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Sleep and Settling Development in Infants

It is widely known that an unsettled infant can be a major cause of stress for some parents. Not surprisingly infant sleep and settling is a major component for health professionals working with families. Of interest is the debate about what techniques are appropriate for parents and children. Some organisations have questioned some settling techniques that could be detrimental to an infant's mental health and/or parent-infant attachment.

When considering sleep and settling development, it is important to understand the parameters of sleep to be able to support the family and plan an appropriate course of action, if any, for the parent to follow. The majority of parents already have an idea about the importance of sleep; however it is the understanding of the child's ability to self regulate that makes the process more difficult for some parents.

It is important to keep in mind that a parent's expectations of sleep patterns may not reflect the developmental ability of the infant to regulate themselves. To "sleep through the night from the day they are born" is an unrealistic expectation in most cases.

What is sleep?

Sleep is a physical and mental resting state in which a person becomes relatively inactive and unaware of their environment. It is worth remembering however, that infant sleep is as individual as the infant themselves.

Sleep serves as a restorative function for our bodies and minds and is very necessary for normal functioning during the day.

Sleep can be divided into 2 distinct stages.

1) Non-rapid eye movement (REM) sleep – quiet sleep

It is during this stage that we lie quietly with a regular heart rate and breathing pattern. There is very little dreaming happening in this stage and it is where the most restorative functions occur.

It is in the earliest months of life that the non-REM sleep divides itself into four stages. It is these stages that identify progress through sleep, from drowsiness to a very deep sleep.

Stage I: This is a state of drowsiness, and is a similar experience to what you might feel as you are drifting off in a lecture or in front of the TV. You nod off and may miss some of the



Practice Resources

Professionals now have ready access to evidence-based information on a range of early childhood concerns as a result of the Centre for Community Child Health's new online Practice Resources series. The series is designed to bridge the gap between research and practice, translating evidence into easily understood, practical information. The topics covered in these resources are:

- Settling and sleep
- Behaviour
- Breastfeeding
- Language
- Literacy
- Injury
- Smoking
- Overweight and obesity
- Eating behaviour

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conversation. You can wake instantly. This is termed hypnagogic (the art of falling asleep).

Stage II: As you transition through the drowsiness into deeper sleep you may experience jerking of the whole body. This is known as the “Hypnagogic startle” and is quite normal. You can be woken easily in this stage.

Stage III and IV: At these stages you fall into a deeper sleep state. Your breathing becomes more stable and some people sweat profusely and are difficult to wake. If woken, you have difficulty thinking clearly and wonder where you are.

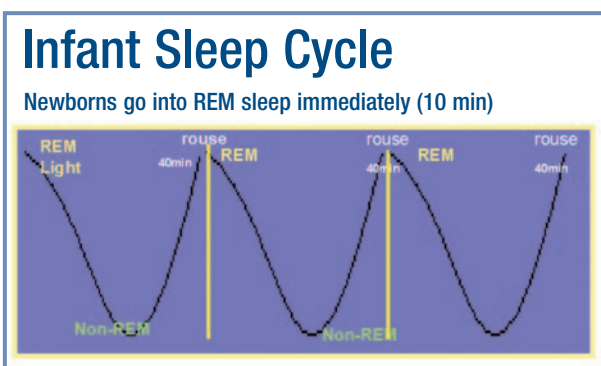
2) Rapid eye movement (REM) sleep – an active state

After one or two cycles in non-REM sleep, you will enter REM sleep. This is a different stage all together. Your temperature will be impaired, so that you will neither sweat nor shiver. You are very relaxed and your muscle tone is also relaxed. This is an active stage and the mind is alert and dreaming occurs. Your body does not react to the outside world, only to what is happening in your own body. You will have rapid eye movements in bursts, which parallel increased heart rates and blood flow.

