Abstract

Sleep related breathing disorders (SRBD) have historically been under-recognised and under-treated. Obstructive sleep apnoea (OSA) affects approximately 3% of children. In line with the increased recognition of SRBD there has been an increase in demand for diagnostic services. We determined the awareness of SRBD amongst Irish paediatricians, examined the trends in the delivery of diagnostic sleep tests in Ireland between 2007 and 2011 and compared this to the literature. We further sought to examine in detail the provision of diagnostic sleep services in a tertiary centre in 2011. Amongst respondents there was an awareness of SRBD but a poor understanding of diagnostic evaluation with 31/46 (67%) referring to inappropriate services. There has been an increase in both diagnostic sleep tests (433-1793 [414]) and in the use of non-invasive ventilation (NIV) (31-186 [627]) for treatment of SRBD between 2007 and 2011. Paediatric sleep services are organized in an ad-hoc manner nationally with significant service variation. The use of domiciliary overnight oximetry reduced the requirement for more formal polysomnography by 70%.

Introduction

Sleep related breathing disorders (SRBD) have a high prevalence in the paediatric population, and as awareness of SRBD has increased, demand has increased on existing sleep services. The commonest type of SRBD in children is obstructive sleep apnoea (OSA) which has a prevalence of approximately 3% and is more common in certain high risk groups such as those with trisomy 21 (50-70%), craniofacial disorders, sickle cell anaemia, mucopolysaccharidosis, and neuromuscular disorders. OSA in children is associated with impaired neuropsychological functioning, long term cardiac morbidity, and increased healthcare utilisation, all of which improve with treatment. The investigation and management of OSA can be very resource intensive and expensive. Nocturnal polysomnography (PSG) in the sleep laboratory is presently the gold standard for the diagnosis of OSA but is costly and time-consuming. Pulse oximetry is an increasingly used abbreviated testing modality for the evaluation of children with suspected OSA. Overnight oximetry is cheap, easily performed at home and is a useful diagnostic test for OSA in some circumstances. A subset of children diagnosed with OSA will go on to require treatment with non-invasive ventilation (NIV), usually following the long term. The need for NIV is more commonly seen in children with pre-existing medical conditions. With increasing awareness of the high prevalence of SRBD and increasing demand for diagnostic testing, more children will be diagnosed with OSA and will require treatment. This will impact on paediatric ENT services and also lead to an increased number of children requiring ongoing NIV. In young children, treatment with NIV involves intensive follow up and support. In light of the increased demand on paediatric sleep services and variations in the approach to SRBD across the country, we sought to assess the awareness of the investigation and management of SRBD in children among paediatricians, and determine the level of service provision in the area over the last number of years. We further sought to examine in detail the provision of diagnostic sleep services in a single tertiary centre and formally assess the utility of domiciliary overnight oximetry to obviate more formal testing in our patient population.

Methods

A survey on awareness of SRBD in children and the referral pathways used was designed and emailed to consultant paediatricians registered with the Royal College of Physicians in Ireland. Data on the provision of paediatric sleep services between 2007 and 2011 was gathered directly from respiratory physicians in all centres that provide services. An audit of diagnostic sleep services at Our Lady’s Children’s Hospital Crumlin (OLCHC) during 2011 was performed with particular emphasis on the effectiveness of screening oximetry. Information was gathered from patients’ notes, sleep files and hospital databases. First line diagnostic tests were included in the audit providing full clinical documentation. Referral and incomplete datasets, NIV titration studies and monitoring studies were excluded. The data were analysed using Microsoft Excel.

Results

Awareness of SRBD and sleep services among paediatricians

The response rate to the survey was 20% (46/230). The majority (36/46 [78%]) had no training in SRBD. The majority (28/46 [61%]) correctly identified the prevalence of OSA in children, with 35/46 (76%) knowing the prevalence of OSA in children with trisomy 21. The majority (31/46 [67%]) said that they ‘always’ or ‘often’ ask about sleep as part of systems review. A third of respondents (15/46 [33%]) were working in hospitals where downloadable oximetry was available. Most respondents (31/46 [67%]) referred to ENT when a child presented with a history suggestive of OSA.

National Services

As of 2011 six centres in Ireland (OLCHC, Children’s University Hospital, Temple Street [TSH], National Children’s Hospital, Tallaght, Dublin 24, Children’s University Hospital, Temple St, Dublin 1, Our Lady’s Children’s Hospital, Crumlin, Dublin 12) were providing some level of structured paediatric sleep service. All centres could provide overnight oximetry and/or oximetry/capnography combined (TCO2). Three of these centres also perform abbreviated polysomnography, two of which have the ability to perform full polysomnography. None of the centres provided multiple sleep latency testing (MSLT). The number of studies performed nationwide has increased significantly in recent years; from 433 diagnostic sleep tests in 2007 to 1793 studies in 2011 (414% increase). There was also a 627% increase in the number of children on NIV nationally from 31 in 2007 to 185 in 2011 (Table 1). There were no funded posts in any of the centres for the delivery of paediatric sleep services. There was an overall increase in the proportion of their practice dedicated to paediatric sleep problems over the course of the four years. Marked differences in approach to diagnostic testing and service provision were seen across the country.

