

Evidence Check

Safe sleeping practices for babies, including a review of co-sleeping

An Evidence Check rapid review brokered by the Sax Institute
for the NSW Ministry of Health—December 2025



University of South Australia

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This report was prepared by: Dr Kim Neylon, Professor Jenny Fereday, A/Professor Micah Peters, Ms Rachael Yates, Rosemary Bryant AO Research Centre, University of South Australia.

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This report was prepared by Kim Neylon, Jenny Fereday, Micah DJ Peters, Rachael Yates, Rosemary Bryant AO
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Executive summary

Introduction

This Evidence Check aimed to examine the latest research about modifiable risk factors for Sudden Unexpected Death in Infants (SUDI), including strategies to support safer co-sleeping practices. The findings of the review will inform the 2026 update of the NSW Health Guideline *Recommended Safe Sleep Practices for Babies* (GL2021_013).

Background

Sudden Unexpected Death in Infants (SUDI) is defined as the sudden and unexpected death of an infant under 12 months of age, with onset of the lethal episode apparently occurring during sleep, that remains unexplained after thorough investigation including performance of a complete autopsy, a review of the circumstances of death and the clinical history.⁽¹⁾ The understanding of modifiable risk factors has improved over time, reducing rates of SUDI, and there is strong evidence that adherence to recommended safe sleeping practices can further reduce the incidence of SUDI.^(2, 3)

Safe sleeping practice recommendations, including those found in the current NSW Health Guideline *Recommended Safe Sleep Practices for Babies* (GL2021_013), emphasise that the safest sleeping arrangement for a baby is to have their own safe sleep environment within the same room as an adult carer during the first six to 12 months of life.⁽⁴⁾ This explicitly excludes sharing any sleep surface with another baby, child or carer, a practice that is commonly referred to as 'co-sleeping'.⁽³⁾

Co-sleeping, however, remains a firmly embedded practice in many communities and cultures, despite the known risks.⁽³⁾ There are organisations and agencies outside of NSW Health that have modified their stance on co-sleeping by embracing a harm minimisation approach.⁽³⁾ Recognising that many families may choose to co-sleep, clinicians and community stakeholders have called for advice that is both evidence-based and practical.⁽⁵⁾

As the NSW Health Safe Sleep Guideline will be updated in 2026, NSW Health has requested a rapid review of the most recent peer-reviewed data on modifiable risk factors for SUDI, interventions that are effective in reducing these modifiable risk factors, and what harm minimisation strategies have effectively reduced the risk of SUDI associated with co-sleeping.

Approach

The authors conducted an Evidence Check rapid review of the literature between 8 August and 22 September 2025 to identify relevant peer-reviewed literature published from 2020 onwards. We

sought evidence from Australia and other countries with similar health and maternity care contexts that was eligible for inclusion based on prespecified inclusion and exclusion criteria. The Evidence Check addressed three overarching questions:

1. What modifiable risk factors have been shown to be associated with SUDI in infants aged 0–12 months?
2. What interventions are effective in reducing the modifiable risk factors associated with SUDI identified in the answer to Question 1?
3. What harm minimisation strategies effectively reduce the risk of SUDI associated with co-sleeping?

Summary of methods

This Evidence Check used a streamlined (rapid) approach based on existing gold standard methodologies for scoping reviews and umbrella reviews (systematic reviews of systematic reviews). Rapid reviews limit but accelerate the comprehensiveness of the search and review process while identifying key sources of evidence and published reviews to address prespecified research questions based on an a priori approach to study selection, data extraction and synthesis. This search was limited by strict inclusion and exclusion criteria agreed on by all stakeholders in our search strategy document (see Appendix 1 Table 11).

In consultation with the policy team and a research librarian at the University of South Australia, we developed a search strategy that covered the period 1 January 2020 to 8 August 2025, using the following databases: MEDLINE (OVID), Emcare and CINAHL. Our Evidence Check prioritised systematic reviews; however, our search strategy allowed for recent primary intervention papers to be included that were of suitable quality and relevance to the review questions.

We uploaded the search results to EndNote. Duplicates were removed and article titles and abstracts were screened for possible inclusion. We used agreed-upon inclusion and exclusion criteria and a hierarchy of evidence based on the National Health and Medical Research Council (NHMRC) Levels of Evidence to determine suitability for inclusion in this Evidence Check.⁽⁶⁾ Articles selected for full-text screening were reviewed and screened based on selection criteria. JBI Critical Appraisal Tool (JBI CAT) tools were also used to assess quality for inclusion.⁽⁷⁻⁹⁾ All members of the research team reached agreement on the final selection. Data extraction was then carried out for the selected articles and the results presented in relation to each Evidence Check question.

Key findings

- Modifiable risk factors for SUDI correspond with the current NSW Guidelines, specifically, infants who did not share a room with their caregiver, the use of soft bedding, heads covered by bedclothes, unsafe items in sleeping areas, unsafe sleep environments, non-

supine sleep position, and co-sleeping or shared sleep surfaces. Prenatal and postnatal illicit drug exposure, smoking or other chemical exposure were found to be statistically significant risk factors for SUDI.

- Protective factors that reduced risk of SUDI identified in the literature included breastfeeding, pacifier use and infants sleeping in the supine position.
- Interventions that used combined approaches to improve safe sleeping and reduce harm were more effective than when interventions were implemented in isolation.
- Interventions that provided safe sleeping equipment, such as a crib or baby box, significantly improved adherence to safe sleeping guidelines, particularly for higher risk populations.¹
- Interventions that relied on technology to communicate with caregivers only had poor or mixed results.
- Quality improvement initiatives in hospital or health service settings that focused on improving health worker knowledge, safe sleep environments and patient knowledge transfer were found to be effective, particularly for high-risk families.
- Knowledge of safe sleeping recommendations did not always correspond to safe sleep practices, particularly over time. More research is needed into understanding the barriers to safe sleep practices.

