

Travel times and ambulance coverage for proposed hyper-acute stroke units and major trauma centres in London

1 Overview

Healthcare for London conducted substantial analysis to calculate travel times to proposed new hyper-acute stroke units and major trauma centres in London.

Healthcare for London and the London Ambulance Service are confident that the analysis and travel time figures outlined in the consultation, *'The shape of things to come'*, are robust and realistic.

As part of the analytical process to establish accurate bluelight travel times (in an ambulance) for the new specialist centres, Healthcare for London:

- Sourced the details of every ambulance journey in London in the last three years – about four million records (London Ambulance Service).
- Used sophisticated modelling software, using real average journey times on roads, to supplement the data from the London Ambulance Service.
- Compared 100,000 bluelight journeys with 2,000,000 other urgent ambulance journeys.
- Conducted specific analysis to assess the impact of the day of the week and rush hour on ambulance journey times.
- Used contour lines for any combination of sites to estimate area, population and incident coverage within different timeframes.

Healthcare for London's analysis is also backed-up by the day-to-day experiences of the London Ambulance Service in taking patients to eight specialist cardiac centres across the capital.

The London Ambulance Service supports Healthcare for London's analysis and figures.

2 Introduction

The system for improving stroke and trauma services in London, proposed in the consultation *'The shape of things to come'*, is based upon patients arriving at new specialist stroke and major trauma centres within 30 minutes and 45 minutes respectively, by blue-light ambulance journey.

Healthcare for London conducted considerable analysis to ensure that the system proposed is robust and that patients from all over London will have equitable access to the new centres.

Healthcare for London's analysis demonstrates that wherever someone lives in London they will be less than 30 minutes, in a blue-light ambulance, from one of eight proposed hyper-acute stroke units; and less than 45 minutes from one of four proposed major trauma centres.

3 Data sources and analytical process

The same methodology and the same two sources of data were used to calculate estimated ambulance times for stroke and major trauma configurations. These were:

- The London Ambulance Service (LAS) database
- Mapinfo Drivetime – software to model travel times

Ambulance journeys were used for planning purposes and the design of the systems, as the vast majority of patients will arrive at the proposed specialist centres by ambulance rather than by private transport.

For major trauma it was decided not to use the air ambulance as part of the system planning process because of the limitations on the use of the helicopter in London. Although the air ambulance will be used for major trauma transportation, the system must be designed to cope with journey times at all times of day and for all types of weather.

3.1 LAS database

Healthcare for London sourced the details of every ambulance journey in London in the last three years (Jan 2005 to March 2008), which amounted to about four million records.

For those journeys with defined start and end locations Healthcare for London has detailed information about the exact start and end times for different stages of the journeys (for example, call to scene and scene to hospital). A number of journeys were discounted due to a number of variables, such as not all journeys turning into real incidents and incomplete records.

A comparison was undertaken to assess whether certain types of ambulance journeys are faster than others (including bluelight) and the extent to which journey speed is influenced by time of day or day of week.

3.2 Mapinfo Drivetime

The analysis of London Ambulance Service journey times was supplemented with modelling using a product called Mapinfo Drivetime. This was because the number of long ambulance journeys in the London Ambulance Service data was not large enough to assess the proposed new model of care using actual journey times alone (because most ambulance journeys currently take patients to their nearest hospital).

Mapinfo Drivetime has been used by the Department of Health in service planning. This (and similar products) are also widely used by delivery companies for route planning.

Mapinfo Drivetime software contains a model of the entire UK road network with associated average speeds. The model allows contours of equal journey time around specified locations (known as isochrones) to be generated. MapInfo Drivetime was used to estimate travel isochrones around each candidate hospital at five minute intervals. These isochrones assume all roads are available for travel and that the fastest routes are taken.

3.3 Additional analysis

The Mapinfo Drivetime modelling was supplemented further:

- a) Direct access to the impact of rush hour was not available through Mapinfo Drivetime. Analysis of the effects of rush hour used Transport for London data

and ambulance data. This enabled estimated comparison between rush hour and non rush hour journeys.

- b) Road speed is the best overall metric for estimating incident and population 'coverage' within a defined time period. Therefore further adjustment for when ambulances are making blue-light journeys (as they travel faster than average road speed) was required. The methodology to do this used parts of the LAS data and Mapinfo Drivetime modelling to create a combined view of bluelight ambulance journeys from standard road journeys.

