



Helicopter Transfer for Stroke Thrombectomy Benefit on Time to Arterial Puncture

in Patients Remote from Regional Centres

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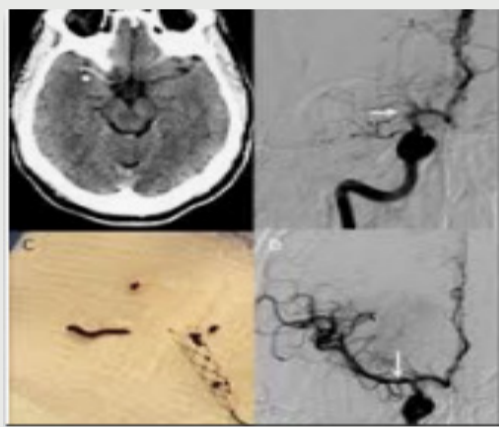
To establish if air transfer offers faster time to arterial puncture for stroke patients transferred to regional centres for thrombectomy

INTRODUCTION

Stroke is the second highest cause of death worldwide and a major cause of disability. The cost to NHS England is £3 billion/year, with a wider economic cost of £8 billion

85% of acute strokes are ischaemic; over 33% due to large artery occlusion.

Mechanical thrombectomy within six hours is now gold standard. It directly removes the obstructing clot, improving blood flow and minimising tissue damage. It saves lives and prevents significant life-changing disability. It is cost-effective, saving bed days, complex rehabilitation and long-term social care. It may be used when thrombolysis is contra-indicated.



Thrombectomy is only available at specialized regional centres. Rapid treatment is vital as benefit declines by 5.3% for every hour delay.



Many patients suffer strokes at significant distance from these centres, needing rapid secondary transfer. Ground transfer can be slow due to distance, traffic, and road conditions. Helicopter Emergency Medical Services may offer a significant transfer time saving and thus optimise neurological outcomes for those suffering a stroke far from regional centres.

Air Ambulance Kent Surrey Sussex (AAKSS) operates 24 hours/day in the South-east of England. The regional thrombectomy centre is St George's Hospital (SGH), South-West London. For East Kent patients, the predicted road transfer time from hospitals with helipads to SGH is 99 to 120 minutes. The predicted air transfer time is 25-35 minutes.

Use of air transfer may significantly improve time to thrombectomy, thus improve neurological outcomes in these patients.

METHODS

Retrospective KSSAAT, SECamb, and SGH thrombectomy database analysis, August 2015 to September 2017.

All patients undergoing secondary inter-hospital transfer for thrombectomy by air from regional hospitals with helipads to SGH. Comparator group: patients transferred by road.

Time to SGH was used as a surrogate marker of time to definitive care (arterial puncture/re-canalisation), as in-hospital factors were not modifiable by air transfer.

Median times and inter-quartile ranges were calculated. Statistical analysis of the time differences was undertaken to ascertain statistical and potentially clinical significance.

CONCLUSION

Helicopter transfer offers rapid secondary transfer for time-critical stroke patients, in patients more remote from thrombectomy centres.

This decreases the time from symptom onset to arterial puncture and thrombectomy, and may impact on long-term neurological outcomes

RESULTS

12 Kent patients were transferred by AAKSS to SGH over this time period. There were 36 road transfers.

	Road	Air
Median transit time to referring hospital (mins) (IQR)	8.5 (6-11.5)	23 (17-37)
Median on-scene time (mins) (IQR)	28 (16.3-35.5)	17 (12-27)
Median transfer time (mins) (IQR)	43.5 (27.5-55.3)	31 (24-39)
Median time: transfer decision to SGH arrival (mins) (IQR)	59 (51-76)	51 (38-79)
Median handover time at SGH (mins) (IQR)	45 (30-67)	17 (12-26)
Median time: symptom onset to arrival at SGH (mins) (IQR)	270 (193-348)	220 (185-280)

Fig 1. Median and IQR times for thrombectomy transfer road vs. air

11 patients transferred by air reached SGH within 6 hours of symptom onset. The 12th was 6hrs30. The correlation coefficient of road transfer times and distance was +0.67