¹ Higher risk populations reported in selected studies included: vulnerable infants (low birthweight, pre-term, multiple births, and admission to NICU); young maternal age; smoking exposure during and after pregnancy; lower socioeconomic status, infants or their siblings who were or had previously been the subject of a child protection plan; families where the birth father is absent and there is a partner whose presence may be irregular or temporary; families where one or both parents were known to misuse alcohol or drugs; families with known domestic violence or criminal behaviours; families where one or both parents had significant mental health problems deemed to present a risk to the children's wellbeing; families where there is unsuitable housing or frequent moves of home; teenage parents deemed to present a risk to the children's wellbeing; parents who were care-leavers; and families who have had other children removed from their care or where the courts have been involved; parents from socially or economically disadvantaged communities; and parents from Indigenous communities.(10-13)

- The quality of evidence in this Evidence Check was varied. While robust research was found that identified modifiable risk factors for SUDI, many interventions relied on self-reported data, which may be influenced by stigma about caregiver use of unsafe sleep practices that could arguably contribute to the underreporting of unsafe sleep practices.

Ten sources of evidence met predetermined inclusion criteria and were included in the Evidence Check. These comprised one umbrella review of meta-analyses, four systematic reviews, one randomised controlled trial and four intervention papers. Additional sources of evidence that did not explicitly meet our inclusion criteria were also included as they were deemed to be of high quality and contain evidence that was relevant to addressing the review questions. An Australian scoping review that was methodologically robust and met all other selection criteria was also included to allow for sufficient data to respond to all Evidence Check questions. A case-study analysis of the Pregnancy Risk Assessment Monitoring System (PRAMS) data from the US Centers for Disease Control (CDC) was also examined to verify data about SUDI risk factors. An additional systematic review of qualitative papers was included at the request of NSW Health. All inclusions were agreed upon by the Rosemary Bryant AO Research Centre (RBRC) research team. Ultimately, the Evidence Check included 13 sources: one umbrella review of meta-analyses, five systematic reviews, one scoping review, one randomised controlled trial, one case study analysis and four intervention papers.

Question 1: What modifiable risk factors have been shown to be associated with SUDI in infants aged 0–12 months?

Identified modifiable risk factors associated with SUDI correspond to the current NSW Health guideline(4), and include:

- Infants who did not share a room with their mother or caregiver were 19 times more likely to die of sleep-related suffocation and almost eight times more likely to die of unexplained infant death, compared with infants who shared a room with their caregiver.(10)
- The use of soft bedding, heads covered by bedclothes, unsafe items in sleeping areas, non-supine sleep position and co-sleeping or shared sleep surfaces were also identified as increasing the risk of SUDI.(10, 11)
- Both prenatal and postnatal illicit drug exposure, smoking or other chemical exposure was found to be a statistically significant risk factor for SUDI.(11, 12)
- Protective factors that reduced risk of SUDI identified in the literature included breastfeeding, pacifier use and infants sleeping in the supine position.(11)

The modifiable risk factors identified were largely consistent with current safe sleeping literature and guidelines.(4) Overall, these findings support recommendations for an infant to share the same room as their caregiver, with their own sleep surface, without soft bedding or other objects in the sleeping area, in a supine position. Avoiding exposure to illicit substances and both prenatal and postnatal smoking is also supported.

Question 2: What interventions are effective in reducing the modifiable risk factors associated with SUDI identified in the answer to Question 1?

We identified interventions that aimed to reduce modifiable risk factors associated with SUDI, including educational-only interventions, environmental modifications, technology-based interventions, community-based interventions and hospital or health service-based interventions. Reported studies often included multiple approaches in their interventions. All interventions are listed in Table 5, Table 7, Table 8 and Table 9.

As community-based interventions for high-risk populations and environmental modification interventions were concerned with reducing modifiable risk factors associated with SUDI, they also aimed to reduce harms associated with co-sleeping. Therefore, while these initiatives are essential to reducing modifiable risk factors for SUDI, their results are included under Question 3. Not all interventions included follow-up, statistical analyses or linked outcomes to SUDI data, and population sizes differed widely in selected studies.(5, 13-17) Some QI initiative papers did not report sample size.(17)

The educational, technological and quality improvement interventions identified in selected papers found that:

- Educational initiatives were not always effective in reducing high-risk behaviours over time, even if knowledge was increased.(5, 13, 15, 16)
- Quality improvement initiatives such as updating staff training, safe sleep policies, screening questionnaires to identify high-risk infants, promotional materials and upgrading in-hospital cribs to ensure compliance, were found to be effective in the literature in improving knowledge and use of safe sleeping practices, reducing SUDI risk, and improving practices for families post-discharge.(12, 17, 18)
- Targeted, evidenced-based screening questionnaires, for example using PRAMS criteria(13) or the Plan-Do-Study-Act (PDSA)(18) or PROCEED/PRECEED methodology(19), allowed health services to provide individualised education and / or equipment provision that improved safe sleeping practices in the short and medium term.(13, 18, 19)
- Interventions that relied on digital messaging alone without integration of other strategies were not found to be effective in improving safe sleep practices.(15, 16)
- Adherence to safe sleep practices was seen to decline over time in multiple varied interventions that included follow-up.(5, 13-17)

Overall, selected studies from primary intervention studies and systematic reviews emphasised that initiatives that used combined approaches to SUDI prevention and co-sleeping harm minimisation were more effective than when single interventions were delivered alone.

