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 Physiology
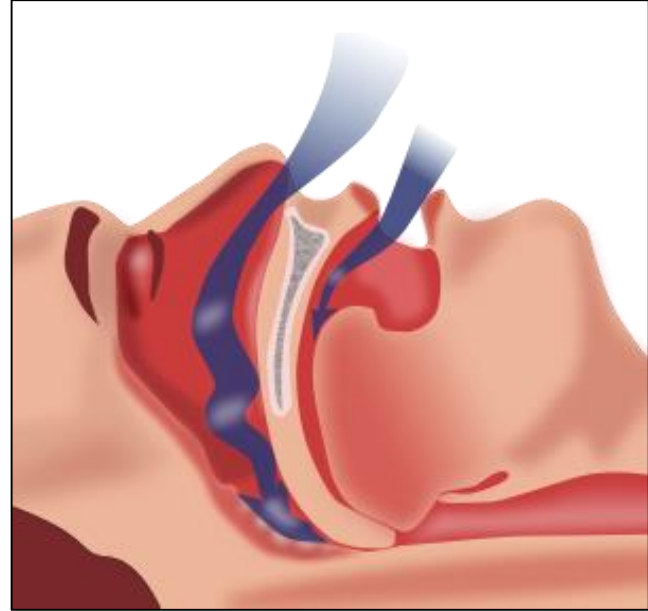
OSA Screening

- 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

Oximetry Home Diagnostic Test

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
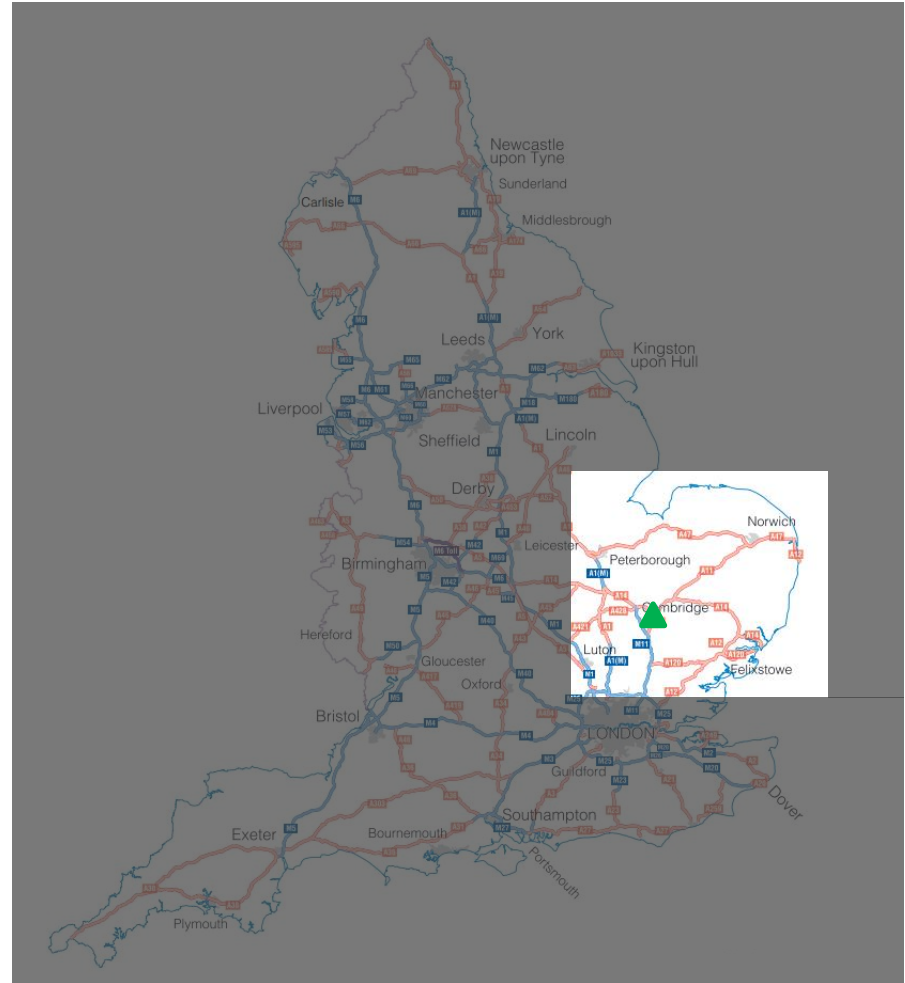
Royal Papworth Hospital Exchange Facility Network

