high, exceeding \$200 000 per survivor annually in an American study.³ It is possible that equally striking economic impact could result from a reduction in the frequency of less costly but much more commonly encountered problems mentioned by Boyd *et al.* For example, they cite data indicating that 89% of infants allocated to donor breast milk, but only 33% of those allocated to formula, tolerated full enteral feeding by two weeks of age. Even at three weeks 17% of those fed on formula were unable to tolerate full enteral feeds. This must have a considerable effect on the duration of parenteral nutrition with attendant complications and costs.

We suggest that pasteurised donor human milk is an important therapeutic resource in the care of very low birthweight infants. There are currently 17 milk banks in the UK. Audit data collected in 2005 by the United Kingdom Association for Milk Banking show that 850 women in the UK provided a total of 5000 litres of milk for pasteurisation and use on neonatal units. There has been a steady rise in use since 2000 and the use of donor milk is becoming a more established part of neonatal practice. Cost-effectiveness, safety, quality control and equity of access might be served best by the establishment of a national network without delay. Additional benefits of such a step would be sustainability of supply sufficient to resource further clinical research into the questions with which Boyd *et al.* conclude. Our current evidence base is over 20 years old and it would be particularly valuable to acquire more information about long-term cognitive attainment, growth and cardiovascular outcome in this very vulnerable

group, particularly the increasing numbers of those very immature infants in whom receipt of breast milk has been associated with higher Bayley psychomotor developmental index at 30 months.¹⁷ Finally, the role of fortification of donor breast milk and its use in other clinical situations (for example chronic diarrhoea¹⁸) could also be explored.

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Neonatal transfers – a thin layer of glue to keep the service network together?

Neonatal transfers – a thin layer of glue to keep the service network together?

Gorm Greisen

Perspective on the papers by Cusack *et al* (see page F181) and Kempley *et al* (see page F185)

This issue of the Archives brings two papers on neonatal transport. The paper of Cusack *et al*¹ is of a pessimistic key. Reporting from the former Trent Health Region, with its longstanding Neonatal Survey (formerly Trent

Neonatal Survey), the authors note that the proportion of inappropriate transfers amounted to as much as 20% of all transfers, with no evidence of decline over a 10 year period. Inappropriate transfer was defined as the transfer

beyond the nearest appropriate neonatal service of a baby born in a service's district or transfer of a baby out of a tertiary neonatal service in the district where it was born. The focus in this paper is on transfers as a remedy for the lack of capacity of the stationary services—as an indicator of insufficiency.

Practising in another country, of the size of the former Trent Health Region but with its own geographical and historical peculiarities, I can comment from a different view. During a visit to Nijmegen, the Netherlands, 10 years ago, I saw my host being taken aside to help make a decision on whether to transfer a pregnant woman by helicopter to Groningen, 150 km to the north. The transfer was to be done because the neonatal intensive care unit in Nijmegen was full, the woman was to be delivered

by caesarean section at 31 weeks' gestation and there was no nearer neonatal intensive care unit with free space. I was astonished. I was used to a flexible cot policy in Copenhagen, where we would almost never transfer a baby to another hospital for lack of capacity or reject a baby in need of intensive care. We still rarely do. We stretch staff and equipment as much as needed.

In the case above, I thought the baby would probably need little intensive care treatment—it seemed a big solution for a small problem. But at times, in terms of the clinical workload in my own service, it is obvious that our practice may trade quality of care for containment of costs and ease of access for parents. The alternatives for us would be transfers to Western Denmark, to Odense, a 2 h drive, or Århus, a 4 h drive, or to Sweden, to Lund, a 1 h drive to a different country with a slightly different language.

A longer term alternative would be to increase capacity. This tactic would make the need for such transfers more rare. The unpleasant statistical rule, however, is that events that occur at random intervals, like admissions for intensive care, tend to cluster unevenly. In a unit of 20 cots, to keep the risk of not having a free cot for a new baby at no more than one in 10, the mean cot occupancy should not exceed 70%. Low mean cot occupancy means high costs. Furthermore, this statistic does not account for epidemics, preterm triplets or the like. This probably means that transfers, stretching of capacity or both must be part of a service under economical constraint.

The rate of 'flying squad' transfers—that is, urgent transfers for neonatal intensive care—was 4.2 per 1000 births in Trent. The neonatal service of Copenhagen university hospital, Rigshospitalet, and its retrieval team covers eastern Denmark, with 30 000 births per year. The corresponding rate of urgent transfers for neonatal intensive care is five per 1000 births. The difference is surprisingly small when considering that mechanical ventilation is provided by only two neonatal services in eastern Denmark and that there are virtually no inappropriate transfers.

The paper of Kempley *et al*² is optimistic and reports on the improved response time of the centralised neonatal transfer service of London and South East

England. Covering an impressive 192 000 births annually, the service managed to provide two-thirds of all urgent transfers for neonatal intensive care. If a transfer team was available, the median time from receipt of the call until the team reached the baby was 1.2 h only, with a 90th centile of 2.8 h. The figures were 2.3 and 5.3 h, respectively, when the call had to be stacked because all teams were already busy. The focus in this paper is on transport as the glue in a network of neonatal services.

Response time is an important aspect of quality. Staff at the local neonatal service may be faced with a medical problem that exceeds their training or is beyond their experience, so the arrival of the transport team may improve the chances of the baby immediately. The most important components of neonatal intensive care can be provided by a well equipped and well trained transport team from its arrival at the local hospital as well as during the transfer.

The level of experience of the transfer team is the other important aspect of quality. The organisation in London and South East England has great potential for quality in this respect because the workload was high, with three urgent transfers per day shared by four teams. By comparison, the organisation in Trent delivered two urgent transfers per three days, shared by three teams, and our team in Copenhagen delivers one urgent transfer per two days.

The main reason for the higher activity level of the London organisation is the size of neonatal population covered. Another reason is that the rate of urgent transfers was nearly twice as high as in Trent and Eastern Denmark, amounting to 8.3 per 1000 births. The reasons for this difference are unclear, as the mean number of births for each neonatal service comes close to 4000 in all three regions. The difference may be related to the level of specialisation of neonatal intensive care, to population characteristics or to an the rate of inappropriate transfers.

So, what is good and what is bad? Given the limitation of resources in a managed care system, common to England and Denmark, the elements of the equation are unit size, cot occupancy and on one side thresholds for transfer and on the other side response time,

service quality and utilisation of the transfer team. This equation has to be solved according to hospital structure, availability of qualified personnel, health-care traditions and local geography. It is no wonder that solutions may differ.

In England and eastern Denmark the logistics of transport are straightforward. In other parts of the world they are not. Geography, distance or economy may pose major problems. As a young physician I served in rural Zambia, in Africa. In this district, the health service, with its hospital and 10 medical health centres, possessed a single vehicle and a limited supply of petrol. Spare parts for the vehicle and petrol were expensive compared with staff salaries. In the wet season, the plains of the Kafue river were flooded, making journeys even longer. The vehicle was therefore reserved for the support of services such as delivery of supplies to the health centres and for preventive services. Ambulance transport was a luxury. In Copenhagen we also serve Greenland and the Faroe Islands in the North Atlantic. Provision of this service means 2–3000 km of flight and often some difficult local transport. Sometimes it takes a day to organise a transfer and a day to carry it out. Sometimes the transfer is delayed or redirected because of bad weather. Yet, this may provide crucial relief for local staff who may have worked with little sleep since they called. Sometimes we compromise by booking the transfer team into a commercial flight, to save money for the local health authority. And yet, this may still save a life and may provide a thin layer of glue in an imperfect network of neonatal services.

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