Arousal is normal between stages, however it is the inability to fall back into sleep that can cause problems for some infants and adults. Infants spend 60% of their sleep in REM sleep. As they get older than 12 months of age, this falls to 30% of total sleep.

Cycles of sleep

A newborn can enter REM sleep immediately after falling asleep. At about 3 months of age a baby will enter non-REM sleep first and they will do this for the rest of their life.



During an arousal state from stage IV of non-REM sleep to REM sleep, the child may call out, sit up, speak unintelligibly and then return to sleep. Arousal can occur every 30-40 minutes followed by a REM sleep for 5-10 minutes.

The previous diagram is the author’s version of the sleep cycle which parents may find useful.

Environmental factors

There are environmental concerns that affect sleep such as:

- Noisy chaotic home
- Cold or too hot environment
- Inability to be allowed time to sleep
- Parents high expectations of how much sleep is necessary
- Constant checking of the infant
- No routine
- Stimulated to get to sleep (sleep associations).

Another problem that may exist is between the parent’s expectations of infant sleep and crying patterns and the actual crying behaviour of an infant. It is important to work through this problem so that you can assist the family to move forward if they’re feeling concerned with the sleep pattern of their infant.

Sleep regulation

A sleep problem is defined in children of one year as being a sleep onset problem, associated with fussing that lasts longer than 30 minutes on a regular basis, or night waking episodes that occur at least 4 nights a week and require parental intervention. Whilst this is the definition of a sleep problem, the practitioner should understand that if a parent is raising a concern, then this needs to be addressed regardless of the definition.

A critical sleep reorganisation period is at 8-12 weeks, which is the establishment of the diurnal cycle. Sleep regulation and consolidation (settling and sleeping through the night) is seen as a developmental milestone by many child health professionals. This consolidation refers to the ability of infants to sustain sleep in a

continuous fashion for their age – for an appropriate period of time before fully awaking.

From the wider reading it is evident that up until the infant is 3 months of age they do not have the ability to regulate their patterns and have an immature involuntary response, so that settling techniques may not be hugely successful prior to 3 months of age.

At 3 months of age, the research tells us that crying becomes more organised and co-ordinated with visual regard and gestures. Infants are also able to be soothed by their parent's voices at this age.

It is important to keep sleep problems in perspective and parents need to be reassured that crying is a normal development for an infant and 70% of infants can self regulate back to sleep at 3 months and 90% infants do this regularly at 9 months. So we can see that by 12 months of age, the majority of infants have regulated themselves and are self soothing and perhaps sleeping for long periods at night. Remember, there will be some parents still experiencing difficulty with their child's sleep at this stage.

Settling techniques

Settling techniques can be best explained by considering these techniques as being cognitive management and behaviour management.

- **Cognitive approach**

The cognitive approach to settling allows the parent to be in tune with their infant and understand what is age appropriate for them.

The main cognitive approach suggested is to allow the infant (1-3 months of age) to fall asleep on their own at bed time. This strategy works in 70% of infants by three months of age; and this then increases to 90% by nine months of age.

If an infant is put into bed awake they are more likely to be self soothers compared to those babies who are put to bed asleep. Infants that require a lot of parental assistance to go to sleep at night are also more likely to require further intervention to fall back to sleep during a wakeful period in the night.

Many parents, (if they accentuate day/night differences), can assist the infant to learn to regulate sleep and waking behaviour according to environmental cues. This may involve a focal feed settling them in a darkened environment or minimising interaction during the night, and/or trying not to rock, hold or feed the baby to sleep.

At around 3-6 month of age, parents can regulate the infant by:

- Moving the infant out of the family bedroom
- Not racing to comfort the infant the moment they make a sound
- Infants are given greater opportunity to self sooth
- Feeds start to distance themselves apart
- Some may start solid food at 6 months of age
- Nighttime feeds become less interactive

Other techniques to encourage sleep are:

- Identification of a child's unique tired signs and acting on these as soon as possible.
- Monitoring the baby's crying by listening and getting to know their own infant's crying and acting accordingly.
- Reassuring parents that short crying periods at settling times are normal and it may take 10 minutes of crying and grizzling to allow the infant to self settle to sleep.

