Paediatric Sleep Disorders are a worrying condition both for children and parents alike. They can be disruptive to family life, but can also be responsible for other conditions and illnesses that inhibit the natural development of our children. The following chart highlights the wide range of paediatric sleep disorders.

Sleep Related Breathing Disorders	Non Respiratory Disorders of Sleep
Obstructive sleep apnoea Adenotonsillar hypertrophy Craniofacial, skeletal and upper airway disorders Central sleep apnoea Congenital central hypoventilation syndrome (CCHS) Brain stem compression Hypoxaemia related to lung / chest wall disease Asthma Sickle cell disease Cystic Fibrosis Bronchopulmonary dysplasia Hypoventialtion related to lung / chest wall disease Scoliosis Neuromuscular disease Cystic Fibrosis Other restrictive lung disease	Parasomnias Sleep terrors Confusional arousals Sleep walking REM behaviour disorder Sleep talking Primary snoring Hypersomnias Narcolepsy Idiopathic hypersomnia Insomnia Behavioral insomnia of childhood Delayed sleep phase syndrome Others Inadequate sleep hygiene

Sleep Apnoea (SA) is probably the most common form of Sleep Disordered Breathing in children.

Apnoea is a Greek word meaning 'without breath' and the condition involves a cessation of breathing while asleep.

When you go to sleep, your muscles relax, including those in your throat. In some children, especially those with enlarged tonsils or adenoids, the relaxed muscles cause narrowing, which can reduce the airflow. This can cause snoring and irregular breathing.

If the airway closes completely, a child might temporarily stop breathing. This is called 'apnoea'. If the airway partially closes, breathing is reduced and this is called an 'hypopnoea'.

As breathing stops or is interrupted or reduced, there may be a fall in the level of oxygen in the blood. Sensors in the brain will tell the body to re-start or increase breathing. Breathing often re-starts with a gasp or snort.

When the problem is severe this can happen many times each night and disturb the quality of sleep. This causes a lot of problems for a child including irritability, reduced cognitive function, social skills problems, mood swings, and excessive tiredness. In young children, SA can inhibit growth and

development due to reduced amounts of quality sleep. Obviously this will often affect all members of the family.

SA is quite common and may affect up to 3% of children (as many as 40,000 in Ireland). It affects boys and girls equally. The following factors increase the likelihood that children will be affected:

◦ Large tonsils and adenoids
◦ Obesity
◦ Family history of OSA
◦ Down's syndrome
◦ Sickle cell disease
◦ Craniofacial malformations such as an abnormally small chin, large tongue or cleft palate
◦ An extremely narrow upper airway
◦ Rare diseases of the nerves or muscles, which cause loss of upper airway tone because of poor muscle strength
◦ Problems with control of breathing

A number of conditions carry a high risk of Sleep Disordered Breathing

Conditions at high risk of Sleep Disordered Breathing			
Condition	**Prevalence**	**Prevalence of SRBD**	**Other comments**
Down's syndrome	1:1,000	70-100%	High risk of pulmonary hypertension, especially if co-incident heart disease
Neuromuscular Disease	1:3,000	42%	Difficult to detect clinically. Reduced life expectancy, reversible by treatment
Craniofacial abnormalities	1:7,000	Depends on severity; 100% in severe cases	
Achondroplasia	1:25,000	48%	
Mucopolysaccharidoses	1:40,000	>90%	Difficult to detect clinically
Prader-Willi syndrome	1:52,000	25-75%	Hypoxaemia common. Abnormal central ventilatory responses co-exist

A child with SA might display some or all of these symptoms.

Night time symptoms

◦ snoring (although this is also fairly common in children without SA)
◦ Pauses in breathing noticed by parents and carers, which might be followed by a gasp or snort
◦ Gasps, snorts and choking sounds
◦ Restlessness and sudden arousals from sleep
◦ Laboured breathing
◦ Unusual sleep posture, for example with the head bent backwards
◦ Bedwetting (although this is common in children with no SA)
◦ Breathing through the mouth, a dry mouth and bad breath

Daytime symptoms

◦ Changes in behaviour, for example being irritable and having tears and tantrums
◦ Hyperactivity, which may alternate with sleepiness
◦ Poor concentration
◦ Poor or decreased performance at school
◦ Tiredness and sleepiness
◦ Failure to gain weight or grow
◦ Developmental delay
◦ Learning difficulties
◦ Breathing through the mouth
◦ Speech that sounds nasal
◦ Difficulty swallowing
◦ Early morning headache

If you think your child might have SA, it is important that you talk to your GP. Take your child with you so the doctor can examine him or her.

Before you make an appointment, talk to the child-minder, nursery or school and ask if they think your child might have a problem.

When you go to your GP, you can help by taking with you:

◦ a list of your child's symptoms;
◦ a list of any relevant observations, reports or notes about your child from the child-minder, nursery or school.

If your GP thinks your child might have OSA, the next step should be a referral to a Respiratory Sleep Disorders Specialist (who specialises in paediatrics). Remember, OSA in children is not quite the same as that in adults, and therefore specialist knowledge is required.

Respiratory Sleep Specialists (Adults) do not normally deal with Paediatrics.

Diagnosis

Oximetry (Oxygen saturation monitoring)

This test is used as a screening tool for Obstructive Sleep Apnoea (OSA). It has an excellent negative predictive value but a poor positive predictive value for OSA in otherwise healthy children. It is a simple test that monitors the patient's oxygen levels whilst they sleep and it can be performed in the patient's home. If performed in the appropriate patient group it can obviate a significant number of sleep studies. The child wears a probe on the finger throughout the night. This can be removed in the morning and the data analysed with a computer programme. Each study should be reported on by a respiratory consultant. The key benefit of this test is that it is easy, cheap and can be performed quickly. With the poor negative predictive value of oximetry, approximately 40% of children who have this test performed will need to have a more thorough sleep study performed.