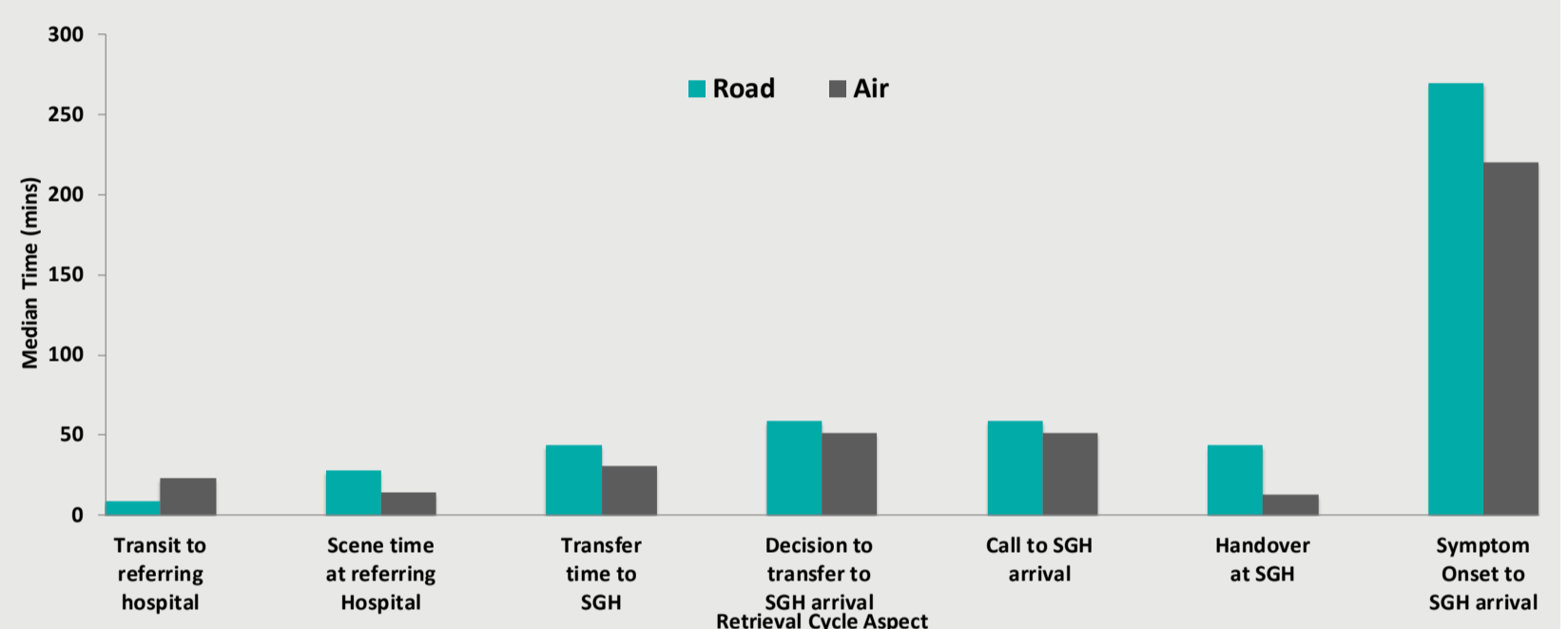


Fig 2. Air vs. road transfer for different aspects of the transfer

Air transfer was significantly faster ($p < 0.05$). HEMS handover and scene times were faster. However, the overall secondary transfer cycle was only minimally quicker due to the increased time to position the aircraft

DISCUSSION

Helicopter transfer offers a rapid secondary transfer modality for time-critical thrombectomy patients when compared with road transfer, in those patients more remote from thrombectomy centres.

Increased rapidity of transfer may improve neurological outcomes by facilitating the earlier provision of definitive care.

The decision to transfer by air should be made early, to mitigate for the longer transit time to referring hospital. The referring team should use this time to prepare the patient for transfer, thus minimising scene time on the retrieval team's arrival.

The secondary transfer pathway is multi-stage. Factors affecting overall transfer time include proximity of the aircraft to the referring hospital, aircraft and team availability, referring hospital helipad availability, patient preparedness for transfer on transfer team arrival, scene times, and handover times. HEMS rehearsal of scene and handover times may account for these decreased times.

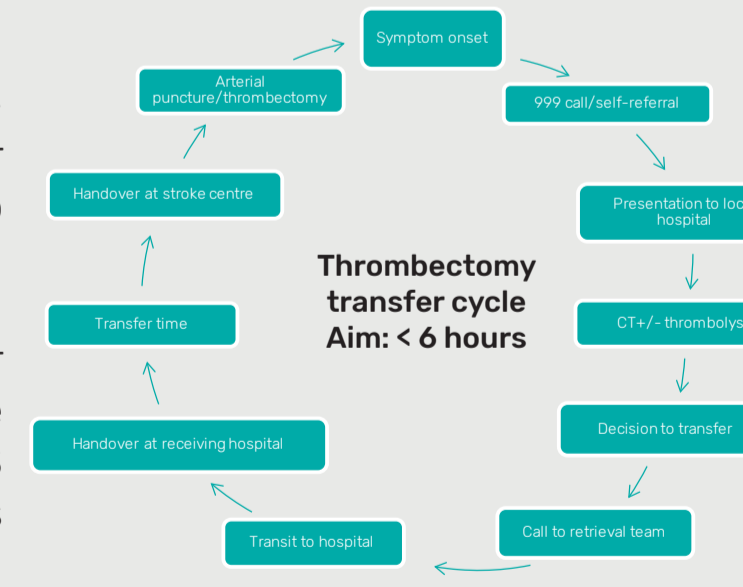


Fig. 3 Thrombectomy Transfer Cycle

All factors must be considered in the development of robust secondary transfer pathways for stroke thrombectomy, especially in areas with long transit times to the referring hospital. Each aspect of the entire patient pathway must be minimised to improve time to arterial puncture/reperfusion, and improve neurological outcomes

Onward work will look at the impact of air transfer on neurological outcomes, and in-hospital factors such as time to imaging and to arterial puncture/re-canalisation.

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