- 21 Exchange Facilities

- Royal Papworth Hospital (green triangle)

- 7 outreach (blue stars)

- 13 GPs (Black Starts)

- Unsure of the effectiveness the network
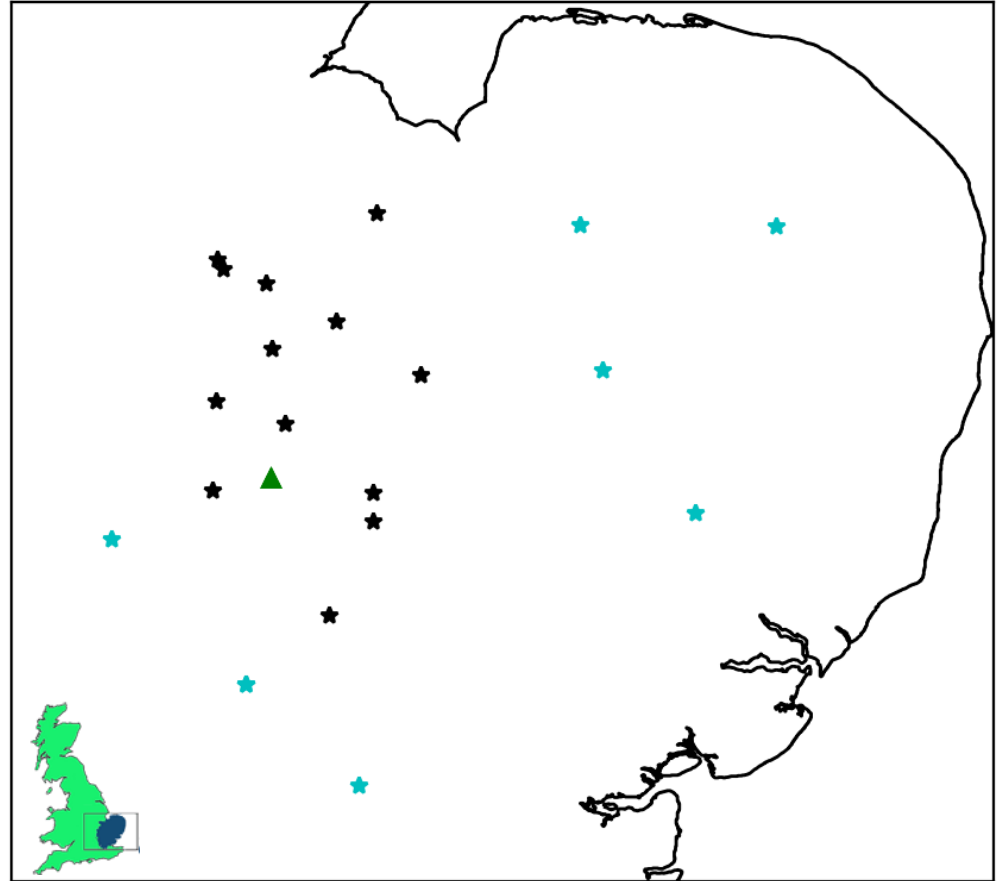
Methods

- Data from 5 years (2013-2018)

- 23,947 Patients

- 46,211 planed pick ups

- Journey reconstruction (Open Route Service API)

