PERSONAL PRACTICE

Interhospital transport to paediatric intensive care by specialised staff: experience of the South Thames combined transport service, 1998–2000

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The South London Combined Transport Service retrieved 1536 children aged 1 month to 16 years to paediatric intensive care (PIC) units usually in south London, over a 2.5 year period. Eighty one per cent of cases were for general PIC, the specialist cases being mainly cardiac and neurosurgical. The service commenced as part of a national framework for improved PIC and offers children with complex needs a safe specialist transfer. Clinician and parental satisifaction with the service appears high, although there are considerable service pressures. Intensive care beds were successfully located, helping to reduce fragmentation of PIC for this population.

Experience from North America[1 2] and from Australia[3] has shown that specialised paediatric intensive care (PIC) teams can deliver rapid and effective care to children requiring interhospital transfer. These systems are seen as essential in underpinning a modern paediatric intensive care service.[4 5] In 1997, the UK Department of Health published a framework for the provision of PIC in England and Wales.[6] This included a recommendation on transfer to specialist centres, staffed by doctors and nurses trained in PIC. The justification for developing these services was the evidence, already available in the 1990s, that if properly constructed, risk to children in transfer was low and outcomes better than if transported in an ad hoc manner.[7] In 1999, a report profiled the use of hospital services by critically ill children in the North and South Thames regions.[8] This identified the challenge facing PIC consequent on fragmentation of the service, and that 7% of children outside London were being cared for in adult intensive care (AIC).

In response to the national policy guidance and the Thames report, the lead commissioners from 12 health authorities covering over 1.3 million children aged 1 month to 16 years in south London, Kent, Sussex, and Surrey jointly funded the provision of a common transport service into three south London teaching hospitals. All three provide PIC, but in accordance with the Department of Health framework, the lead centre was designated as Guy's Hospital. King's College Hospital provides mainly specialist PIC (neurosurgery and hepatic), and St George's Hospital provides a mixture of general and specialist PIC (for example, paediatric oncology).

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AIMS OF THE SERVICE

The aims of the service are to provide appropriate care for children by timely clinical advice and management by trained senior clinicians available to referring clinicians at all times. Furthermore, it is the responsibility of the service to ensure that an appropriate bed is found and to educate and train staff in referring units. The service at inception also set out to improve PIC provision as recommended in the Thames report[8] on the basis that the coordinated South Thames service would ensure that no child who needed a PIC bed would be denied that access. This was based on the assumption that there is enough supply in the whole system in London to meet need, and that fragmentation of the service could be overcome without compromising safety.

OPERATION OF THE SERVICE

The service was inaugurated in May 1998. A commissioning consortium comprises 12 health authorities in south London and southeast England. One commissioner is a lead purchaser and there is a steering group of all commissioners. There is a specification for the service, which covers aims of the service; how cases will be designed to each centre; the responsibility of the lead centre; response times; quality standards and monitoring, including audit; staffing and budget. The service specification requires a clinical group from the lead centre and the other two providers to meet three monthly in order to audit referrals to the service. Comprehensive information is collected for this purpose and also collated into an annual report. The annual budget for the service in 2000/01 was £584 000, covering the costs of ambulances, additional intensivist medical and nursing staff, equipment, and the audit and education nurse.

The common transport service builds on previous referral patterns and serves 27 referring hospitals in South Thames and takes occasional referrals from North Thames. The service is provided from the lead centre. Referring hospitals eligible to use the service have a single telephone number, which is diverted to a discrete line within the lead centre. This is similar to other developed countries, with a specialised transport system retrieving to tertiary centres coordinated by telephone triage at the lead centre[3]; furthermore,

Abbreviations: AIC, adult intensive care; PIC, paediatric intensive care

Table 1 Adverse incidents in transit

	Rate/1000 journeys/year		
	June–Dec 1998	1999	2000
Physiological events			
Hypotension	17	7	37
Hypertension	0	2	0
Bradycardia	9	0	3
Tachycardia	0	2	2
Desaturation	11	0	8
Raised intracranial pressure	0	0	2
Seizure	0	0	1
Accidental extubation	0	0	3
Hypercapnia	0	0	2
Fluctuating conscious level	6	0	0
Equipment events			
Infusion pump failure	6	7	9
Ventilator malfunction	6	8	9
Propaq malfunction	14	7	0
Incomplete kit	0	2	0
Ambulance breakdown	0	7	1
Venous/arterial line disconnected	11	3	3
Oxygen head leak	3	0	3
Istat failure	0	0	1
Saturation probe failure		0	1

transfers are only undertaken from hospital, and not general practitioner locations. The service does not cover neonatal intensive care.

The referring clinician is connected with a fellow in the lead centre who discusses cases with the doctor referring and advice is provided about the child, ultimately defining whether a retrieval is necessary. The referring clinician is offered a choice of the three south London hospitals, although specialist referrals can only go to certain locations. Clinical staff comprises two designated doctors and one nurse for the core team, so that there is always at least one fully trained paediatric care specialist doctor (or specialist in training) and nurse on every retrieval; these are all provided by the lead centre. Nursing staff are specialised in intensive care and have attained a recognised intensive care course in this country or Australia.

