

Home sleep studies: lessons from research and practice

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Background

Cardiorespiratory polygraphy studies (CRP) are traditionally conducted in hospital, where children may sleep badly. Delivery of paediatric care in or near a child's home is central to the philosophy of the Children's NSF which encouraged 'timely, high-quality and effective care as close to home as possible'. Based on our research experience in young children with Down syndrome (DS) we introduced an innovative home based sleep study service in Southampton. Here we report the acceptability and success rates of home sleep studies in both research and clinical settings.

Design: Prospective observational research study and retrospective clinical service evaluation

Setting: Sheffield, Evelina London and Southampton Children's Hospitals

Methods

- Sleep Disordered Breathing (SDB) was assessed using the SomnoTOUCH device (S-Med) comprising: chest & abdominal RIP, pulse oximetry, nasal pressure flow, snore, body position sensor & actimetry. The device was adapted for young children with shortened leads and nasal cannulae. In addition stand-alone oximetry (Masimo, UK) was performed.
- Parents and children visited their local centre, were taught how to set up their child and given the choice of domiciliary or attended lab CRPs (domiciliary was encouraged in the research group).
- Domiciliary studies were performed the night after training.
- Written instructions with photographic images of set-up were provided and a telephone contact was available in case of difficulties.
- Success was defined as ≥ 4 hours of artefact free data with an episode of Active Sleep. If studies failed, families could repeat the study at home or request a supervised sleep study (by a nurse or technician) in the research centre or hospital.

Research Participants:

- Children with DS aged 6 months – 6 years were recruited from 3 children's hospitals: Sheffield, Southampton & the Evelina, London.
- Families were contacted 3 months later and asked how easy/difficult they found the diagnostic procedure/s and whether they would be happy to repeat the experience.

Clinical Patients:

- A retrospective review of all home CRP studies recorded at Southampton Children's Hospital between 03/2015 and 01/2016 was performed.
- Families were asked to return a service evaluation feedback form the following day. This included a Likert scale from 1 (very easy) to 5 (very difficult) on ease of using the equipment.

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Results

- The indication for the majority of clinical studies was ?OSA (Table 1), although patients had a wide range of comorbidities (Table 2).
- 87.1% of research participants and 93.4% of clinical patients had successful studies (see Table 3).
- In both settings, a mean of 1.2 studies per child were required for successful data acquisition.
- 84% of research and 89% of clinical parents were willing to repeat home studies in the future (Table 3).
- 67% of research parents found the equipment 'easy or okay' to use, while 64% of clinical parents reported it as 'easy or very easy' (Table 3).

Indications	N
OSA	49
Hypoventilation	1
OSA/ Hypoventilation	3
O ₂ / ventilation titration	5

Table 1. Clinical indications for CRP

Diagnosis	N	Diagnosis	N
Typically developing	18	Craniofacial	3
Down's Syndrome	9	Significant comorbidity#	8
Hypotonia/ Neuromuscular/ PWS	4	Other	1
Cerebral Palsy	18	# CLD, congenital heart disease, sickle cell disease, brain tumour	

Table 2. Patient diagnosis

	N	Age range (mean)	Gender	Successful study	Willing to repeat in future	Found equipment 'very easy', 'easy' or 'okay' to use
Research participants	194	0.5-6yrs (3.0yrs)	91F (46.9%) 103M (53.1%)	169/194 (87.1%)	163/194 (84%)	130/194 (67%)
Clinical patients	61	0.4-19.5yrs (8.3yrs)	27F (44.3%) 34M (55.7%)	57/61 (93.4%)	54/61 (89%)	39/61 (64%)

Table 3. Participant/patient demographics and CRP success and acceptability rates

Conclusions

Home sleep studies offer an acceptable and potentially cost-effective approach to the assessment of SDB in children and could transform service delivery in the UK where sleep laboratory resources are sparse. **Lessons for practice:** Parents value the opportunity to manage diagnostic testing at home. Before disseminating more widely in the NHS cost-effectiveness should be formally evaluated.