- Spatial distribution of patients pooled to 6x6 km grid

- Identify optimal exchange facility locations
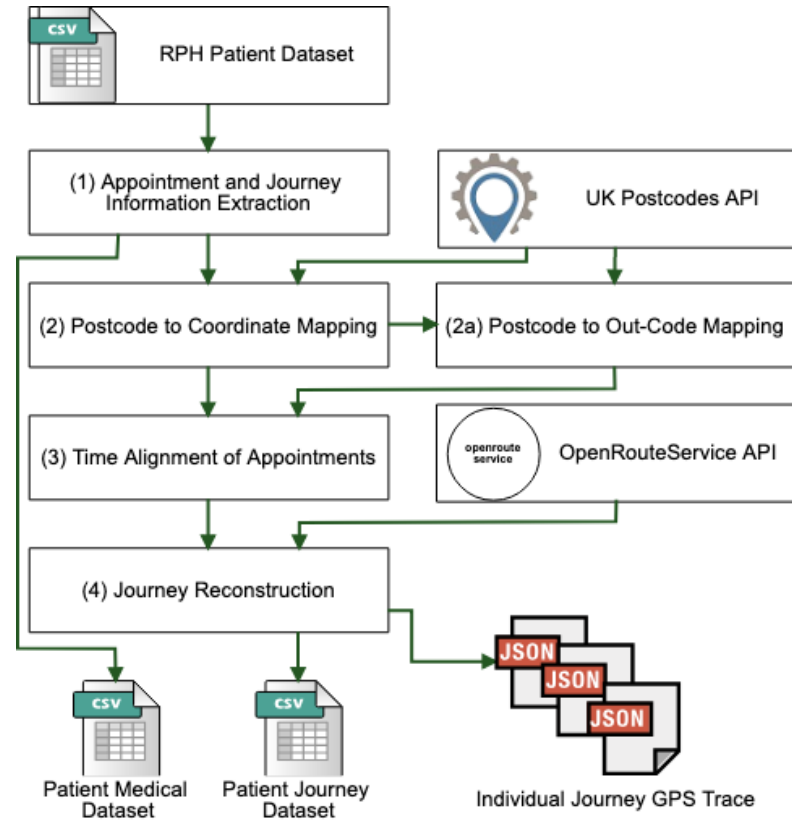
OSA screening facilities compared to demand for service

- 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
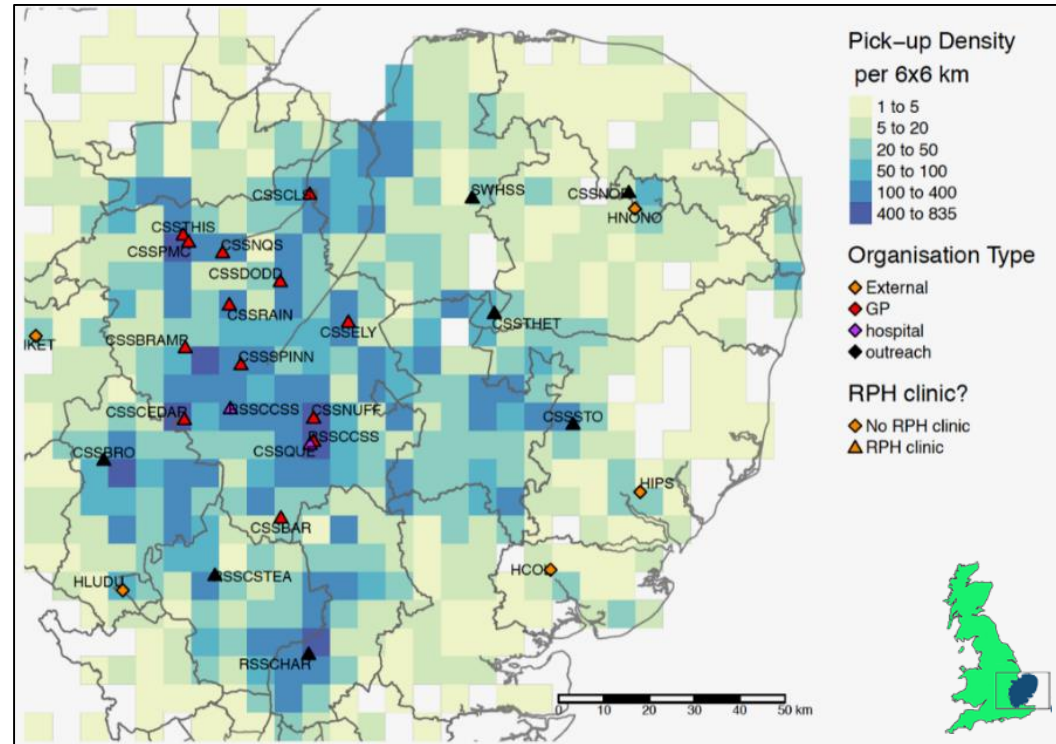
Outreach services are not being utilized

