



POSITION PAPER

Scientific consensus forum to review the evidence underpinning the recommendations of the Australian SIDS and Kids Safe Sleeping Health Promotion Programme – October 2010

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Abstract: This paper summarises a 1-day scientific consensus forum that reviewed the evidence underpinning the Australian SIDS and Kids Safe Sleeping Health Promotion Programme. The focus was on each of the potentially modifiable risk factors for sudden unexpected deaths in infancy, including sudden infant death syndrome (SIDS) and fatal sleeping accidents. In particular infant sleeping position, covering of the face, exposure to cigarette smoke, room sharing, unsafe sleeping environments, bed sharing, immunisation, breastfeeding, pacifier use and Indigenous issues were discussed in depth. The participants recommended that future 'Reducing the Risk' campaign messages should focus on back to sleep, face uncovered, avoidance of cigarette smoke before and after birth, safe sleeping environment, room sharing and sleeping baby in own cot.

Key words: bed sharing; breastfeeding; infant care practices; sleep position; smoking; sudden infant death.

Introduction

Sudden infant death syndrome (SIDS) refers to 'the sudden death of an infant under one year of age which remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history'.¹ This definition was modified in 2004 to include an apparent association with sleep, and a broader requirement for a death scene examination to include an evaluation of the entire circumstances of death.² The most

significant developments over the past two decades have involved the identification of behaviours and situations that decrease the likelihood of a SIDS death.

In Australia, infant deaths attributed to SIDS among non-Indigenous Australians have fallen approximately 83% during the last 20 years.³ Evidence suggests that the marked reduction in SIDS incidence can be directly associated with Australian public health campaigns that promoted safe sleeping practices and, in particular, advice to parents to place infants on their backs when sleeping.⁴ Despite these significant reductions in infant mortality, SIDS continues to comprise the largest category of deaths occurring in the post-neonatal period (between 28 and 365 days after birth).⁵ However, these significant reductions in SIDS have not been observed among Indigenous Australians, and total population data from Western Australia reports a non-significant decrease in SIDS and a corresponding increasing risk ratio when comparing Indigenous infant mortality rates attributable to SIDS to that observed among non-Indigenous infants.⁶

Previous expert forums have been held in Australia – in Canberra in 1991 and in Melbourne in 1997^{7,8} – to examine the validity of the 'Reducing the Risk' campaign messages. In 1997, the agreed messages were:

- Put baby on the back to sleep, from birth
 - Sleep baby with face uncovered
 - Cigarette smoking is bad for babies: avoid exposing baby to tobacco smoke before birth and after.
- In 2002, two further recommendations were added:
- Provide a safe sleeping environment, day and night: safe cot, safe mattress, safe bedding and safe sleeping place
 - Sleep baby in their own cot in the same room as their parents for the first 6–12 months of life.

Key Points

- 1 Sudden infant death syndrome (SIDS) mortality has decreased dramatically since the 'Reducing the Risk' campaign, which advised mothers to put baby on the back to sleep.
- 2 The consensus forum recommended that future 'Reducing the Risk' campaigns should focus on back to sleep, face uncovered, avoidance of cigarette smoke before and after birth, safe sleeping environment, room sharing and sleeping baby in own cot.
- 3 Adherence to these recommendations is estimated to reduce sudden unexpected death in infancy to less than 0.1 per 1000 live births.

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Disclaimer: This statement and recommendations are not necessarily endorsed by all the participants, nor are the opinions necessarily those of the authors. The authors have attempted to capture the evidence presented, the discussions and recommendations.

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Epidemiological investigations have shown that many of the maternal, infant and socio-demographic risk factors for SIDS are common to the broader category of sudden unexpected deaths in infancy (SUDI) and to fatal sleep accidents. Therefore, safe sleeping strategies will target all three of these categories of infant death.^{5,9,10}

Epidemiological features of SIDS have changed since the 1997 'Reducing the Risk' campaign. Examples of recent changes include a younger median age of victims nowadays, a reduction in the previous winter peak¹¹ and thermal risk factors are much less important now that few babies sleep prone.¹² For this reason, a forum of invited experts and others involved in the field from Australasia and overseas was convened by SIDS and Kids in Sydney, Australia in October 2010 to provide an up-to-date examination of the evidence base for risk factors for SUDI and to endorse, or propose, recommendations based on this evidence.