To estimate how much faster bluelight journeys are compared to similar non-bluelight journeys Healthcare for London carried out the following analysis:

- Compared 100,000 bluelight journeys versus 2,000,000 other urgent ambulance journeys. This gave an estimate that, averaged over all journeys, bluelight ambulance journeys take about 1/3 less time (equivalent to 1.5 times faster)
- Therefore, to estimate a 30 minute bluelight ambulance journey Healthcare for London used a 45 minute road journey (1/3 less than 45 minutes)

Contour lines were used for any combination of sites to estimate area, population and incident coverage within different timeframes.

4 Analysis of proposed sites

Using the process of analysis described above, Healthcare for London has identified a proposed system of hyper-acute stroke units and major trauma centres, which are no further than 30 minutes and 45 minutes respectively by bluelight ambulance journey from any point in London.

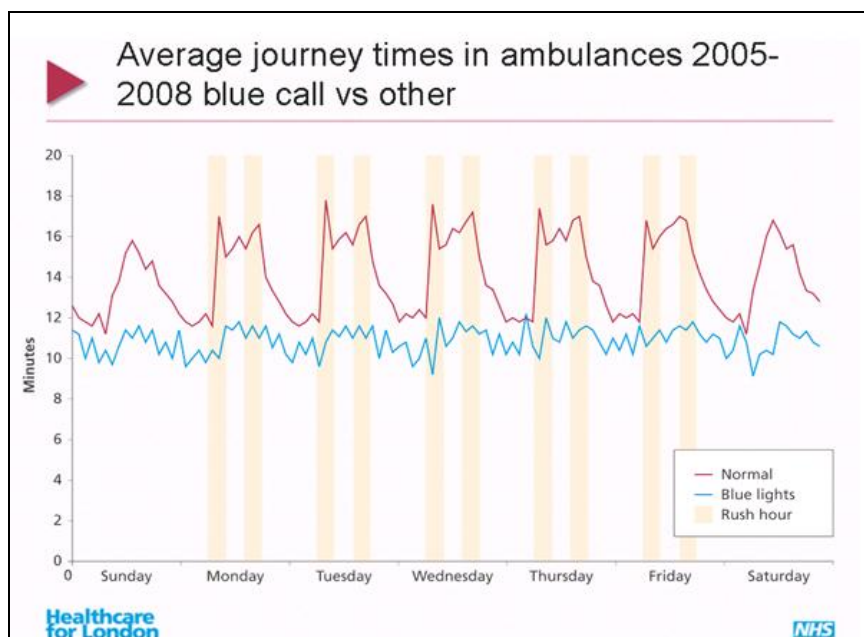
The conclusions around travel times, drawn from this analysis, were discussed with the London Ambulance Service, which has agreed with, and supports, Healthcare for London's analysis and assessment of travel times to the proposed hospital sites.

The conclusions are also consistent with the actual experiences of the London Ambulance Service arising from the reconfiguration of cardiac services – a specialisation of services into eight hospitals across London (please see page 4).

5 Points to note about the analysis

- Analysis of the London Ambulance Service travel times show that the time taken by bluelight ambulances is very consistent across the day, unlike non-blue light journeys which lengthen considerably during peak traffic times (please see Figure 1). For planning purposes peak traffic times can be treated in a similar fashion to non-peak times.