Question 3: What harm minimisation strategies effectively reduce the risk of SUDI associated with co-sleeping?

Environmental modification and community-based interventions were primarily the harm minimisation strategies used to decrease the risk of SUDI associated with co-sleeping. Environmental interventions included the provision of a safe sleeping surface or equipment to caregivers for at-risk infants. Not all interventions included follow-up, statistical analyses or linked outcomes to SUDI.(5, 12-15, 17, 20) These interventions found that:

-
- Understanding of the barriers to safe sleeping and the drivers of co-sleeping were critical to improving safe sleep practices.(5)
 - Harm minimisation initiatives that provide a safe space to sleep for high-risk populations, in conjunction with education and other initiatives, were effective in reducing unsafe sleep behaviours, particularly for the early months of life.(12-15, 20)

Overall, community-based and environmental interventions were effective in reducing risk behaviours and improving sleep safety. Initiatives that combined culturally appropriate education, follow-up protocols and the provision of safe sleeping equipment were the most effective at improving adherence to safe sleep practices. Declines in safe sleep practices, however, were still identified in some studies over time, as infants aged. The selected qualitative systematic review found decision-making processes for co-sleeping were complex and required further exploration—looking at, for example, why individuals may choose to co-sleep despite knowledge of safe sleep practices—in order to facilitate individualised responses to reduce risk.(5)

Conclusion

This Evidence Check provides an overview of 2020–25 peer-reviewed papers concerning modifiable risk factors, interventions and harm minimisation strategies to reduce SUDI for infants aged 0–12 months. While evidence that identified modifiable risk factors included robust statistical analyses, not all interventions included follow-up, statistical analyses or linked outcomes to SUDI data, and sample size differed widely among selected studies.

This review found strategies that acknowledged the widespread use of co-sleeping and interventions that have been established and evaluated to reduce this risk. Modifiable risk factors remain consistent with previous studies; specifically, a child sleeping in a different room from the caregiver before six months of age, soft bedding, items in the sleep area and shared sleep surfaces are contributing factors to SUDI risk. Overall, it found environmental modification strategies that provide a suitable safe sleeping surface, combined with educational or other support, have led to improvements in safe sleep practices, particularly for at-risk communities.

Quality improvement initiatives in hospital and other health service settings that target health professionals, environmental improvements and caregiver education can also lead to improvements in safe sleep behaviours, potentially reducing the risk of SUDI. Interventions that included parental education reported continued positive outcomes when follow-up was recorded.(21, 22) However, not all QI initiatives reported follow-up outcomes for parents after discharge from their health service.(17)

Introduction

Background

Sudden Unexpected Death in Infants (SUDI) is defined as the sudden and unexpected death of an infant under 12 months of age, with onset of the lethal episode apparently occurring during sleep, that remains unexplained after thorough investigation including performance of a complete autopsy, a review of the circumstances of death and the clinical history.⁽¹⁾ Understanding of modifiable risk factors has improved over time, reducing rates of SUDI, and there is strong evidence that adherence to recommended safe sleeping practices can further reduce the incidence of SUDI.^(3, 23)

The NSW Health Guideline *Recommended Safe Sleep Practices for Babies* (GL2021_013) (the Guideline) was published on 27 July 2021 and is scheduled to be reviewed by 27 July 2026. It applies to the NSW Ministry of Health, Local Health Districts, Board Governed Statutory Health Corporations, Specialty Network Governed Statutory Health Corporations, community health centres and public hospitals. It informs staff who work in maternity services, emergency departments and paediatrics, and child and family health professionals in their interactions with caregivers and infants.⁽⁴⁾

Co-sleeping refers to an infant sharing any sleep surface with another baby, child or carer.⁽³⁾ The Guideline emphasises that the safest sleeping arrangement for a baby is to have their own safe sleep environment within the same room as an adult carer during the first 6–12 months of life, which excludes co-sleeping.⁽⁴⁾ This position is strongly supported by national and international guidelines.^(2, 14, 24, 25)

Co-sleeping, however, remains a firmly embedded cultural practice in many communities and cultures, despite the known risks.⁽³⁾ Organisations and agencies have modified their stance on co-sleeping by embracing a harm minimisation approach.⁽³⁾ Recognising that many families may choose to co-sleep despite existing recommendations, clinicians and community stakeholders have called for advice that is both evidence-based and practical.⁽⁵⁾

The Guideline considers families at higher risk of SUDI as those that are known to the child protection system and families who are disadvantaged and poorly resourced. Aboriginal babies are over-represented in SUDI deaths and are also considered at higher risk.⁽⁴⁾ These definitions of high-risk populations are supported by international data.^(11, 15, 16)

As the Guideline is to be updated in 2026, NSW Health has requested a rapid review of the most recent peer-reviewed data about modifiable risk factors for SUDI, interventions that are effective in reducing these modifiable risk factors, and what harm minimisation strategies have effectively reduced the risk of SUDI associated with co-sleeping.

Evidence Check questions

This review aimed to address the following questions:

Question 1: What modifiable risk factors have been shown to be associated with SUDI in infants aged 0–12 months?

Question 2: What interventions are effective in reducing the modifiable risk factors associated with SUDI identified in the answer to Question 1?

Question 3: What harm minimisation strategies effectively reduce the risk of SUDI associated with co-sleeping?

Methods

Aims

The Evidence Check aimed to provide NSW Health with advice about updated peer-reviewed literature concerning modifiable risk factors, interventions or harm minimisation strategies that promote safe sleeping practices for babies, to reduce the risk of SUDI. This information will assist NSW Health in its upcoming update of the Guideline.