In most cases these small/subtle settling techniques can be enough of a signal for the infant to relax into a sleep.

- **Behaviour modification ideas**

Behaviour modification strategies tend to come into play when cognitive techniques are in place and the infant and family are continuing to struggle to find a balance in their routine.

There has been much discussion on the different types of behaviour modification strategies, particularly the controlled crying / comfort settling / extinction methods.

From the evidence, it is paramount when considering using a behaviour modification technique that the health professional completes a full assessment of the situation

and assesses whether a technique such as this should be recommended.

It is important not to recommend a controlled crying technique unless you are able to support and closely follow up while parents are using the technique.

It is also advisable that behaviour extinction methods not be used for an infant who is aged less than 6-8 months of age.

Another cautionary note would be that the parents need to listen to their infant's need and cries and monitor how they are managing when using a technique such as controlled crying / extinction.

Food for thought

From literature reviews and meta-analyses, it is evident that there needs to be many questions clarified in relation to the technique for sleep and settling. It is important that we consider all opportunities to gather evidence and research, to develop and review current best practice.

Some questions that need to be answered are:

- What are different cultural theories and expectations on sleep for infants?
- What is an accepted level/length of crying?
- How does the use of behavioural modification techniques affect maternal attachment and the ability to respond to their infant? And visa versa.

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Useful websites for parent information on sleep and settling:

- Raising Children Network – raisingchildren.net.au
- Child and Youth Health – www.cyh.com



Reflection Questions

- 1. How informed are you about infant tired signs? Can you confidently explain these to parents?***
- 2. How do you personally feel about behaviour modification techniques? Would you use or recommend them to parents? Would your decision be based on evidence or personal feelings?***
- 3. Consider the demographic and cultural characteristics of the parents attending your services. What are their expectations on sleep for infants? Are these realistic?***

Fluid Intake in Infants and Young Children

Why water is important

Water has many important roles in the body. It helps transport nutrients, maintains blood volume, regulates body temperature and removes waste products.

Infants and young children:

- Have a higher metabolic rate which increases heat production, waste products and fluid requirements.
- Have immature kidneys and do not concentrate urine as well as adults.
- May not be able to verbalise that they are thirsty and unlikely to have independent access to beverages.

All these factors contribute to an increased risk of dehydration in infants and young children.

Dehydration can be life threatening. Symptoms to be aware of include sunken eyes, decreased urine output, irritability and dry skin, mouth and eyes. Dehydration can also contribute to constipation as the colonic contents become dry and hard, making stools more difficult to pass.

Fluid requirements

The daily fluid intake for children 0 – 12 months old should be around 150ml/kg. After 6 months, a portion of this fluid is provided by solids and it is normal for fluid intake to decrease.

Children 1 – 5 years old should drink at least one litre each day. This includes water, milk on cereal and juice. Best fluid choices are described below.

Best fluid choices

Breast milk is the best fluid for infants under 12 months. For the first 6 months, it provides all the nutrition the infant needs. Infant formula should be used for those infants who are not breast fed. Cow's milk should not be introduced as a beverage until the infant is 1 year old, however, small amounts of cow's milk may be used in food (i.e. on breakfast cereal) after 6 months of age.

Tap water is the best drink for children. Water should be offered to all children over 6 months to supplement fluid intake and can be offered in a cup from this time. If

children are consuming spring or rain water, a fluoride supplement may be necessary but this should be discussed with the child's dentist.

Milk or milk products are essential for ensuring young children (over 12 months) have an adequate intake of key nutrients such as calcium and zinc. However, too much milk may contribute to nutrient deficiencies as the child will easily fill up on milk at the detriment of other foods. Limit milk to 600ml/day and encourage children to eat a varied diet. Cow's milk should be offered in a cup, avoid offering it in a bottle, as this promotes tooth decay and excessive intake of milk.

