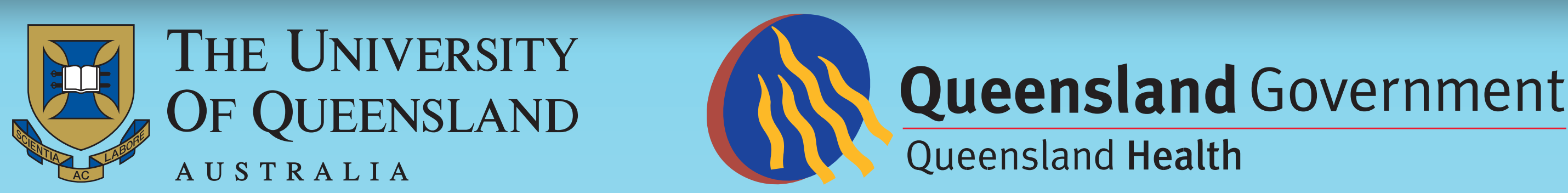




Neonatal Consultation at a Distance

A Case Series



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Background

In Queensland there are only two hospitals (1,400km apart) with tertiary perinatal facilities able to care for critically ill neonates. Transport of sick infants born away from these facilities is costly and time consuming. It also has risks for both the infant and for the transport-team. Telemedicine may improve care and avoid the need for some infants to be transported.

Methods

We have designed and developed a system for neonatal teleconsultation (NEMO – Neonatal Examination and Management Online)^{1,2}. In previous work, we confirmed the efficacy of NEMO using a method comparison study in which clinical assessments of infants and interpretations of radiological images by telemedicine were compared with in-person assessments^{3,4,5}. Subsequently, NEMO has been installed in four remote hospitals forming a neonatal referral network with each hospital linking to a tertiary perinatal hub at the Royal Brisbane and Women's Hospital (RBWH). To obtain an early indication of effectiveness, the present study carried out an informal retrospective review of the first ten

consecutive telemedicine consultations. Audio, video and captured still images from all sessions were recorded to allow evaluation of the content of the sessions. Cases of avoided transport were identified by interviewing the clinicians involved in the consultations. To estimate the potential savings resulting from these avoided retrievals, information on the minimum level of nursing and medical staff required for retrieval was combined with information on the distance/time and related cost of different modes of retrieval transport. All costs are described in Australian Dollars (AUD) at 2009 prices; AUD 1 ≈ USD0.86. All unit costs are rounded to the nearest dollar value.

Results

We reviewed ten cases. Median session duration was 27 minutes (range 10 minutes to 57 minutes). Median infant age at time of NEMO consultation was 3 days (range 190 minutes to 112 days). Mean gestational age at time of birth was 33 weeks, 2 days (range 24 weeks, 1 day to 41 weeks, 0 days). Nine of the consultations were led by a consultant neonatologist and one consultation by a senior registrar at the RBWH. In all ten cases a paediatrician attended at the referring sites.

Visual information used during sessions included radiological images (n=7); observation of the infant (n=7); viewing of the patient monitor (n=2) and ventilator settings (n=2).

On four occasions, NEMO was used to manage a request for infant retrieval. These resulted in two transports to the RBWH and one transport to another intensive care nursery. In the fourth of these cases, a visual diagnosis of trisomy 18 was made and a management plan developed

with the regional nursery thus avoiding the need for retrieval. On five occasions, the system was used by staff at the referring hospitals to seek a second opinion from specialist staff at the tertiary hub. Review of the sessions suggested that in two of these cases, it is probable that the visual information made available by telemedicine allowed sufficient confidence in formulating a local management option that retrieval was considered unnecessary. In one case, a remote infant consultation was conducted by a consultant at the Royal Children's Hospital in Brisbane, avoiding a non-urgent transport. The total estimated saving from retrievals avoided was \$23,618 (Table 1) not including the potential savings provided by avoided intensive care admission, approximately \$1,439 per day.ⁱ

ⁱ Based on the difference between the cost per day of an intensive care cot and the cost of a regional special care nursery cot in 20066 (published per year cost of \$900,000/365.24=\$2,464/day and \$436,000/365.24=\$1,194 respectively) adjusted to 2009 Australian dollars with a change in the Australian CPI of 12.7% for the three year period June 2006 to June 2009⁷

Conclusions

These encouraging early results show that NEMO is a useful mechanism to project remote specialist advice. Medical staff have indicated that the added visual information provided during consultations was able to increase the safety and confidence in formulating a local management plan. As demonstrated, with the support of telemedicine, an infant may be managed in their own community, avoiding costly and risky transport to a tertiary facility. Further work is being carried out to formally assess the clinical and economic benefits over a longer time period.

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Table 1 – Avoided infant transport with cost in 2009 AUD

Case	Remote hospital location	Transport Type	Distance*	Transport Mode†	Time‡	Estimated transport cost (\$)⁴	Estimated staff cost (\$)⁵	Estimated total cost (\$)
1	Hervey Bay	Retrieval	248nm	Helicopter	3hr8min	11,017	221	11,238
4	Hervey Bay	Retrieval	248nm	Helicopter	3hr8min	11,017	221	11,238
7	Nambour	Non-urgent transport	200km	Road ambulance	3hr	930	212	1,142
Total								23,618

*Round-trip distance to collect retrieval team and return with infant to Brisbane

†The most likely mode of transport based on infant/case characteristics and urgency

‡Incorporates an assumed 1hr on-site time for the retrieval team at the remote site

⁴Helicopter transport for Bell 412 valued at \$5,164/engine hour and road ambulance transport valued at \$930/retrieval⁸

⁵Valued at registered nurse (grade 5 year 2) hourly wage rate of \$27.70/hour⁹ and medical registrar (level 3) hourly wage rate of \$42.89/hour¹⁰ for retrieval and on site time only

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