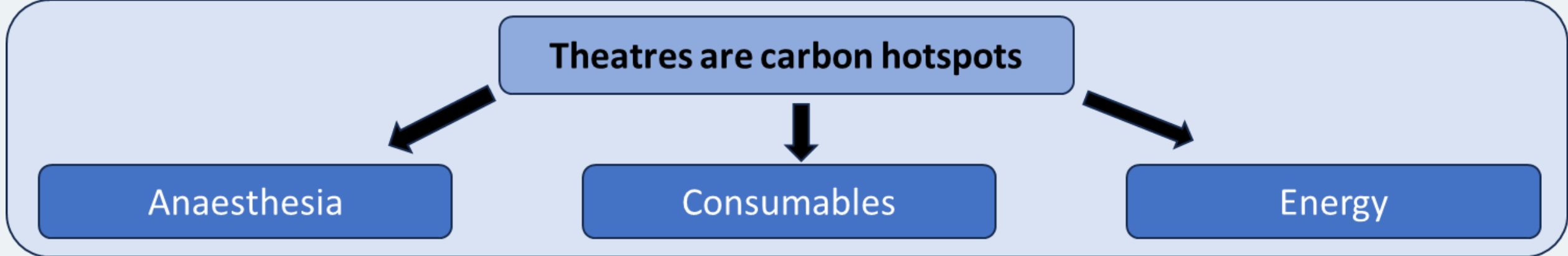


Exploring the relationship between theatre efficiency and carbon footprint

BACKGROUND



Long theatre turnover times, where the theatre is running without operating on a patient, produces carbon emissions without patient benefit. Because cataract surgeries are very short, turnover time between patients has a large impact on the per patient carbon footprint. Theatre turnover time can be shortened through more efficient processes in hospitals, thereby providing a lever for reducing carbon emissions.

We were interested in the proportion of total surgery time that can be attributed to theatre turnover, and in unwarranted variation between hospital sites, to identify whether increasing efficiency in theatre could be reduce the carbon emissions of surgery.

METHODS

We used the NHS theatres dataset for our analysis. Data was triangulated with Hospital episode statistics (HES) data to check the data quality of the theatre data.

Inclusion criteria

- Financial year 2022-23, up to September 2023
- All patients > 16 years age that were operated on in NHS trusts
- Elective and day cases

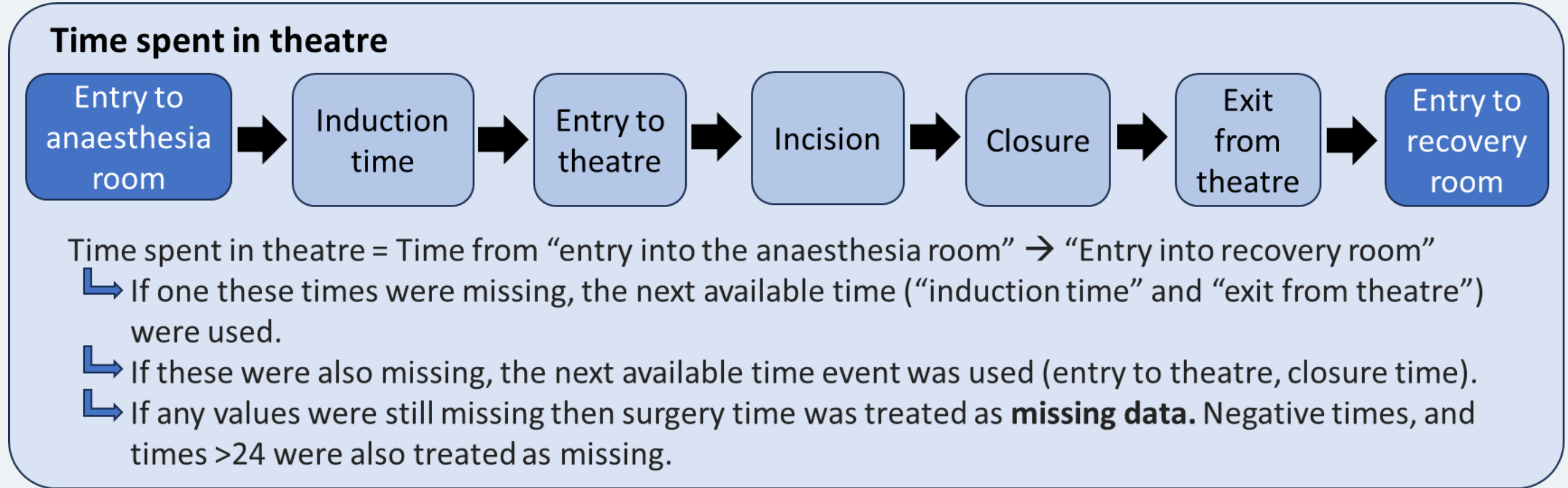
Exclusion criteria

- Operations marked as cancelled

Time per cataract surgery was calculated in two ways:

- Through the times recorded in the theatres dataset (see Figure 1)
- For cataract only lists time was calculated from the actual session time and the number of procedures per list

Theatre time was then compared between hospital trusts and to GIRFT guidelines for high volume low complexity cataract surgery, which recommend >8 cataract procedures pre 4 hour list.



