

Sudden unexpected death in infancy: Where are we now?

Sudden unexpected death in infancy (SUDI, see: “New terminology”, over page) refers to the death of an infant aged under one year, which is initially unexplained. Death usually occurs while the infant is asleep. The incidence of SUDI has declined significantly since public prevention campaigns began in New Zealand in the early 1990s. Prior to this, in the 1980s, the SUDI mortality rate was over 4 per 1000 live births.¹ This corresponded to over 200 infant deaths per year.¹ Now, the mortality rate is less than 0.8 per 1000 live births (across all ethnicities), with approximately 50 deaths per year.¹

This success, however, masks several important factors. The first is that New Zealand still has one of the highest rates of SUDI in the developed world.^{2,3} Australia, for example, has an incidence of 0.4 cases of SUDI per 1000 births, half New Zealand's rate.⁴ The second is that the decline in infant mortality has not been equal among all New Zealanders. Māori infants now form the overwhelming majority of SUDI deaths, with a mortality rate five times that of European infants.³ In 2009, Māori and Pacific infants accounted for 75% of all SUDI deaths (Māori 61.8%, Pacific 12.8%).³ Infants born to families in lower socioeconomic areas also have a disproportionately high likelihood of SUDI.⁵ Younger maternal age is another significant risk factor, with the majority of SUDI deaths occurring in infants whose mother is aged under 25 years.⁶

The increased incidence of SUDI among Māori in particular is thought to be due to greater levels of high-risk behaviour, such as maternal smoking, and poorer knowledge about SUDI

Ministry of Health's recommendations for Safe Sleep

The Ministry of Health has published safe sleep recommendations for parents of young infants. It is emphasised to parents that SUDI is extremely rare when infants are protected by being put to bed in safe sleep conditions.

Parents are advised that they can protect their infant by doing the following things:¹²

- Place the infant to sleep on their back with their face up
- Ensure the infant's face is clear of bedding and they cannot become trapped or strangled. Pillows and bumper pads should be avoided, the infant should not be placed on soft surfaces or loose bedding and there should be no gaps in the bed.
- Put the infants to sleep in their own cot, bassinet, wahakura or Pepi-Pod, in the same room as the parent. Infants should not sleep in a bed with another person (either adult or child).
- Provide a smoke-free environment both during pregnancy and after birth
- Where possible, mothers should breast feed the infant

New terminology, new understanding

Sudden unexpected death in infancy (SUDI) refers to the death of an infant aged under one year, usually while sleeping, which is initially unexplained. Sudden infant death syndrome (SIDS) refers to cases in which the death remains unexplained after a thorough investigation.⁸ SUDI is a broader term, including deaths that can be explained, such as accidental asphyxiation, and those that cannot. This has prevented the artificial lowering of SIDS mortality rates as the accuracy of investigation and mortality coding increases. However, it is possible that the change in terminology may account for some of the decline in the reported incidence of SIDS/SUDI over the years.

risk factors, along with lack of access to this information.⁷ What is less well understood is why Māori have poorer knowledge about SUDI. Maternal education about risk factors has been successful among Europeans and families in higher socioeconomic areas, but has failed to have a strong impact among the groups most at risk.⁶ This may be partly attributable to less exposure to health education among Māori women, such as lower attendance at antenatal classes.⁷ Educational messages that are not culturally tailored to Māori families also contribute to the problem.⁷

This gap in health knowledge presents a strong opportunity, and responsibility, for General Practice to help address disparities. The focus should be on explaining the factors which increase the risk of SUDI, why these factors present a risk and helping to find ways to minimise or overcome risks that are culturally and financially acceptable. Information, conveyed in a culturally relevant way, is the key to reducing rates of SUDI in New Zealand.

The cause of SUDI: a trio of risks

Understanding of the causes of SUDI has grown over the last two decades. The current model is multi-factorial and relies on three aspects being simultaneously present:^{9,10}

- An infant in a critical developmental period
- An underlying vulnerability present since birth
- Exposure to an external stressor

The critical developmental period is from age one month to one year.⁸ However, 90% of deaths occur in infants aged less than six months, with a peak between ages one and four months.⁸

The vulnerabilities that lead to SUDI are only now beginning to be understood. They include low birth weight (either from pre-term birth or low weight normal gestation births), abnormalities in the arousal system, serotonin receptor abnormalities and genetic polymorphisms, such as altered calcium channel genes which may affect cardiac rhythms.¹¹ Most of these vulnerabilities are genetic, present from birth, difficult to identify and non-modifiable.¹⁰

The external stressors for SUDI are factors which place the infant at a higher risk of asphyxiation, re-breathing of expired gases, overheating or other similar risks. The factors are usually modifiable and recognising them and creating public health messages around their avoidance has helped to reduce the burden of SUDI worldwide.¹ It is these risk factors that present the greatest opportunity for SUDI prevention in primary care.