Specific Issues

Prone sleeping and side-sleeping

Evidence from many countries shows that prone sleeping increases the risk of SIDS by between 3–14 times, with a population attributable risk ranging from 38–82%.^{13–19} Side sleeping also significantly increases the risk of sudden infant death primarily because of the greater possibility of an infant rolling prone during sleep.^{20,21} Rolls and devices intended to keep an infant in the side position do not stop rolling prone and are therefore not recommended.^{22–24} Prone position when awake ('tummy time') is recommended to help develop head control²⁵ and reduce the risk of deformational plagiocephaly.²⁶

There is substantial observational evidence that the risks of aspiration, apnoea and cyanosis are not increased when the supine position is used.^{27,28} A systematic review that investigated the effect of positioning in improving outcome of gastroesophageal reflux in developmentally normal infants from 1 month to 2 years of age concluded that the prone position should not be used for any infant who is still within an age range to be at risk for SIDS.²⁹ Aspiration of gastric contents is also not a problem in countries that traditionally place infants on their backs (e.g. Hong Kong).^{30,31}

Covering of the face

A meta-analysis of 10 age-matched controlled studies by Blair and colleagues³² showed a consistent risk associated with head covering. By head covering the authors meant covering of the face with bedding and did not refer to covering the head with a bonnet or hat. A quarter of SIDS infants are found with their heads under bedclothes representing an eightfold difference compared to age-matched controls, with an increased risk of sudden infant death of approximately 17 times (with a resultant Adjusted Odds Ratio (AOR) of 16.9; 95% CI = 12.6–22.7). The magnitude of the risk increases when other factors are controlled for (including sleep environment, position and smoking).³² If head covering is causally related to SIDS,³³ the population attributable risk of 27.1% suggests that avoiding head covering might reduce SIDS deaths by more than a quarter.³² The increased risk may be associated with airway obstruction, mechanical suffocation or overheating.^{32,33}

Doonas, duvets and quilts are considered high risk, even after other factors were controlled for, due to their propensity to totally cover infants (AOR 1.88; 95% CI = 1.14–3.12).^{22,32} Limited evidence supports the advantages of 'feet to foot' sleeping for infants, or the use of sleeping bags.³⁴

Exposure to cigarette smoke

Smoking and exposure to environmental tobacco smoke adversely affects infant health by increasing the likelihood of stillbirth, low birth weight, prematurity, and respiratory infections.^{3,35,36} An increased risk of SIDS has been demonstrated in more than 60 studies associated with smoking during pregnancy as well as through passive smoking.³⁷ The risk of SIDS for mothers who smoked during pregnancy is approximately four times greater than that of non-smokers (Relative Risk 3.9; 95% CI = 3.8–4.1).³⁸ It is estimated that a third of SIDS deaths could be avoided if *in utero* smoke exposure was eliminated.^{24,38,39}

It is difficult to separate the effects of postnatal environmental tobacco smoke exposure from smoking in pregnancy, as parental smoking behaviours during and after pregnancy are highly correlated.^{37–40}

An independent effect for paternal smoking has also been found, although it is lower than the risk associated with maternal smoking. Paternal smoking risk where mother is a non-smoker has an estimated risk of 1.5 times (summary odds ratio of 1.47) compared to an infant with both parents who do not smoke.³⁸ Many studies support a dose-response relationship, with the risk of sudden infant death increasing with the number of cigarettes smoked.³⁹ The amount of smoke exposure increases with the number of household smokers, the number smoking in the same room as the infant, the number of cigarettes smoked, and the daily hours that an infant is exposed to a smoke-filled environment.^{36,37,39,40} The population attributable risk attributed to smoking by mother, father or both parents/caregivers has been estimated as high as 62%, meaning that SIDS deaths could be reduced by approximately 62% if smoking could be stopped.³⁹ Smoking is also associated with low rates of breastfeeding initiation and duration.^{41,42} Smoking is now the most important modifiable risk factor in reducing the risk of sudden infant death.^{24,37,39}

Room sharing

Several studies have reported that infants who sleep in a separate room from their caregivers have an increased risk of SIDS^{42–46}, with one large case-control study demonstrating a 10-fold increased risk associated with solitary sleeping.⁴⁶ The protective effect of room-sharing does not include room-sharing with siblings or other children.^{44,47,48} SIDS infants who slept separately from their parents are more likely to be found with bedclothes covering their heads, and if placed on their sides to sleep, were more likely to be found prone, compared to infants who slept in the same room as their caregiver.⁴⁹ The recommendation to room-share with infants for the first 6–12 months is supported by studies in a number of countries including Australia, New Zealand, the United Kingdom, the United States, Canada and most northern European countries.^{13,50} There is no

evidence to suggest that this recommendation should not apply to parents who smoke, although it should be emphasised that parents should not smoke in the bedroom.