Search strategy, approach and rationale

We conducted a rapid literature review using an accelerated approach based on best practice methodologies for scoping reviews and umbrella reviews. While rapid reviews are not as yet underpinned by a consistent, recognised methodological gold standard, in general they limit the comprehensiveness of the search while identifying key primary papers and published reviews to address the research questions in much the same way as other more comprehensive and methodologically robust evidence synthesis methodologies. This search was limited by strict inclusion and exclusion criteria agreed upon by all stakeholders in our Search Strategy document (see Appendix 1, Table 11).

In consultation with the policy team and a research librarian at the University of South Australia, we developed a search strategy that covered the period 1 January 2020 to 8 August 2025, using the following databases: MEDLINE (OVID), Emcare and CINAHL. Our Evidence Check included only English-language sources and prioritised systematic reviews. Our search strategy, however, allowed for the identification of recent primary intervention papers to be considered for inclusion that were of suitable quality and relevance.

The search results were uploaded to EndNote. Duplicates were removed and article titles and abstracts were screened for possible inclusion. We used agreed upon inclusion and exclusion criteria and a hierarchy of evidence based on the National Health and Medical Research Council (NHMRC) Levels of Evidence to determine suitability for inclusion in this Evidence Check. Full-text articles selected for secondary screening were reviewed and screened based on selection criteria. We also used JBI CAT Appraisal tools for systematic reviews and primary interventions to assess quality for inclusion. All members of the research team reached agreement on the final selection. A progress report was submitted to the Sax Institute and NSW Health teams at this time. Data extraction was then carried out for the selected articles.

On review of the completed data extraction, the RBRC team discussed the value of the data and any gaps identified in answering the questions requested by NSW Health. Following this discussion, we agreed to use two additional sources that did not ostensibly meet all selection criteria but were methodologically sound and necessary to complete the data required to comprehensively answer the

requested questions. Their limitations have been included in the analysis below. Detailed inclusion and exclusion criteria are summarised in Table 1.

Table 1—Evidence Check inclusion and exclusion criteria

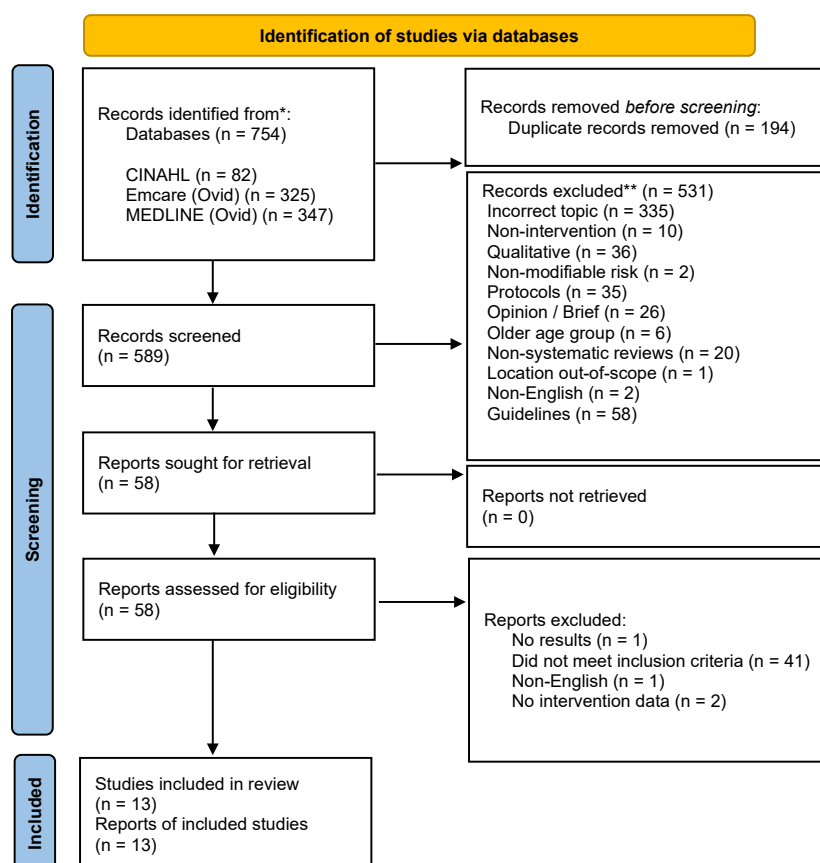
Included	Excluded
Study design	
Systematic reviews reporting findings of observational studies (cohort, case-control or longitudinal studies)	All research that does not meet the NHMRC Levels of Evidence criteria (Level I and Level II)
Systematic reviews reporting findings of intervention studies	Qualitative studies
Recent randomised controlled trials if data saturation is not met from systematic reviews listed above	Narrative studies and other non-systematic reviews
Systematic reviews that include mixed methods if data saturation is not met from systematic reviews listed above.	Grey literature.
Outcomes of interest	
Efficacy	Outcomes excluded from criteria
Efficiency	
Safety	
Risk	
Risk factors	
Harm minimisation	
Reduction in SUDI	
Study language	
English	Non-English languages
Study country	
High-income countries according to the World Bank classification system	Other countries
Study year	
January 1 2020 – 8 August 2025	2019 and prior

Results

Screening and selection

Preliminary screening identified a total of one meta-analysis, five systematic reviews, one randomised controlled trial and seven primary interventions for data extraction based on agreed search strategy criteria. The quality of papers that met selection criteria was assessed using the NHMRC Levels of Evidence, the JBI Critical Assessment Tool (CAT) for Systematic Reviews(8) and the JBI CAT for quasi-experimental studies.(7) The single RCT was assessed using the JBI CAT for RCTs.(9) However, through data extraction, one systematic review and three interventions were found not to sufficiently meet selection criteria or were of insufficient quality to be included in analysis, as outlined in the PRISMA flow chart below.