- 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
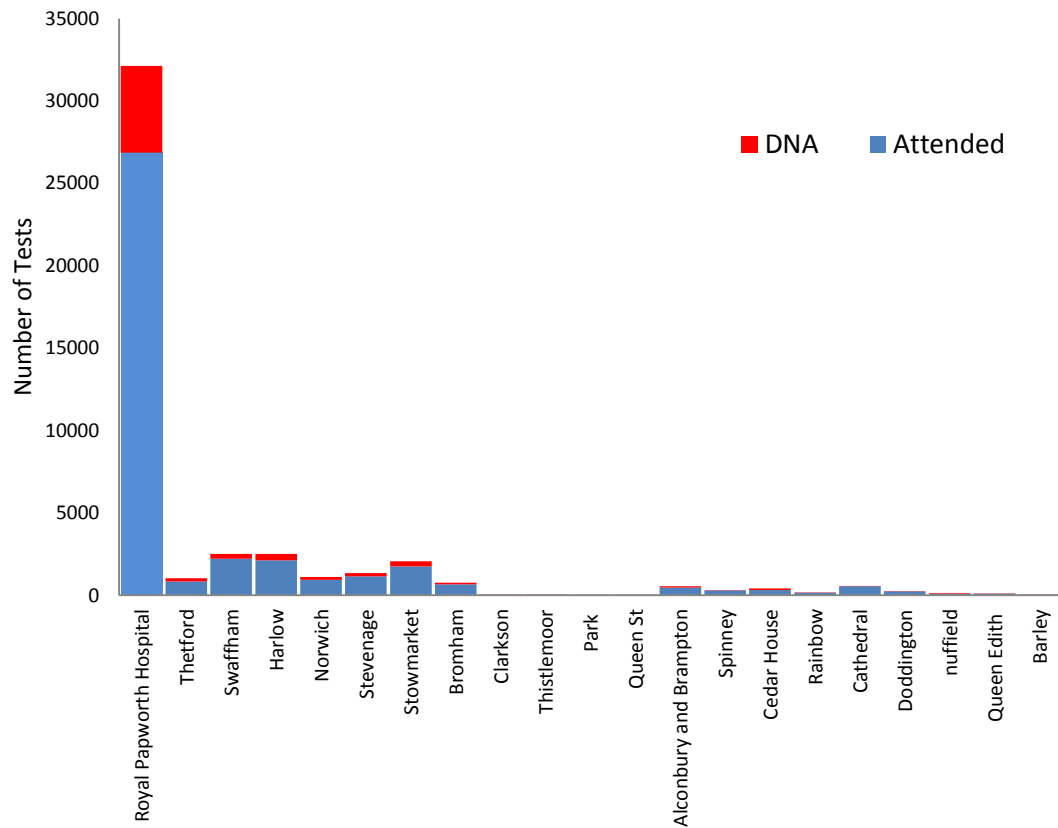
Long Journeys