Unsafe sleeping environments

Infant deaths in cots may also be due to unsafe environments that have led to fatal hanging or wedging.⁵¹ All new and second-hand cots being sold must comply with the Australian Standard for household cots (AS/NZS 2172) and should carry a sticker showing compliance.⁵² Ill-fitting mattresses may result in infants wedging in the gaps between the mattress and the cot side that can lead to suffocation.^{52,53} Prams, strollers, bouncinetttes and rocker chairs are not designed as infant sleep environments, and fatal sleeping accidents have occurred when babies were left unsupervised in these environments.^{52,53}

Soft bedding and soft surfaces, including pillows, quilts, comforters, sheepskins and porous mattresses, have been shown to be important risk factors as they may lead to airway obstruction, suffocation and overheating.^{24,54–56} Mattresses may also sag, producing troughs into which infants become entrapped causing suffocation.⁵⁵ A strong interaction has been found between prone sleep position and a soft bedding surface.⁵⁷

There is no evidence to suggest that antimony- and phosphorus-containing compounds used as fire retardants in cot mattress materials are a cause of SIDS.^{58,59}

Shared sleeping (bed sharing and co-sleeping)

There is often confusion about terminology with various terms used to define shared sleep environments between infants and their carers, including co-sleeping and bed sharing. In this section, we refer to bed sharing as being the mother (it is usually the mother, but can include fathers or other adults) sleeping with the infant on the same sleeping surface (usually a mattress).

Recent surveys have shown that 50+% of infants who die suddenly and unexpectedly are found in a bed-sharing situation.^{34,60,61} The risk of SIDS with bed sharing is high when the mother smokes.^{34,43,45,50,62–64} There is a small increased risk when the mother does not smoke for infants less than 3 months of age.⁴³ Bed-sharing infants placed back in their cot are not at increased risk of SIDS.³⁴ The risk is increased by parental sedation (including non-prescription drugs, alcohol and maternal fatigue), soft surfaces (i.e. pillows, beanbags, waterbeds), multiple bed sharers (especially siblings) and maternal obesity.^{34,65} Infants at highest risk are those born preterm or were born small for gestational age.^{66,67}

Sleeping on a sofa with a baby is associated with a significantly high risk of sudden infant death and fatal sleeping accidents and should be avoided.^{48,68} The increased risk has been seen mainly in the UK, and has not been identified as a risk in New Zealand or Germany, possibly because few babies in these countries are exposed to the risk of their mothers sleeping on sofas (Mitchell and Vennemann, pers. comm., 2010).

There is no evidence that bed sharing is protective against SIDS in any group. When an interaction is present, removal of either factor will achieve the same effect.

The potential benefits of bed sharing need to be discussed. The major documented benefit relates to breastfeeding.⁶⁹ Bed sharing is associated with more frequent suckling,⁷⁰ although duration of feeds may be shorter compared to room-sharing and solitary sleeping babies.^{70,71} Bed-sharing babies also show reduced intervals between feeds relative to solitary sleeping infants.⁷² Bed sharing is associated with reduced formula supplementation^{68,71} and a longer duration of breastfeeding (in terms of infant age)^{73,74} but this may not be causal. Some groups have promoted bed sharing as a strategy to improve breastfeeding.

Physiological studies have shown that when bed sharing, both mother and baby have more arousals compared with solitary sleeping.^{71,75,76} Resulting sleep fragmentation could be detrimental or even possibly protective in early infant development. Such studies have also documented increased maternal responsiveness, including the adaption of maternal body positioning that facilitates breastfeeding.^{71,77,78} However some studies have documented increased episodes of infant head covering by mothers in bed-sharing environments.⁷⁹

Other benefits claimed include enhanced maternal–infant bonding,^{80–83} improved settling with reduced crying,^{71,84,85} improved maternal and infant sleep,^{86,87} and long-term psychological outcomes, including increased self esteem and discipline.^{81,82}

It should be stressed that the forum does not suggest that babies should not be brought into the parent's bed for comfort and feeding. This has been investigated in previous studies and has not been found to be a risk factor provided the infant is returned to his own cot. The concern is with risks associated with *sleeping* with a baby in the parental bed.