What milk is best?

Full fat dairy products are recommended for children under two years of age, skim milk and reduced fat milks should not be used for this age group.

Between the age of 2 and 5 years, children do not usually need the extra fat from milk and milk products, therefore, reduced fat milks are appropriate from 2 years of age. Skim milk should not be used for children less than 5 years of age.

Children with allergies or intolerance to cow's milk should find a suitable high calcium replacement. Soy milk is appropriate after 12 months if the child is eating a varied diet.

What our children are drinking

According to the 1995 National Nutrition Survey, juice was a popular beverage choice, with 85% of boys, aged between 2-3 year old, drinking juice (fruit or vegetable) on the day of the survey compared to 79% who consumed water. The average intake of juice in this age group was 388ml per day, far above the daily recommendation.

Fruit juice contains the vitamins from fruit but it lacks the fibre and variety children would be getting if they ate fresh fruit. If children are drinking juice, it should be limited to one small glass per day, preferably with a meal.

The percentage of children drinking soft drink was also alarming, with 26% of all 2-3 year olds and 33% of 4-7 year olds, consuming soft drink on the day of the survey.

Problems with too many sweet drinks

Sweet drinks such as cordial, soft drink, sports drinks and fruit juices are not necessary for children and excess consumption can contribute to common nutritional problems.

- **Toddler Diarrhoea**

Juices and soft drinks are especially concentrated and some children may find it difficult to digest such large loads of sucrose or fructose. Managing toddler diarrhoea may be as simple as removing fruit juice.

- **Dental caries**

Regular consumption of sweet beverages contributes to tooth decay and poor oral health. Putting babies or young children to bed with a bottle also increases the risk of decay.

- **Fussy eating**

Always ask what type and volumes of fluids children are drinking. Children may fill up on sweet drinks or milk and be less inclined to eat a variety of food.

- **Weight gain**

Recent research shows soft drinks can contribute to obesity and industry data suggests that soft drink intake is increasing. Habits are formed at a young age and we should be encouraging our children to be drinking less soft drink and other sweet beverages.

Situations requiring increased fluid requirements

Hot/humid weather and activity

Children playing outdoors or in a car on a warm day can lose high volumes of fluid and are very susceptible to dehydration and heat stress. Thirst is not always the best indicator of hydration and children should be offered fluid more regularly in the warmer weather, particularly if they are active.

In hot weather, babies will usually naturally demand more fluids and it is acceptable to give formula fed babies small amounts of cool boiled water after the bottle if they seem extra thirsty. Breast fed babies may need extra breast feeds and mother should maintain her hydration. It is not usually necessary to offer water; however, occasionally this may be needed.

Illness/Fever

When children are unwell they may not feel like drinking or eating despite an increased need for fluids. This is an appropriate time to offer flavoured beverages such as watered down juice or flat and diluted soft drink to encourage fluid intake and provide some energy (kilojoules).

Gastroenteritis/Diarrhoea

Maintaining hydration is critical in children with diarrhoea/gastroenteritis. The principle of fluid replacement is offering small amounts frequently. Clear fluids familiar to the child will be accepted but must be diluted to ensure a glucose solution of about 2%. An Oral Rehydration Solution (ORS) available from pharmacies over the counter, may be used. ORS helps to more effectively restore fluid by replenishing electrolyte balance. Be mindful that children may refuse some of these because of the taste. If a child is breast fed then this should continue during the period of illness.

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Reflection Questions

1. *During hot weather do you regularly discuss with parents the increased fluid needs of their infants and children?*
2. *Have you recently reviewed your knowledge of the clinical signs of dehydration in infants and children?*
3. *Do you currently discuss with parents the range of problems that are associated with sweet drinks?*