Table 2—PRISMA flow diagram for study selection



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

We identified one Cochrane Systematic Review; however, the authors found no trials that met their inclusion criteria and so they reported no results; as such, no data was available for inclusion.⁽²⁾ We identified overlap in authorship for three systematic reviews, one of which contained only qualitative results and analysis.^(5, 15, 16) The reviews were found not to be duplicates of the same review. Rather, they were part of the same project, the UK's Child Safeguarding Practice Review Panel's National Review in England into SUDI in families where the children are considered at risk of harm. In 2020, the Child Safeguarding Practice Review Panel commissioned a wide-ranging literature review of SUDI in families with children considered to be at risk. Research teams ran concurrent reviews based on different criteria and approaches to inform future SUDI reduction strategies.⁽⁵⁾ The two systematic reviews that included quantitative and qualitative results were included in this Evidence Check.^(15, 16) The third review, while containing qualitative results, was also included on request from the team at NSW Health on 16 September.⁽⁵⁾ All included systematic reviews scored between eight and 11 out of 11, with four out of five including qualitative as well as quantitative research, as seen in Table 3, below.

Intervention papers screened for inclusion rated between three and eight out of nine on the JBI CAT for quasi-experimental studies⁽⁷⁾, an insufficiently robust score for two out of six papers. One intervention described a program that inserted safe-sleeping videos in an already popular pregnancy app; however, it only reported engagement as proof-of-concept and did not include measurements of efficiency or effectiveness. The other paper reported health service attitudes to neonatal co-bedding, but did not involve any interventions that improved practices for safe sleeping. Both were low quality and excluded from the analysis. We identified a 2022 paper that evaluated the German SIDS Hamm Prevention Project; however, we did not find an English-language version so it was excluded from review.⁽²⁶⁾ The randomised controlled trial was conducted in China.⁽¹⁹⁾ While this was outside the selection criteria for countries, it was methodologically robust and was included as the only recent RCT trial identified outside of included systematic reviews.

Data extraction following grading of the remaining selected studies revealed insufficient data to effectively answer all research questions. However, secondary screening also revealed an Australian scoping review that addressed the research questions.⁽¹⁴⁾ This was determined by the research team to be methodologically robust and the contents of sufficient interest to the goals of NSW Health to require inclusion in this Evidence Check. It included a focus on high-risk populations, including Aboriginal and Torres Strait Islander caregivers.⁽¹⁴⁾ Further, a population-based case-control study to examine risk factors for unexplained infant deaths and sleep-related suffocations from the US that used population-level SUDI data from the Centers for Disease Control and Prevention's (CDC) 2016–17 Unexpected Infant Death Case Registry for infants aged two-to-nine months was determined to be useful in response to Question 1 and data was extracted for this purpose.⁽¹⁰⁾

Other non-systematic reviews were excluded as they were not methodologically robust, were not in English, or provided no further information than was already found in selected articles that met search strategy criteria. All members of the research team agreed on the final 13 included papers listed in Table 3, below: one umbrella review of meta-analyses, five systematic reviews, one scoping review, one randomised controlled trial, one case study analysis and four intervention papers.

Table 3—Selected papers and level of evidence

Citation	Title	Type	NHMRC Level of Evidence	JBICAT*
Kim et al. 2024	Prenatal and postnatal factors associated with sudden infant death syndrome: an umbrella review of meta-analyses	Umbrella review and meta-analysis	I	11/11
Aggelou et al. 2024	Evaluating Educational Patterns and Methods in Infant Sleep Care: Trends, Effectiveness, and Impact in Home Settings	Systematic review	I**	9 /11
Ellis et al. 2022	Interventions to Improve Safer Sleep Practices in Families With Children Considered to Be at Increased Risk for Sudden Unexpected Death in Infancy: A Systematic Review	Systematic review	I**	9 /11
Garstang et al. 2021	Improving engagement with services to prevent Sudden Unexpected Death in Infancy (SUDI) in families with children at risk of significant harm: A systematic review of evidence	Systematic review	I**	8 /11
Pease et al. 2021	Decision-making for the infant sleep environment among families with children considered to be at risk of sudden unexpected death in infancy: a systematic review and qualitative metasynthesis	Systematic review	I**	8 / 11
Salm Ward et al. 2022	Hospital-based inpatient quality improvement initiatives on safe infant sleep: Systematic review and narrative synthesis	Systematic review	I**	10/11
Li et al. 2025	Impact of PRECEDE-PROCEED model on enhancing neonatal sleep safety practices	Randomised controlled trial	II	10/13

Citation	Title	Type	NHMRC Level of Evidence	JBICAT*
Stringer et al. 2025	An Evidence-Based Safe Sleep Program Is Associated With Less Infant Sleep–Related Deaths	Non-equivalent group quasi-experimental, pre- and post-test program evaluation design implemented with a quality improvement methodology	III	8/9
Krishnamurti et al. 2025	Integrating Infant Safe Sleep and Breastfeeding Education Into an App in a Novel Approach to Reaching High-Risk Populations: Prospective Observational Study	Prospective observational study	III	8/9
Shin et al. 2023	A Hospital-Based Infant Safe Sleep Intervention and Safe Sleep Practices Among Young Women: A Prospective Longitudinal Study	Prospective longitudinal study	III	8/9
Hsu 2023	Modeling of infant safe sleep practice in a newborn nursery: a quality improvement initiative	Pre- and post-intervention quality improvement study	III	7/9
Cole et al. 2022	Infant Care Practices, Caregiver Awareness of Safe Sleep Advice and Barriers to Implementation: A Scoping Review	Scoping review	I**	8/11
Parks et al. 2023	Risk Factors for Suffocation and Unexplained Causes of Infant Deaths	Population-based case-control study	III	9/9