Bed sharing is controversial because of opposing views on the benefits and risks associated with this practice. Some have argued that the risk of SIDS and accidental asphyxia out ways any potential benefits, whereas others have argued that it is a valued culturally determined practice. As a consequence, some health professionals do not even discuss the risk, so it is probably not surprising that surveys show that less than half of mothers of infants do not know that bed sharing increases the risk of death.⁸⁸ Mitchell has argued that whatever one's stance is in this debate that parents have a right to know the risk.⁸⁹ For parents to make an informed decision about the infant care practices they use, health professionals have an important role in ensuring that parents are provided with clear information that includes the evidence base for both the risks and benefits of bed sharing with babies.^{74,89–94}

Immunisation

Parents are advised to immunise their babies according to the national vaccination schedule.^{95,96} The possibility of the DTP (diphtheria-tetanus-pertussis) vaccination being linked to SIDS has been discussed periodically over the last 20 years, however a series of studies have consistently refuted the association.^{97–99} A recent meta-analysis published provides strong evidence that immunisation is associated with a decreased risk of SIDS (OR 0.54; 95% CI = 0.39–0.76).¹⁰⁰

Breast feeding

There are many known benefits of breastfeeding, including the reduced risk of postneonatal mortality.¹⁰¹ Epidemiologic studies measuring the association between breastfeeding and SIDS have been inconsistent.^{102–105} A recent meta-analysis found a protective effect of breastfeeding, but only 6 studies were included and they analysed 'ever breastfeeding' only.¹⁰⁶ A meta-analysis of 24 original published case-control studies was presented (F Hauck *et al.*, unpubl., 2010). The univariate OR was 0.49 (95% CI = 0.45–0.53). Nine studies reported adjusted ORs and the pooled OR was 0.68 (95% CI = 0.58–0.80). Exclusive breastfeeding was associated with a lower pooled OR (0.32; 95% CI = 0.28–0.36). Four studies examined information about 'any breastfeeding at 2 months of age' (univariable OR was 0.33; 95% CI = 0.26–0.41). The authors concluded that any breastfeeding is protective compared with no breastfeeding, but the protective effect is stronger for exclusive breastfeeding and for longer duration of breastfeeding. Although there is a clear association between breastfeeding and a reduced risk of SIDS, the possibility that this is due to confounding factors cannot be eliminated.¹⁰⁷

Pacifiers (or dummies)

The New Zealand study was the first to find a potential protective association between using a dummy for the last sleep and a reduced risk of SIDS¹⁰⁸, which was confirmed in the CESDI study.¹⁰⁹ Since then, this has been confirmed by other studies,¹¹⁰ while thumbsucking has also been associated with a reduced risk of SIDS.^{111,112} Two meta-analyses of eight case-control studies have shown a strong protective effect of pacifiers reducing the risk to a third.^{113,114} In the United States, the American Academy of Pediatrics has recommended the use of pacifiers once breastfeeding has been established.²³ The authors¹¹⁴ of the other meta-analysis urged caution, and argued that further understanding was needed of any direct protective effect as well as concerns of any negative impact, in particular on breastfeeding and rates of infection. They recommended that pacifiers were not discouraged but did not specifically recommend their use.¹¹⁴

Other Topics

Indigenous issues

High rates of SIDS and SUDI deaths occur in disadvantaged Indigenous groups globally.¹¹⁵ In Australia, linked total population data from Western Australia reports that the risk of an infant dying as a result of SUDI remains significantly higher when compared to the risk for non-Indigenous infants.⁶

Collection of data in these groups needs to be culturally sensitive, for example discussions of deaths may uncover significant loss and grief issues that are not typical of non-Indigenous groups. Other issues involve language differences and geographic isolation. In Australia in all the states that have available data, SUDI rates are higher in Aboriginal and Torres Strait infants than in the other ethnic groups.¹¹⁶

There were a number of presentations relating to the risk of SIDS in the Aboriginal population. These highlighted the higher

mortality rates, the socio-economic disadvantages, overcrowding, the higher rates of low birth weight, abuse, alcohol and substance abuse, smoking and co-sleeping.^{117,118}

Intervention programmes will, therefore, need to be adapted to the needs of local communities, with adequate funding. A recent Indigenous led project in Western Australia, Reducing the Risk of SIDS in Aboriginal Communities is an excellent example of such a programme. This project has developed culturally appropriate resources and training for the prevention of sudden and unexpected infant death, including SIDS and fatal sleeping accidents, among Western Australian Indigenous infants. Target groups and their leaders were closely engaged in the process from its earliest stages, with cultural practices being understood and incorporated into training practices. This project provided messages that were consistent and delivered using simple and non-confusing language; for example, the term 'cot death' was avoided as this implied that the deaths are related only to cot usage. This programme is now being extended in these communities and these steps will maximise the chances of increasing awareness and behavioural change.

A number of presentations described other innovative interventions in both Australian and International Indigenous communities. Some of these programmes are yet to be fully evaluated. These are outside of the scope of this report.