- 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
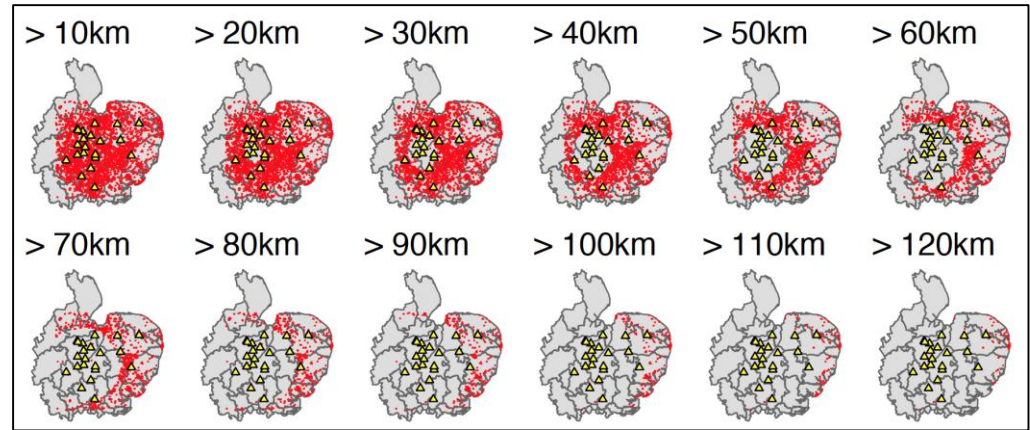
Travel Distance and no-show

- 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
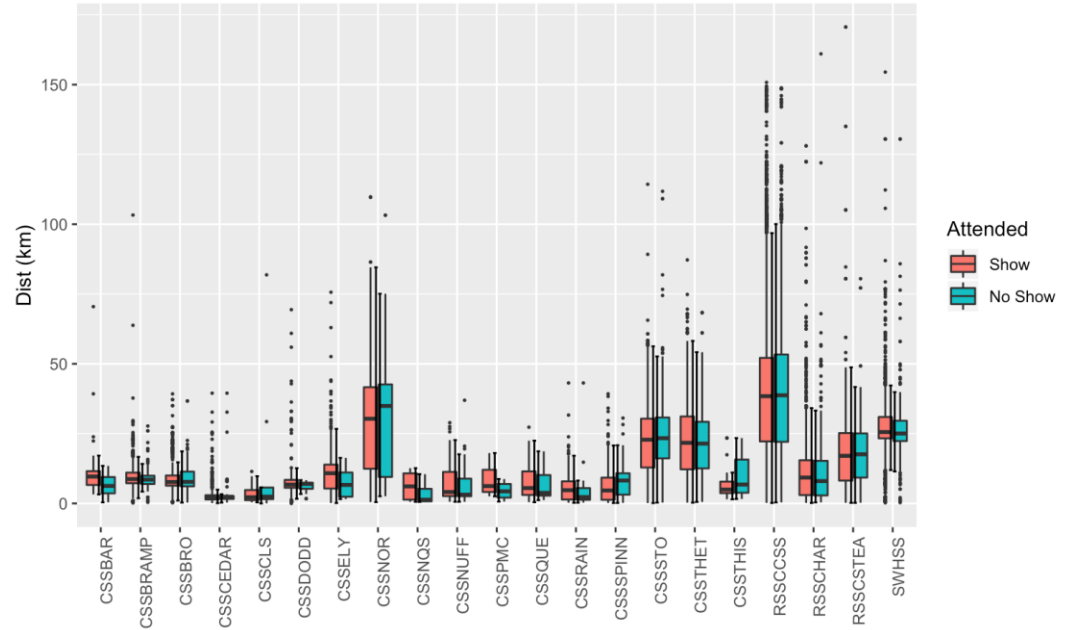
Optimal number of Exchange Facilities?