* JBI CAT for Systematic reviews /11; JBI CAT for quasi-experimental studies /9; JBI CAT for RCT /13

** Included quantitative and qualitative interventions

Question 1: Modifiable risk factors

In determining what modifiable risk factors have been shown to be associated with SUDI in infants aged 0–12 months, we identified a 2024 umbrella review of meta-analyses of modifiable risk factors (Kim et al. 2024) in this Evidence Check. It revealed statistically significant risk factors, as well as protective factors that were shown to reduce the risk of SUDI. Their sources included eight meta-analyses covering 152 articles from 21 countries. We extracted additional data from other systematic reviews and interventions and from Parks et al., a secondary analysis of US SUDI data from CDC databases. Other papers identified prenatal and postnatal risks; however, they did not include statistical analyses. Their findings are listed in Table 4, below. Similar findings are grouped, and modifiable risks are listed in descending order of risk according to the authors’ statistical analyses.

Table 4—Modifiable risk factors for SUDI identified in the literature

Modifiable prenatal risk factor	Source	Statistical significance
Prenatal drug exposure—opioid, methadone, cocaine	Kim et al. 2024	prenatal drug exposure [eOR = 7.84 (95% CI = 4.81–12.79)]
		opioid exposure [eOR = 9.55 (95% CI = 4.87–18.72)]
		methadone exposure [eOR = 9.52 (95% CI = 3.34–27.10)]
		cocaine exposure [eOR = 4.38 (95% CI = 1.95–9.86)]
Prenatal maternal smoking	Kim et al. 2024	eOR = 2.25 (95% CI = 1.95–2.60)
Exposure to smoke and other chemicals	Shin et al. 2023	No statistical analysis

Modifiable postnatal risk factor	Source	Statistical significance
Infants who did not share a room with their mother or caregiver	Parks et al. 2023	aOR = 18.7 (95% CI: 6.8–51.3) for sleep-related suffocation aOR = 7.6 (95% CI: 4.7–12.2) for unexplained infant death
In a different room than caregiver	Cole et al. 2022	No statistical analysis, outcomes reported in 38 studies
Use of soft bedding	Parks et al. 2023	aOR = 16.3 (95% CI: 5.0–53.3) for sleep-related suffocation aOR = 5.0 (95% CI: 3.2–8.0) for unexplained infant death
Infants found with heads covered by bedclothes	Kim et al. 2024	eOR = 11.01 (95% CI = 5.40–22.45)
Unsafe items in bedding	Shin et al. 2023; Cole et al. 2022	No statistical analysis. Cole et al.—35 papers reported outcomes
Infant sharing a sleep surface with someone who smoked	Cole et al. 2022	eOR = 6.27 (95% CI: 3.94–9.99) in one included meta-analysis
Infants not placed to bed in a crib, bassinet or portable crib	Parks et al. 2023	aOR = 3.9 (95% CI: 1.4–10.4) for sleep-related suffocation aOR = 1.0 (95% CI: 0.7–1.6) for unexplained infant death
Unsafe sleep surfaces including prams, bouncers/rockers, co-sleepers/side beds, being held, car capsules, infant carriers, swings, hammocks, snuggle beds and bean bags	Cole et al. 2022	No statistical analysis. 27 papers reported outcomes

Modifiable postnatal risk factor	Source	Statistical significance
Unsafe sleep environments	Aggelou et al. 2024; Ellis et al. 2021; Garstang et al. 2021; Ward et al. 2022; Stringer et al. 2025; Li et al. 2025; Shin et al. 2023; Cole et al. 2022	No statistical analysis
Bed sharing	Kim et al. 2024	eOR = 2.89 (95% CI = 1.81–4.60)
Infants who share a sleep surface with another person or animal	Parks et al. 2025	eORs = 2.5 (95% CI: 1.1–6.0) for sleep-related suffocation eORs = 2.1 (95% CI: 1.4–3.2) for unexplained infant death
Shared sleep surfaces	Shin et al. 2023; Ellis et al. 2021; Cole et al. 2022; Aggelou et al. 2024; Ellis et al. 2021; Garstang et al. 2021; Ward et al. 2022; Stringer et al. 2025	No statistical analysis
Postnatal maternal smoking	Kim et al. 2024	eOR = 1.97 (95% CI = 1.75–2.22)
Postnatal exposure to smoke and other chemicals	Shin et al. 2023; Cole et al. 2022	No statistical analysis. Cole et al.—62 papers reported outcomes
Non-supine sleep position	Parks et al. 2023	aOR = 1.9 (95% CI: 0.9–4.) ¹ for sleep-related suffocation aOR = 1.6 (95% CI: 1.1–2.4) for unexplained infant death
Unsafe (non-supine) sleep position	Cole et al. 2022	No statistical analysis, outcomes reported in 101 studies
Lack of knowledge of safe sleeping by high-risk populations	Krishnamurti et al. 2025	No statistical analysis