RESULTS

- Procedure time and data available for 185,380 patients, median patient age: 76 years

Analysis of theatre time recorded in the theatres dataset showed:

- Median procedure time 38 minutes (29-49 minutes)
- Median incision to closure time 27 minutes (interquartile range 21—37 minutes)
- Mean 3.4 cataract surgeries per 4 hours

Analysis of average cataract surgery time for cataract only lists showed:

- Median time per cataract surgery 38 minutes
- Mean 3.6 cataract surgeries per 4 hour session

Strengths

- National dataset, good data coverage and quality (mandatory dataset)
- Able to triangulate theatre data with HES to ensure quality
- Agreement between HES and Theatres dataset, with theatres dataset comprising 70% of procedures conducted in the NHS as recorded in HES → good coverage
- Only 0.5% data missing

Limitations

- Possibly still data quality issues due to variations in recording
- True time in theatre might be slightly longer because for some records full timing data was not available but this was relatively rare
- Cannot extrapolate to other procedure types or outside of the UK
- We have not adjusted for case mix, so there may be good reason why individual trusts have longer operating times

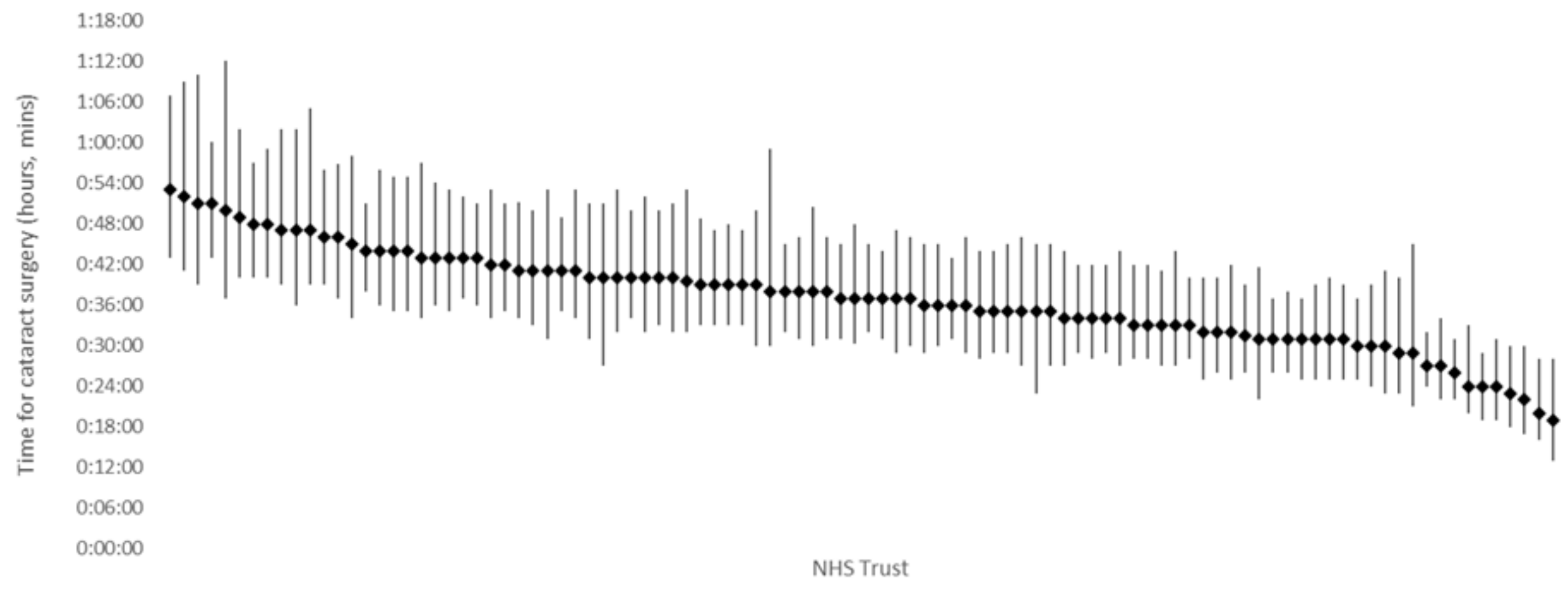


Figure 1: Variation in time spent per cataract surgery between NHS trusts

DISCUSSION

Our project highlights the importance of targeting theatre efficiency as a key lever to reduce per patient carbon emission as well as reduce NHS waiting lists.

We found that the average time per cataract surgery is below GIRFT guidelines for most hospital trusts. GIRFT guidelines recommend 8 cataract surgeries per 4 hour session (30 minutes per procedure. We also found substantial variation between trusts (see Figure 1) with few trusts compliant with best practice for high volume procedures.

The results from this research demonstrate improvements that can be made in the delivery of healthcare through increasing the number of patients per list.

This will have the triple benefit of reducing carbon emissions, reducing waiting times for people requiring surgery and reducing costs for the NHS through reduced need to fund additional capacity to tackle waiting lists (weekend operating lists and outsourcing to private providers).

Currently, it can reasonably be assumed that any freed capacity through increased efficiency will be taken up by other clinical services, however large amounts of theatre down time is still a wasteful practice in the delivery of clinical care which increases carbon emissions per patient and should be targeted to achieve a net zero NHS.

Key messages

- Both procedure time and incision to closure time are substantially longer than recommended in best practice guidelines
- There is wide variation of time per surgery between NHS trusts
- Lower surgery times in some trusts suggest there is opportunity to learn from good practice
- Increases in efficiency can reduce patient waiting lists at the same time as contributing to low carbon care