Improving Proximity to Obstructive Sleep Apnoea Diagnostic Services

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Background: What is OSA?

• Sleep disordered breathing disorder

• Affects a large population (6-17% of adults are expected to require treatment)

• Untreated OSA is related to higher risk of cardiovascular disease and motor vehicle collisions

• Treatment is highly beneficial and cost-effective

• Access to OSA screening tests is difficult
OSA Screening

- The first stage of an OSA diagnosis is to complete a home-based oximetry test
- Watch-like device with finger probe
- Measures blood oxygen saturation whilst the patient sleeps
- Can confirm moderate and severe cases of OSA
- Patients pick up the device from an exchange facility to use for 1 night
Royal Papworth Hospital Accessibility

- RPH is based in Cambridgeshire (East of England)
- Catchment area of over 200 square miles
- Poor road network / little public transport
- Large numbers of the population living in badly connected areas
- Long journeys to get to RPH
Royal Papworth Hospital Exchange Facility Network

- 21 Exchange Facilities
- Royal Papworth Hospital (green triangle)
- 7 outreach (blue stars)
- 13 GPs (Black Starts)
- Unsure of the effectiveness the network
Methods

- Data from 5 years (2013-2018)
- 23,947 Patients
- 46,211 planned picks
- Journey reconstruction (Open Route Service API)
- Spatial distribution of patients pooled to 6x6 km grid
- Identify optimal exchange facility locations
OSA screening facilities compared to demand for service

- The areas of high patient density are located in high population areas
- Most high density areas are in close proximity to an exchange facility
- There are some expectations (e.g. Kings Lynn, Bishop’s Stortford & Lowestoft)
- Many rural patients are not well serviced
Outreach services are not being utilized

- 53.3% of oximeters are picked up from Royal Papworth Hospital
- Some exchange facilities have very few pick-ups
- Only 24% pick up from closest exchange facility
- 15.8% no-show rate
• Large range of travel distances to an exchange facility
• Journey completed 4 times
• Mean travel distance: 32.9km
• Mean travel distance if all patients picked up from closest exchange facility: 12.3km
Travel Distance and no-show

- Some variation in mean travel distance between exchange facility type
- RPH had the highest mean journey distance
- There was no relationship between travel distance and chance of no-show
Optimal number of Exchange Facilities?

- P-median analysis
- Calculates travel distance based on 1-30 exchange facilities in optimal locations
- Optimal number of Exchange facilities = 10
- Any additional facilities after 10 only yield diminishing results
Optimal location of the 10 Exchange Facilities?

- Many of the existing exchange facilities are located close to optimal model
- There is huge benefit to have these facilities perform better
- The core and Eastern areas are over serviced
- Northern areas are underserviced
Next Steps?

• The current approach only assessed current demand for service, not need of an OSA service based on risk factor prevalence.

• We are in the process of developing an OSA risk prevalence map.

• Early results show some variation in RPH’s catchment area.

• If the early results are confirmed, the optimal service model will need to be adapted appropriately before a service reorganization can take place.
Summary

- Some of RPH’s oximetry exchange facilities are well located and some are not.

- Despite the option of 21 exchange facilities, more than half of the tests are picked up from RPH.

- A redistribution of the exchange facility network based on these results should significantly improve accessibility to OSA diagnostic tests.

- The methods used here may be useful to any health service that involves outreach facilities.
Feedback, Comments or Questions

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