Protective factors	Source	Statistical significance
Breastfeeding	Kim et al. 2024	eOR = 0.57 (95% CI = 0.39–0.83)
Pacifier use	Kim et al. 2024	eOR = 0.44 (95% CI = 0.30–0.65)
Supine position	Kim et al. 2024	eOR = 0.48 (95% CI = 0.37–0.63)

The largest odds ratio for a modifiable risk factor that was reported in the literature was for infants who did not share a room with their mother or caregiver. The case study analysis by Parks et al. found infants who did not share a room with a caregiver were 19 times more likely to die of sleep-related suffocation and almost eight times more likely to die of unexplained infant death, compared with infants who shared a room with their caregiver.(10) A statistically high rate of increased risk was also found for the use of soft bedding—more than 16 times higher for sleep-related suffocation and five times higher for unexplained infant death.(10)

Similarly, the next highest odd ratio was for infants found with their heads covered by bedclothes, who Kim and colleagues' 2024 umbrella review of meta-analyses found were 11 times more likely to die across reviewed meta-analyses.(11) Unsafe items in sleeping areas, soft bedding, overheating from excess coverings, unsafe sleep environments and co-sleeping or shared sleep surfaces were also identified as increasing the risk of SUDI in other papers without statistical analyses, as was a non-supine sleep position.(12–16, 19, 27) Both prenatal and postnatal illicit drug exposure, smoking or other chemical exposure was found to be a statistically significant risk factor for SUDI across studies that examined their impact.(11, 12)

Populations considered at higher risk of SUDI in the literature included vulnerable infants (low birthweight, pre-term, multiple births and admission to NICU); young maternal age; smoking exposure during and after pregnancy; lower socioeconomic status; infants or their siblings who were or had previously been the subject of a child protection plan; families where the birth father was absent and there was a partner whose presence may be irregular or temporary; families where one or both parents were known to misuse alcohol or drugs; families with known domestic violence or criminal behaviours; families where one or both parents had significant mental health problems deemed to present a risk to the children's wellbeing; families where there was unsuitable housing or frequent moves of home; teenage parents deemed to present a risk to the children's wellbeing; parents who were care-leavers; and families who have had other children removed from their care or where the courts have been involved; parents from socially or economically disadvantaged communities; parents from culturally diverse communities; parents from migrant communities; and parents from Indigenous communities. Updated statistical analyses were not provided in the selected studies to determine the risk of SUDI for the populations listed as higher risk.(13–16)

Significantly, Kim and colleagues also explored protective factors, that is, modifiable factors that were negatively correlated with SUDI.(11) Breastfeeding, pacifier use and infants sleeping in the supine position were all found to be protective and significantly lowered the risk of SUDI in the meta-analyses included in their umbrella review.(11) However, while Cole and colleagues found studies that linked

breastfeeding with protection against SUDI, they also found other studies that linked extended breastfeeding with risky use of shared sleep surfaces.(14) A strong link between a reduced risk of SUDI and breastfeeding has been found in previous studies and is included in current safe sleep recommendations.(28) Other listed prenatal and postnatal risk factors were found in papers without statistical analysis to verify their impact on SUDI.(13-16)

Question 2: Effective interventions

All papers were considered to determine what interventions were effective in reducing the identified modifiable risk factors associated with SUDI. Interventions are listed in Table 7, below.

Selected papers (systematic reviews, scoping reviews and primary interventions) reported on 71 unique interventions. They can be categorised as: educational interventions for caregivers (n=9), environmental modification programs (n=14), community-based interventions (n=12), technology-based programs (n=7), and quality-improvement initiatives in hospital settings (n=29). Environmental modification and community-based interventions are effective in reducing the risk of SUDI; however, as they primarily operate as harm minimisation interventions that aim to reduce risks associated with co-sleeping, they have been detailed in Question 3 of this report. These approaches were often combined in interventions reported in the selected studies.

Interventions are listed in Table 5, Table 6, Table 7, Table 8 and Table 9. Some interventions were listed in multiple systematic reviews. Qualitative research and papers that reported on risk factors or behaviours but did not include interventions to reduce risks of SUDI were not included in these tables. Interventions that did not address risks associated with SUDI, for example that focused on modifying sleep behaviours such as night waking but did not include safe sleep practices(16), were also not included in this section.

Educational interventions

Educational interventions included in-person education sessions conducted by trained health professionals or educators and were found to have mixed results (n=9). Interventions are listed in Table 5 and included:

- Education for primary caregivers that focused solely on SUDI risks(13-15)
- Education for primary caregivers that included SUDI risks and other advice(13-15)
- Education for nurses / other healthcare professionals(13-15)
- Education for primary caregivers and extended family members.(13-15)

Education interventions were reported consistently to improve knowledge and awareness of safe sleeping advice, particularly the benefit of a supine position and the risks of soft bedding, items in bedding area and sleep location, as well as guidelines and recommendations relevant to the intervention evaluated. This was demonstrated for high-risk populations that had demonstrated a deficit in knowledge before the intervention. However, these studies did not report whether improved knowledge, awareness or attitudes led to improvements in safe sleeping practices.