Figure 1 – average journey times in ambulances

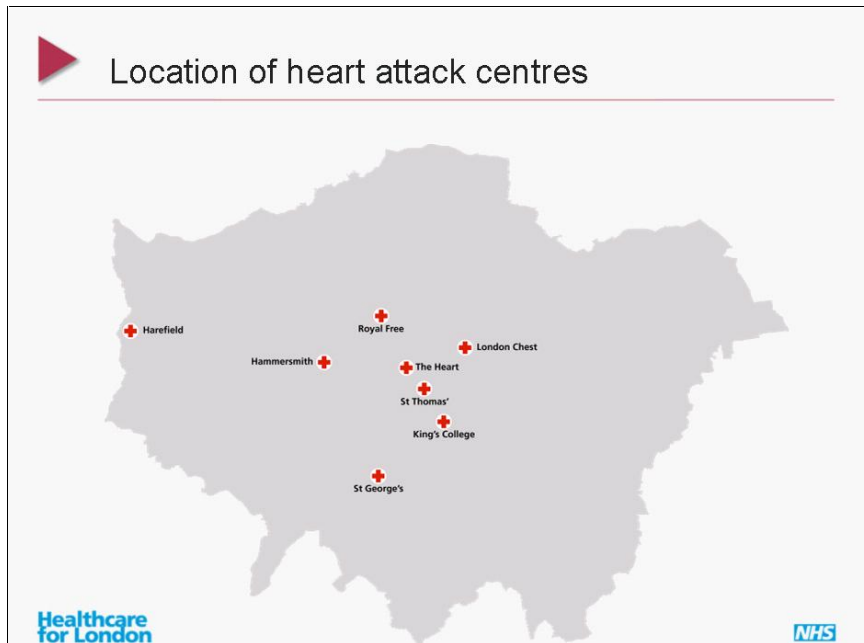


- The analysis cannot take into account specific localised transport disruptions, such as the closure of roads, bridges or tunnels, but the London Ambulance Service dataset covers a long period of time, and typical traffic disruptions in London are already accounted for. Ambulance crews use their experience to make routing decisions to minimise the impact of specific disruptions.
- Major incidents, such as the 7/7 bombings are included in the Healthcare for London analysis in terms of the journey times records. However, in such incidents the Major Incident Plan would be activated including the closure of major roads to traffic.
- Thirty minutes and 45 minutes are expected maximum timescales – the vast majority of journeys will be well within these times.
- Even for major trauma, analysis of ambulance journey data suggests that, for the small number of major trauma patients who would be taken directly to one of the major trauma centres, the average scene to hospital journey time would increase from around 11.5 minutes to about 16 minutes.
- The key metric for stroke is that patients are able to receive treatment within three hours from the onset of a stroke. The 30 minute journey time from site to hospital is part of this three hour window.

6 An existing London case study: heart attack centres

In recent years ambulances have been bypassing local hospitals in favour of specialist cardiac centres for suspected cases of heart attack. The locations of these specialist centres can be viewed in Figure 2.

Figure 2 – London’s heart attack centres

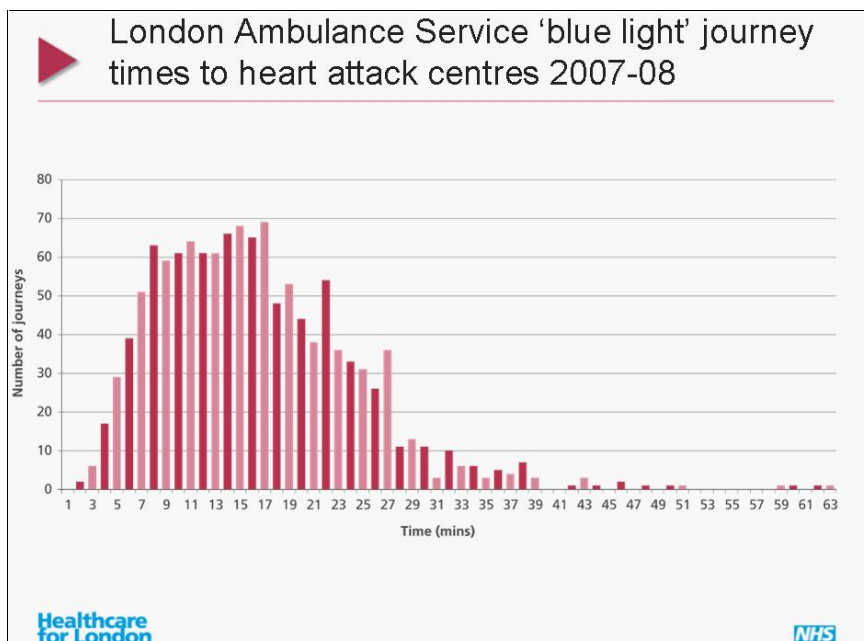


The experience of the London Ambulance Service of taking patients to these specialist centres reinforces Healthcare for London’s travel times modelling and analysis.

In 2007-08, 95 per cent of all blue light ambulance journeys to London’s heart attack centres were made within 30 minutes (please see Figure 3) and 99 per cent were made within 45 minutes. Those journey times that were more than 30 minutes were usually as a result of extenuating circumstances, as opposed to long distances.

In this period, the mean time for journeys to London’s heart attack centres was 15.57 minutes. The median journey time was 14.53 minutes.

Figure 3 – blue light journey times to heart attack centres



Conclusion

Healthcare for London has undertaken extensive modelling and analysis of bluelight ambulance travel times to the new proposed hyper-acute stroke units and major trauma centres.

This analysis, combined with the empirical data from the London Ambulance Service's experience of heart attack centres, provides a robust case for the proposed configuration of hyper-acute stroke units and major trauma centres in London.

Healthcare for London and the London Ambulance Service are confident that the travel times given are realistic and achievable.