- 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
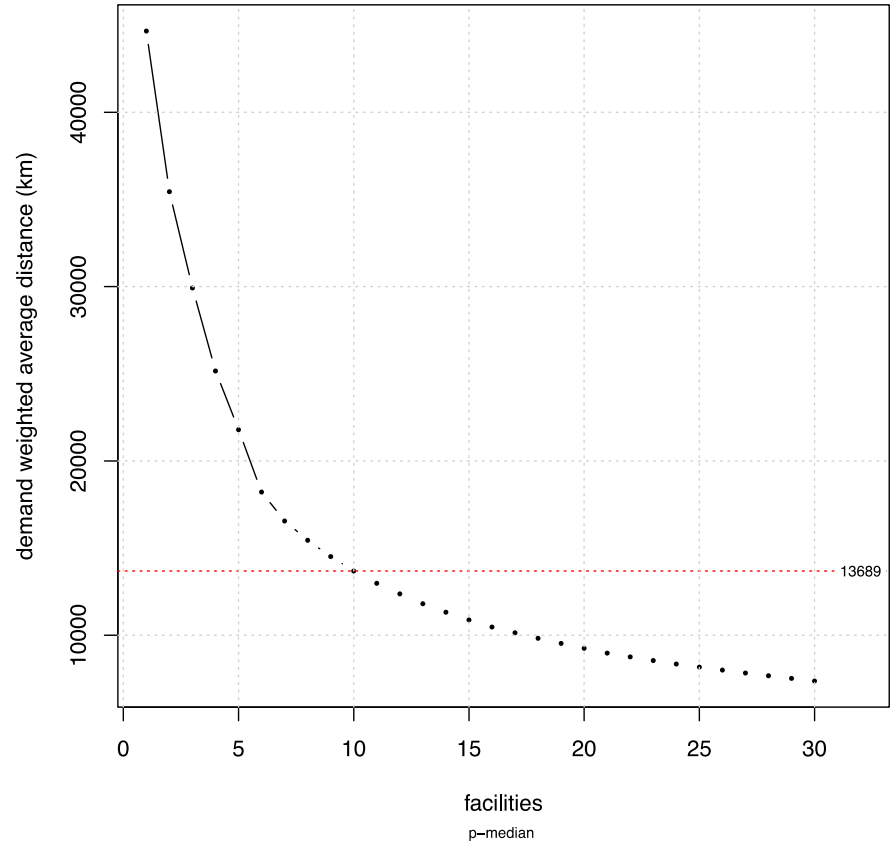
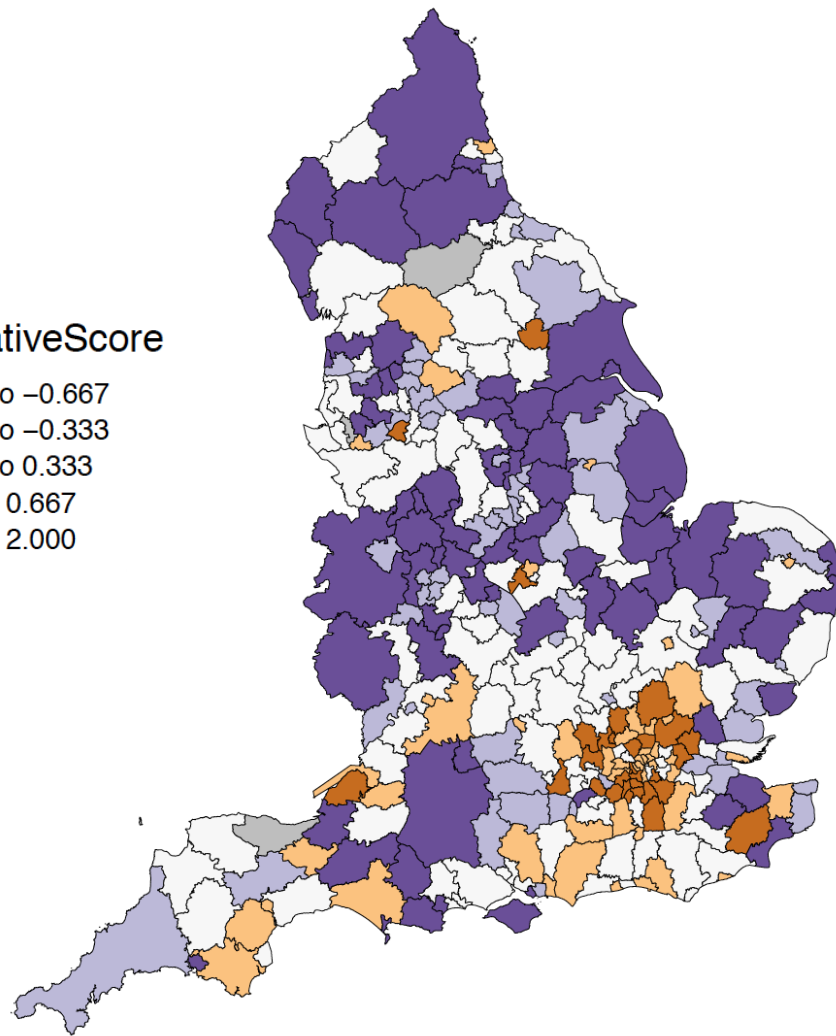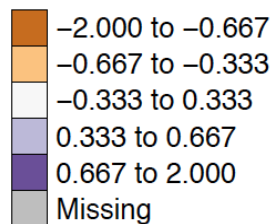# Optimal location of the 10 Exchange Facilities?