Recommendations

In the last part of the forum the participants took this evidence and determined what the public health messages should be. These recommendations are strategies based on identified modifiable risk factors which health professionals, parents and caregivers can influence:

These recommendations were:

- Put baby on the back to sleep, from birth
 - Sleep baby with face uncovered: use an infant sleeping bag or place baby with feet to the foot of the cot, if sleeping in a cot
 - Avoid cigarette smoke: keep baby smoke-free before and after birth.
 - Provide a safe sleeping environment, night and day with a safe cot, a safe mattress, safe bedding and a safe sleeping place
 - Place baby in a cot beside the parent's bed for the first 6–12 months of life
- In particular, the forum endorsed the International Society for the Study and Prevention of Perinatal and Infant Death (ISPID) recommendations relating to a safe sleeping place (reproduced with permission):¹¹⁹
- Place the baby to sleep in its own crib next to the parents' bed for the first 6 months (room sharing).
 - Never share a bed with baby if you or your partner smoke. Babies whose parents smoke are at increased risk of SIDS while co-sleeping.
 - Never share a bed with baby when you have had alcohol or drugs. (Don't use alcohol or drugs when caring for your baby, especially ANY TIME you may fall asleep.) Babies whose parents have recently used alcohol or drugs are at increased risk of SIDS (and accidental suffocation) while co-sleeping.

- There is a slightly increased risk of SIDS with bed sharing for infants less than 3 months even if they were not exposed to cigarettes, particularly if the baby was small (less than 2.5 kg) at birth or born prematurely.
- In some countries there is a recommendation to avoid all bed sharing, although some disagree and advise avoiding bed sharing only if there are other risk factors present such as smoking or alcohol use.
- Never sleep with baby on a couch or sofa. This increases the risk of SIDS and fatal sleep accidents.

It was decided that immunisation, breastfeeding and pacifiers would be discussed as general health messages but not specifically recommended as 'Reducing the Risk' messages.

General health messages

Immunisation

Parents are advised to immunise their babies according to the national vaccination schedule.

Breastfeeding

Breastfeeding is associated with reduced infant mortality and morbidity worldwide. Breastfeeding is beneficial and should be encouraged as it promotes healthy outcomes for infants and mothers, however it is not currently recommended as a specific strategy to reduce the risk of sudden infant death.

Pacifier use

If parents choose to use a pacifier, and wish to breastfeed, it is recommended that pacifier only be introduced after the first 4–6 weeks for breastfed babies, as pacifier use may interfere with breastfeeding becoming established. Parents are also advised not to force the child to use a pacifier and that if the pacifier falls out of the mouth during sleep not to reinsert it.

Cultural considerations

Although families may share particular cultural practices, values and beliefs on the basis of common ethnic origins, all families have individual features and characteristics and are not defined just by their race or ethnicity.¹²⁰ Poor awareness of risk factors for sudden infant death does not directly translate to suboptimal infant care practices; however raising parental awareness of safe sleeping recommendations by health professionals in culturally sensitive ways will assist in reducing the risk of sudden infant death for all infants.

Conclusion

There is sufficient and compelling evidence to suggest that over 90% of sudden and unexpected deaths in infancy are associated with preventable risk factors. Implementation of these 'Reducing the Risk' messages could result in a reduction of sudden unexpected death in infancy to less than 0.1 per 1000 live births. The challenge is to implement this knowledge.

Speakers and Participants

Chair: Jane Freemantle

Rapporteur: Roger Byard

Coordinator: Dorothy Ford

Speakers: Jane Freemantle, Jeanine Young, Fern Hauck, Edwin Mitchell, Peter Blair, Barry Taylor, Sharron Yarran, Shauna Gaebler, Katie Panaretto, Janice Finlayson, Wanda-Phillips Beck, Rachel Eni, Anthony Schapel.

Participants: Rachel Moon, Caroline Blackwell, Rosemary Horne, Elizabeth Murphy, Paul Colditz, Karen Waters, Kate Mortensen, Noel Woodford, Christine Erskine, Matthew Lynch, John Olle, Yeliena Baber, Brad Thach, Caroline Homer, Susan Beal, Jackie Scurlock, Gaye Edgcombe, Heather Jeffery, Vicki Flenady, Leanne Raven, Jill Green, Lorraine Harrison, Sharon Davis, Anne Callahan, Maxine Weber, Christine Paynter, Dorothy Ford, Louise Ellis, Susan Arbuckle, Catherine Cotter, Helen Cunningham and Joanne Pittock.

Observers: SIDS and Kids Educators

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