Vulnerabilities: modifiable risk factors for SUDI

Sleep position

Infants should be placed to sleep in a supine rather than prone position, i.e. on their back, not on their front. The promotion of this behaviour has been the single greatest factor in reducing infant death while sleeping.¹ It is estimated that prone sleeping increases the risk of SUDI between 3 – 14 times.¹³ Side-sleeping is also strongly associated with an increased risk of SUDI, as it increases the likelihood that the infant will roll into a prone position.¹³

Some parents may be hesitant to place infants in a supine position due to the belief that this is associated with choking, reduced muscle development or deformational plagiocephaly (the flattening of one side of the head). However, the risk of aspiration, apnoea and cyanosis are not increased when an infant is placed in a supine position, compared to a prone position.¹³ Prone sleeping is not a recommended method to prevent gastro-oesophageal reflux in infants; raising the head of the bed may be helpful.¹³

Infants should be placed on their back for sleeping from birth until at least age twelve months. In order to help infants develop head control, upper body strength and reduce the risk of plagiocephaly, “tummy time”, where the infant is placed on their front on the floor, is recommended when the infant is awake and under adult supervision.¹³ Parents should be reminded to instruct all caregivers about the correct sleeping position for the infant.

Bed sharing

Adults sleeping in the same bed as an infant, i.e. bed sharing or co-sleeping, increases the risk of SUDI.^{8,13} A retrospective study of SUDI cases in Wellington found that 50% of the reported deaths occurred while bed sharing.¹⁴ A similar study in Auckland found that 67% of SUDI deaths occurred while bed sharing, and the vast majority of these deaths (97%) occurred in Māori and Pacific infants.¹⁵

The risk associated with bed sharing is highest in infants aged under three months.¹³ The risk is further increased if the infant is sharing a bed with a person who smokes, has consumed alcohol or taken drugs.^{8,13}

There has been resistance to advice against bed sharing due to perceived advantages such as ease of breast feeding and night-time bonding.⁹ In addition, bed sharing is viewed as a

culturally important part of childrearing by many Māori and Pacific peoples, with important practical, psychological and spiritual benefits for the infant.^{1,7} While this issue can be sensitive, most consensus statements recommend that the risks of bed sharing should be discussed with the parents, regardless of ethnicity or cultural views, as parents have a right to evaluate the risks and benefits themselves.¹³

Ideally, infants should be placed in a cot, next to the parent’s bed, until at least age six months.^{8,13} Interventions that allow safe bed sharing to take place are also acceptable, such as wahakura (woven flax bassinet) or Pepi-Pod (a basket-like device), (see: “Māori and Pacific sleep safe interventions”, over page).

Mattresses, mattress protectors and bumpers

Soft bedding and sleeping surfaces, such as pillows, quilts, comforters, sheepskins and mattresses not designed for infants, increase the risk of SUDI through airway obstruction, re-breathing of expired gases and overheating.¹³ Mattresses should be new or in good condition, and tightly fitted to the cot. If a mattress is ill-fitting, an infant can become trapped between it and the wall of the cot.¹³ Mattress bumpers should not be used and soft toys should not be placed in the cot.

In the past, some experts recommended wrapping the cot mattress in polythene, in theory to prevent toxic gases from the mattress reaching the infant. However, this theory has now been discredited,⁸ and there is a potential risk of suffocation with the polythene.