In approximately 7% of journeys there are two nurses and one doctor, and in 4% there are two doctors and two nurses. There is designated transport contracted for the service and this contract was changed in 1999 to ensure that two specially adapted ambulances are available and the possibility of a third on call if required. Ambulance crews are offered training and partake in study days. The service specification is for the team to be mobilised within two hours of accepting a referral. This occurred in 93% of instances in 2000: on the 45 occasions when the teams were delayed that year, the commonest reasons were shortages of medical and nursing staff because of demands on the wards, or that one or two teams were already out. The median time from leaving the base unit to returning there was 155 minutes in 2000, 159 in 1999, and 161 in 1998.

Local protocols operate for a range of specialist conditions in South Thames. In 2002 a common transport system will also commence for North Thames, and protocols are in development for use across London for respiratory and neurosurgical conditions.

PROFILE OF THE SERVICE

Between June 1998 and December 2000, the service transported 1536 children aged 1 month to 16 years; this comprised 348 in the first half year, 565 in 1999, and 623 (an increase of 10% from 1999) in 2000. The geographical source of the cases for retrieval was South Thames in 1188 (77%) cases and North Thames and other areas in 348 (23%) cases. There has been a 21% increase in cases from South Thames between 1999 and 2000, compared to a 19% fall from outside this area in the same period. The journey rate over the period was 5.0 journeys per 10 000 children per full year in 1998, 5.8 in 1999, and 6.7 in 2000.

Of the 1536 retrievals, 1243(81%) were for general PIC, particularly respiratory and sepsis cases. A total of 293 (19%) comprised specialist diagnoses, particularly cardiac and neurosurgical. The pattern of ventilation among the general cases increased by 11% between 1998 and 1999, and stayed constant in 2000. In each year, about one fifth of referrals were between midnight and 8 00 am.

Table 1 shows the adverse incidents in transit. The increase in hypotensive events in 2000 may have been a result of better recording on new forms and an increasingly open culture of reporting critical incidents. No child died in transit, nor experienced poor final outcomes consequent on events in transit.

A survey in 1999 of the district hospitals using the service obtained a 74% response rate. Ninety per cent of respondents considered that the common transport service had led to an overall improvement in the management of critically ill children and 85% found few or no problems with the service.[9] Respondents wanted more standardised protocols for common conditions, although local protocols were in widespread use. There was a call for even more education and training at the periphery. A parent survey was also conducted at this time among all parents who had experienced the common transport service, except for those whose children died, or who did not speak English.[10] Of 509 mothers mailed, 47% responded on only one mail shot. Only two parents expressed outright dissatisfaction; most were very positive about the service, although many expressed an acute sense of separation from their children during the transport time.

The 1536 cases transported followed 2055 calls to the service; therefore 519 calls (24%) did not lead to a retrieval. Table 2 analyses the 519 children not transported to the south London PICUs. Systematic information has only been collected on these cases since 1999.

MEETING THE CHALLENGES

The common transport system in South Thames has drawn both PIC providers and district hospitals into a framework,

Table 2 Phone calls to the service, which did not result in retrieval to a south London PIC unit

Reason	June–Dec 1998	1999	2000
Advice only required	3	38	43
Consensus PIC not required	5	82	67
South London PICUs full	6	31	37
South London and all London PICUs full	0	(5)	(12)
Bed available, but referring hospital wished not to wait for South Thames team*	0	0	31*
All PICUs full, inside or outside of London	0	1	20
Other reasons	0	9	17
The referring unit conducted the transfer†	3	31†‡	29†‡
Neurosurgical transfer by the referring unit	7	13	14
Died before transfer			
Team present	5	2	5
Team not present	2	6	12
Total	31	213	275
Grand total		519	

*In many of these cases, shortages of nursing staff at the lead centre caused the delay.
†95% of these were neonatal cardiac cases and the referring units were able and willing to treat and transfer.
‡Excepting neurosurgical transfers.

which has helped reduce the previously fractured provision of PIC. Few, if any, children needing intensive care in this region are now cared for on adult wards, and concurrently the south London units have defined their place in a managed PIC network.

It appears, as confirmed elsewhere, that children with complex needs can be safely transferred by a specialist service. Perhaps because of case complexity, the number of adverse physiological events in transit increased over the period; however, at just 6% of all journeys, it is still less than reported in other series.[1]

There is considerable pressure on the service. Prior to setting up the combined South Thames service, it was estimated that the need for retrieval services was around 170 journeys per million children in 1997.[6] This was based on operating retrieval services in the UK Midlands. In 1999, the common transport services in South Thames carried almost three times that number and in 2000, the need was almost four times greater. This occurred in the face of an additional significant number of cases handled by telephone advice and local resolution. Delays have proven problematical at times, compounded by severe shortages of specialist paediatric nurses in inner London and by needing to locate a PIC bed, which can be very time consuming. It requires coordination within south London and linkage with the Emergency Bed Service, which itself is under significant pressure. Additional clerical resources within the PIC service are a proposed alternative. It is the preference of the neurosurgical specialist advisers to the combined transport service that referring hospitals undertake their own neurosurgical transfers, the imperative being to save time. Protocols and training are needed for this and are being developed, because some general paediatricians have been reluctant to move critically ill neurosurgical cases.

Over the 2.5 years, there were 68 occasions when south London PIC units were not able to receive a child because they were full and 17 occasions when all London PIC units were full. However, other retrieval services came to help in both 1999 and 2000 and no child who needed PIC was ultimately denied an appropriate bed.

The future of the service is likely to be linked to a purchasing consortium for PIC throughout London, although there will not be a common London-wide transport service for logistical reasons. Areas in need of development are a better system for locating paediatric intensive care beds rapidly and the coordination of the service to mount more trained clinical teams at short notice.

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