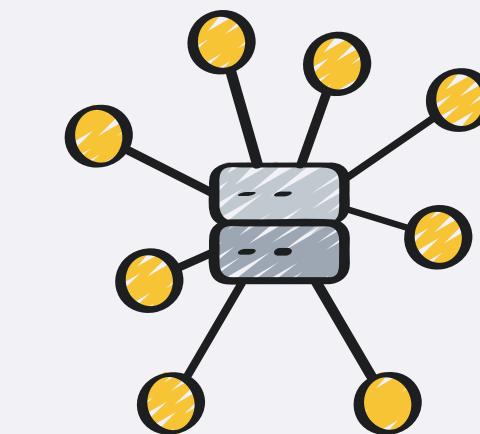
Standardize appointment classification to reduce errors and inconsistent mappings.

### Flag 'Unknown' and 'Unmapped' Data for Review:



NHS systems should trigger alerts when excessive "Unknown" values appear in records, prompting manual review.

### Develop a Centralized Data Entry System:



A single, unified NHS platform should ensure all regions follow the same data recording practices, reducing discrepancies.

# Analytical Recommendations



## Expand Data Collection:

Incorporate patient demographics, reminder response rates, and historical DNA trends to refine predictive analytics.



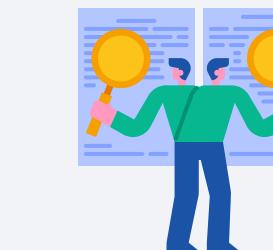
## Assess Effectiveness of Engagement Strategies:

Track the impact of SMS, email, and letter reminders on reducing DNAs.



## Investigate Root Causes of DNAs:

Explore socio-economic factors, accessibility barriers, and appointment preferences to improve patient attendance.



## Compare NHS Interventions Over Time:

Establish a framework to measure changes in DNA rates after implementing scheduling optimizations or communication strategies.

# Future Analysis - What could be explored further?

## Patient Demographics and DNA Rates

- Are missed appointments more common among **specific age groups, socioeconomic backgrounds, or health conditions?**
- How do **external factors** (e.g., transportation, digital literacy, socioeconomic barriers) influence appointment adherence?
- **Next Step:** If patient-level data were available, we could segment DNA rates by patient characteristics and tailor engagement strategies accordingly.

## Workload Distribution – Staffing vs. Appointment Demand

- Does NHS staffing align with **peak appointment demand?**
- Are some healthcare professionals (GPs) **overburdened while others are underutilized?**
- **Next Step:** If NHS provided workforce data, we could **analyze workload distribution** and suggest staffing reallocations.

# Future Analysis - What could be explored further?

## Impact of NHS Interventions on DNA Rates

- Do patients respond better to **certain reminder formats** (e.g., text vs. phone calls)?
- Do different patients groups respond differently to messaging styles?
- **Next Step:** Conduct A/B testing on **different reminder strategies** to determine the most effective engagement method. Test pathos (emotional appeal), logos (rational appeal) and ethos (authority based appeal) on different patient groups.

## Predictive Analytics for DNA Reduction

- Could machine learning models help **predict high-risk DNA patients** and **suggest proactive scheduling changes**?
- **Next Step:** If historical patient data were available, we could build a predictive model to flag high-risk DNAs and suggest double-booking strategies or preemptive confirmations.

## Conclusion

To maximize NHS efficiency, three key actions stand out:

- 1 Reduce DNA rates through **automated reminders** and **smarter scheduling**.
- 2 Balance same-day demand with **longer-term appointment planning**.
- 3 **Improve data collection** to enhance predictive analytics.

With these strategies, NHS can optimize appointments and reduce resource strain.



# Thank You

I welcome any questions  
or feedback.

Annora Ng, Data Analyst