Over-heating

Over-heating is associated with an increased risk of SUDI.^{1,8} However, the risk is lessened if the infant is placed in a supine position.¹

Infants should be dressed appropriately for the environment, with no more than one extra layer than an adult would wear to be comfortable.⁸ Blankets and coverings should also be appropriate to the environment. Ideally, the temperature of the room the infant sleeps in should be between 18 – 22°C.¹

Swaddling

Swaddling refers to the practice of firmly wrapping young infants in light sheeting or muslin. It is thought to create a tranquil sleeping state and longer sleep periods.¹⁶ Evidence is conflicting on the association between swaddling and the risk of SUDI.¹⁶ It is thought that because swaddling increases sleep time and reduces arousal, it may increase the risk of SUDI.¹⁶

Māori and Pacific sleep safe interventions

The emphasis of SUDI prevention has changed over time, from giving strict “rules” that help prevent SUDI, to providing education and interventions that allow for culturally important behaviours to continue in a safer way. One of the most effective of these interventions has been the wahakura, a flax bassinet that allows the infant to share the parent’s bed while sleeping in their own space. The device prevents exposure to adult bedding, mattresses and pillows, and reduces the risk of the parent crushing or overlaying the infant.²⁰ Correct use of a wahakura, along with education relating to SUDI risk factors, appears to have been highly effective in pilot studies.²⁰

Producing wahakura from flax is a skill-intensive process, and therefore they are not available commercially.²⁰ As a result, a similar device called a Pepi-Pod has been developed and is now being produced on a larger scale. A Pepi-Pod is essentially a wahakura made from recycled plastic (the bottom of a clothes basket) that comes with a fitted mattress and safe bedding. Pepi-Pods are currently being trialled in selected high-need groups around New Zealand, and have been shown to be highly effective and acceptable.²⁰

The general practice team are encouraged to work collaboratively with Māori health providers, who are also working within their communities to reduce the incidence of SUDI. This may help to overcome the barriers to knowledge that have created the current ethnic disparities in SUDI incidence over the last two decades.

 For more information on Pepi-Pods and similar interventions, see:

www.whakawhetu.co.nz/pepi-pod.html

Infants should not be swaddled in heavy material, which can cause over-heating, and infants who are swaddled should never be placed in a prone position for sleeping.¹⁶

Cigarette smoke exposure

There is strong evidence that antenatal exposure to cigarette smoke and nicotine increases the risk of SUDI.^{8, 13} *In utero* exposure to tobacco smoke increases the risk of intra-uterine growth retardation and pre-trem birth.¹³ It also increases the recovery time from hypoxia, decreases heart rate variability and removes the normal relationship between gestational age at birth and predicted heart rate.⁸ These factors represent the vulnerabilities outlined in the trio of risks.⁹ There is also evidence that exposure to maternal smoking *in utero* reduces the frequency of arousal from sleep in the infant, which is a strong risk factor for SUDI.⁹ Nicotine exposure may also alter serotonin receptors in the brain stem; brain stem abnormalities involving the serotonergic system are found in up to 70% of cases of SUDI.⁸

While General Practitioners rarely act as lead maternity carers, any consultation before or during pregnancy should be used to encourage smoking cessation. This should extend to all household members. Parents and family members who wish to stop smoking should be offered and encouraged to use smoking cessation supports, e.g. Quitline and NRT.

Breast feeding

Breast feeding is thought to have a protective effect against SUDI and other causes of post-natal mortality.¹³ Infants should ideally be breast fed exclusively until age six months, with continued breast feeding, alongside complementary foods, until the infant is aged at least one year.¹⁷

As of 2010, approximately 85% of infants in New Zealand were breast fed up to age six weeks.¹ However, there is a lower rate of breast feeding, and earlier breast feeding cessation, among Māori mothers.⁷

Barriers to breast feeding should be discussed, and education and support provided where necessary.

Immunisation

Infants who are fully immunised have a decreased risk of SUDI.^{13, 18} There may be a misconception among some parents that vaccines, particularly diphtheria-tetanus-pertussis (DTaP), are associated with an increased risk of SUDI. A series of studies over the last two decades has consistently refuted this association.¹³

Parents should be strongly encouraged to keep up to date with their child's immunisation schedule, and if any immunisations have been missed, plan a catch-up immunisation as soon as possible.

Dummy (pacifier) use

There is a recognised association between the use of a dummy (pacifier) and reduced risk of SUDI.¹³ The protective mechanism is not well understood, however, and dummy use is associated with several adverse effects, such as malocclusion of the teeth, increased risk of dental caries, otitis media and earlier cessation of breast feeding.¹⁹

If dummies are used, they should not be introduced before breast feeding is firmly established, usually at age three to four weeks.⁸

Further resources for parents

Patient handouts and waiting room posters can be found at the Ministry of Health Safe Sleep website, see: www.health.govt.nz (Keywords: safe sleep)

ACKNOWLEDGEMENT: Thank you to **Professor Ed Mitchell**, Professor of Child Health Research, Department of Paediatrics, University of Auckland for expert review of this article.

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