Diagnostic sleep service in OLCHC

We looked in detail at the provision of diagnostic sleep services in OLCHC, which carried out 1001 of the 1793 studies (56%) that were performed nationally in 2011. In OLCHC there was a 38% increase in the number of tests performed from 208 in 2007 to 1001 in 2011. Two hundred and thirty-four first line diagnostic studies had full clinical information available and were suitable for inclusion in the audit (127 oximetry, 53 TCO2 and 54 abbreviated polysomnography). The median wait time for an outpatient test was four months (range one to nine months), with particular emphasis on the effectiveness of screening oximetry. Information was gathered from patients’ notes, sleep files and hospital databases. First line diagnostic tests were included in the audit providing full clinical documentation. Referral and incomplete datasets, NIV titration studies and monitoring studies were excluded. The data were analysed using Microsoft Excel.

Diagnosis and Treatment of Sleep Related Breathing Disorders in Children: 2007 to 2011
Most children (154/234 [66%]) had an underlying medical condition (Table 2). Of children without an underlying diagnosis 45/56 [5%] had OA, and in children with an underlying medical condition 71/154 [46%] had OA. Figure 2 depicts the distribution of OSA in children with and without underlying conditions. Most children (71/127 [56%]) were diagnosed with OSA following a first oximetry and required no further testing. Overall 80 of 127 children (63%) were diagnosed with OA following testing with oximetry and this figure rose to 85/127 (67%) following a combination of oximetry and abbreviated polysomnography. All patients in whom a screening oximetry was used for OSA the number of polysomnography studies required was reduced by 70%. In parallel to increased diagnostic testing we saw a striking increase over the study period in the number of children on NIV at OLCHC from 9 in 2007 to 86 in 2011. Of the cohort of children who had a first line diagnostic test in 2011, the majority of children diagnosed with OA were referred to ENT (89/127 [70%]), and of these 9 (12%) required treatment with NIV. Three children (4%) were treated with NIV without being referred to ENT.

Discussion

We describe the provision of paediatric diagnostic sleep services in Ireland. We have no local prevalence data for OA and thus calculating the true incidence using international estimates would quotes a prevalence of 1-3%. This suggests that there are approximately 10-50,000 children in Ireland with OA. The provision of children that are being referred for investigation and treatment is increasing. The increasing awareness and recognition of OSA in Ireland has resulted in an increased recognition demand on services which mirrors the increased awareness and demand that is being seen internationally. As recognition of OSA has increased it is likely that this will result in further increases in referrals to paediatric respiratory and sleep services. It is not clear whether this is being reflected in the resources directed to tertiary services. There was a significant increase in all types of diagnostic tests over the period of the study. This was most marked with TOCO, likely partly related to its increasing availability over the duration of the study. The lowest increase in numbers was seen with polysomnography. This likely reflects both the resource intensive nature of the test, thus the limited scope to increase numbers and the increasing use of screening tests with their relative ease of use compared to more time consuming tests.

In conclusion, we report for the first time on the provision of diagnostic sleep services to children in Ireland.

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In conclusion, we report for the first time on the provision of diagnostic sleep services to children in Ireland. We have no local prevalence data for OSA and thus calculating the true incidence using international estimates would quotes a prevalence of 1-3%. This suggests that there are approximately 10-50,000 children in Ireland with OA. The provision of children that are being referred for investigation and treatment is increasing. The increasing awareness and recognition of OSA in Ireland has resulted in an increased recognition demand on services which mirrors the increased awareness and demand that is being seen internationally. As recognition of OSA has increased it is likely that this will result in further increases in referrals to paediatric respiratory and sleep services. It is not clear whether this is being reflected in the resources directed to tertiary services. There was a significant increase in all types of diagnostic tests over the period of the study. This was most marked with TOCO, likely partly related to its increasing availability over the duration of the study. The lowest increase in numbers was seen with polysomnography. This likely reflects both the resource intensive nature of the test, thus the limited scope to increase numbers and the increasing use of screening tests with their relative ease of use compared to more time consuming tests.

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In conclusion, we report for the first time on the provision of diagnostic sleep services to children in Ireland. We have no local prevalence data for OSA and thus calculating the true incidence using international estimates would quotes a prevalence of 1-3%. This suggests that there are approximately 10-50,000 children in Ireland with OA. The provision of children that are being referred for investigation and treatment is increasing. The increasing awareness and recognition of OSA in Ireland has resulted in an increased recognition demand on services which mirrors the increased awareness and demand that is being seen internationally. As recognition of OSA has increased it is likely that this will result in further increases in referrals to paediatric respiratory and sleep services. It is not clear whether this is being reflected in the resources directed to tertiary services. There was a significant increase in all types of diagnostic tests over the period of the study. This was most marked with TOCO, likely partly related to its increasing availability over the duration of the study. The lowest increase in numbers was seen with polysomnography. This likely reflects both the resource intensive nature of the test, thus the limited scope to increase numbers and the increasing use of screening tests with their relative ease of use compared to more time consuming tests.