- 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
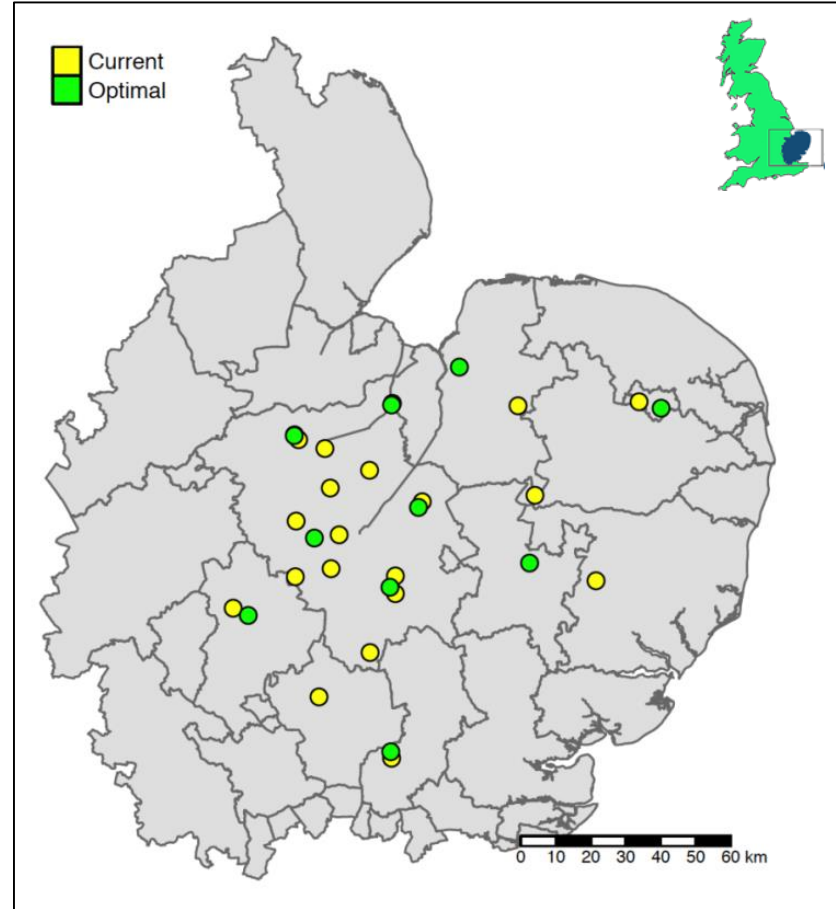
Next Steps?

- 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

RiskRelativeScore
- −2.000 to −0.667
- −0.667 to −0.333
- −0.333 to 0.333
- 0.333 to 0.667
- 0.667 to 2.000
- Missing

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 many be useful to any heath service that involves outreach facilities

Track & Know

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Feedback, Comments or Questions

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