Transcutaneous Oximetry/Capnography (TCOM)

This is a non-invasive test used to monitor a patient's oxygen and carbon dioxide levels overnight. It gives valuable information about the patient's ventilation status at night and is also used to monitor patients who are on non-invasive ventilation (NIV). This test is performed on patients who have been admitted to the hospital in the majority of cases. The child wears a probe on the ear or cheek throughout the night. This can be removed in the morning and the data analysed with a computer programme. Each study should be reported on by a respiratory consultant.

Limited Sleep studies (Domiciliary Sleep Study)

A supervised PSG is the gold standard test recommended by the American Academy of Sleep Medicine (AASM) for all children who have been referred for sleep investigations. This is highly labour intensive, time consuming and expensive. There is therefore a role for limited sleep studies where 8 channels of recording are obtained rather than 12 and if non-diagnostic the patient will then proceed to a full PSG. Limited PSGs look at the respiratory and cardiac variables but do not measure brain waves (EEG). They are easier to perform, with fewer probes, and provide very useful information in most instances. The equipment that is required for these studies is usually hand held and portable. Studies must be performed in hospital but can be performed in regional units where ward staff have training in the use of these devices. As the technology improves some of these studies may be performed in the home with the appropriate support staff. These studies can be performed in an unsupervised setting but this increases the risk of insufficient data collection. Insufficient data collection runs the risk of making clinical decisions with inaccurate data and increases the rate of repeat studies, thus reducing system efficiency. These studies require manual analysis by a technician and reporting by a paediatric respiratory consultant.

Full Overnight Sleep Study/Polysomnogram (PSG)

A supervised PSG is the gold standard test which is recommended by the AASM for all children who have been referred for sleep investigations. It is a non-invasive test which monitors the patients breathing, oxygen levels, carbon dioxide levels, respiratory effort and brain wave activity. This is a comprehensive labour intensive test which needs to be analysed manually by a technician and then reported on by a Respiratory consultant.

The performance of fully supervised and video recorded PSG is a significant undertaking but is necessary for the diagnosis of complicated sleep disorders, or in complicated or very young patients.

Waiting lists for all types of sleep diagnostic study (in the public health system) in Ireland are long. They range from 8 months to 14 months and longer depending on the nature of the study.

Treatment

SA is a treatable condition and if your child is diagnosed with it there is lots of help available. These are the options available to treat SA in children.

Weight loss

If your child is overweight or obese, weight loss is an essential first step to controlling OSA.

Adenoid/tonsillectomy

This operation to remove the child's tonsils and adenoids has a good success rate for treating OSA in children who are otherwise well. It is not suitable for all cases.

Continuous Positive Airway Pressure (CPAP)

CPAP is an effective treatment in some cases of children with OSA. It is a simple machine that pumps air through a mask worn at night to keep the airway open. The machine uses ordinary room air and is powered from the home electrical power supply. Proper/professional mask fitting and follow-up is imperative and should be managed by a specialist respiratory paediatric team.

Tracheostomy

In a tracheostomy, the surgeon creates an opening in the neck at the front of the windpipe. This is only required in cases of extremely severe OSA if all other options have failed.

Oral Appliances (Mandibular Advancement or Repositioning Splints)

This option could be considered for OSA in children with 'malocclusion' of the jaw. This means faulty contact between the upper and lower teeth when the jaw is closed, for example when the lower jaw is set back.

Mandibular and maxillary advancement surgery

This may be helpful for children with craniofacial syndromes (a group of similar inherited conditions affecting the skull, face and sometimes the limbs), which cause a set-back lower jaw.

What happens if OSA isn't treated?

It is important that SA in children is diagnosed and treated. Untreated SA has been linked with:

◦ Failure to grow or gain weight
◦ Worsening behaviour, hyperactivity and aggression
◦ Poor or impaired performance at school
◦ Poor quality of life
◦ Risk of high blood pressure or heart disease

Paediatric Sleep Disorders' services are available at the following centres:

Our Lady's Hospital for Sick Children, Crumlin, Dublin 12.

Children's University Hospital, Temple Street, Dublin 1.

Cork University Hospital, Cork

The National Children's Hospital, Tallaght, Dublin 24.

Mid Western Regional Hospital, Limerick.

Galway University Hospital, Galway.

The Sleep Disorder Support Foundation (SDSF) is a voluntary support and advocacy group for Sleep Disorder sufferers and their families. Membership is free.
The SDSF web site is located at www.sdsf.ie
SDSF can be contacted at help@sdsf.ie or Tel: 086-6053891

While the information contained in this leaflet has been sourced from clinically approved and reputable sources, it is not a substitute for professional medical advice. If you suspect that you or your child might have Sleep Apnoea you should consult with a medical professional.

CHECK LIST OF POSSIBLE SYMPTOMS.
IF ANY ARE APPLICABLE YOU SHOULD BRING THIS LIST TO YOUR DOCTOR (GP)

Night Time Symptoms	
Snoring	
Pauses in breathing	
Gasps, snorts or choking sounds	
Restless sleep	
Laboured breathing	
Unusual sleep position	
Bed wetting	
Mouth breathing/Bad breath	

Daytime Symptoms	
Behavioural changes (irritability/tears/tantrums)	
Hyperactivity	
Excessive tiredness/sleepiness	
Poor concentration	
Failure to thrive/gain weight/grow	
Developmental delay	
Learning difficulties	
Mouth breathing	
Speech that sounds nasal	
Difficulty swallowing	
Early morning headache	
Frequent illness/difficulty shaking off infections	

OTHER SYMPTOMS (Specify)	