Goodstein and colleagues (2015) provided an example of an effective education intervention. Their hospital-based intervention included a four-month follow-up on parental education and safe sleep behaviours in the home, after a comprehensive hospital-based infant sleep safety (ISS) program. They found both the intention to follow safe sleep practices and the use of actual safe sleep practices were higher in parents receiving the hospital-based education program; however, safe sleep practices such as the use of cribs in the parents' room and no soft objects in sleeping spaces declined over time.(29)

Systematic reviews identified several education-only interventions with poor results for behaviour modification.(13, 14) Interventions that focused solely on education of SUDI risks, even when including the rationale behind the guidelines, were found to improve knowledge but had no statistically significant impact on altering behaviour, for example Carlin and colleagues found no change in practices such as sharing the same room with an infant.(13-15)

SUDI educational interventions were found to have some positive results when combined with more information on other health, parenting or sleep advice, for example enhanced messaging was found to have a small but statistically significant impact on reducing soft bedding use compared with standard SUDI information in Mathews and colleagues. Other interventions reported improvements in knowledge or attitudes about safe sleep but did not report whether this reduced risk behaviours.(13) Peer support groups alongside a comprehensive education program, used in Li and colleagues' RCT, were found to be effective in addressing barriers to safe sleep practices and improving behaviours for caregivers compared with control groups that received standard information only.(19)

Educational interventions were found to be effective at reducing risk behaviours when combined with other interventions, particularly providing safe sleep equipment and community interventions including home visits and peer support(13-16), as described below in Question 3.

Table 5—Educational interventions to reduce the risk of SUDI identified in the literature

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Carlin et al. 2018 US	Aggelou et al. 2024	RCT	Intervention group received enhanced messaging emphasising both SIDS risk reduction and suffocation prevention. Control group received only standard messaging about safe sleep practices. Follow-ups conducted at 2–3 weeks, 2–3 months, and 5–6 months postpartum.	1194 mothers (958 completed first follow-up, 716 completed second follow-up, 637 completed all follow-ups).	Infant sleep position at six months; maternal knowledge and attitudes; self-efficacy regarding sleep practices.	First six months, supine sleep positioning declined from 95.9% at 2–3 weeks to 79.9% at 5–6 months in both groups. No significant difference between the groups of sleep positioning practices, or the effectiveness of messaging on changing infant sleep positions over time.
Dowling et al. 2018 US	Aggelou et al. 2024	Longitudinal study	Caring about Preemies’ Safe Sleep (CaPSS) educational program. Delivered over five sections, 10 min per section. Rationale behind each recommendation included. Pre-discharge survey, educational module, post-discharge survey four weeks after leaving the hospital. Additional content about needs of pre-term infants, addressing topics such as adjusting to life at home after discharge.	15 mothers of preterm infants born before 37 weeks’ gestation.	Mothers’ knowledge of SIDS Risk-Reduction Recommendations (RRRs); changes in plans for infant care post-discharge; adherence to SIDS RRRs one-month post-discharge.	Mothers’ knowledge of RRRs significantly increased. Before, 40% felt they knew only ‘a little’ about SIDS; after, 100% of mothers reported an increase in knowledge about SIDS recommendations. Statistically significant (p = 0.000). Remained significant at one-month post-discharge (p = 0.012). Actual adherence remained suboptimal after discharge. 86.7% planned to have their baby sleep in their room, only 71.4% did one-month post-discharge. 46.7% planned to breastfeed exclusively, but only 14.3% were doing so after discharge.
Goodstein et al. 2015	Aggelou et al. 2024;	Cross-sectional survey and quasi-	To evaluate the effect of a comprehensive hospital-based infant sleep safety (ISS) program	1092 parents at hospital discharge (HD) and 490 at	Cross-sectional survey of parents of healthy newborns at the time of hospital	A significant decline in unsafe practices.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
	Cole et al. 2022	experimental non-equivalent control group study.	on parental education and safe sleep behaviours in the home. Consistent modelling of safe sleep practices by all staff, mandatory viewing of the educational DVD <i>Safe Sleep for Your Baby: Right From the Start</i>, review of written materials, and a parental signature on an acknowledgment form. Delivered to all families in the postpartum units of two community hospitals. Started at birth and continued through educational reinforcement at every interaction.	four-month follow-up (F/U).	discharge (HD) and at four-month well-childcare visit follow-up (F/U). Parental knowledge of safe sleep practices; actual sleep practices at home. Effectiveness was evaluated through surveys conducted at hospital discharge and at four-month follow-up.	Supine sleep knowledge was 99.8% at HD. 94.8% of families planned to always use this position. At F/U, 97.3% retained supine knowledge, and 84.9% maintained this position exclusively. Knowledge of crib as safest surface was 99.8% at HD and 99.5% F/U. Room-sharing fell to 91.9% (HD) and 68.2% (F/U). F/U group was more likely to use supine positioning and a bassinette or crib. Knowledge of pacifier use being protective against SIDS increased from 57.2% (HD) to 65.5 (F/U). Families felt they received the correct amount of ISS education (97.3%, HD; 89.6%, F/U). Intention to follow safe sleep practices and use of actual safe sleep practices were higher in parents receiving ISS education but slight decline over time.
Hall et al. 2015	Aggelou et al. 2024	RCT	Two-hour group teaching session and four bi-weekly follow-up phone calls over a period of two weeks. Parents were taught strategies to promote infant self-soothing and were provided with handouts, sleep–wake–feed–play charts and	Biological or adoptive families in the Greater Vancouver area, infants aged 5.5–8	Primary: Composite measure of significant sleep disturbance	Intervention group decreased from 14% to 4%; control group decreased from 18% to 14%. Significant relative reduction in severe sleep issues by 10% (p = 0.01).

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Canada			controlled comforting charts to track their use of the techniques. The intervention focused on changing parental cognitions and behaviours to improve infants' sleep through structured routines and controlled comforting techniques.	months with moderate behavioural sleep problems (BSP).	(parent report and actigraphic data). Secondary: Infant's longest sleep duration, parental sleep quality, fatigue.	Parents reported fewer night wakings, with 31.1% of infants in the intervention group having two or more night wakes, compared with 60.4% in the control group ($p < 0.001$). Longest sleep period increased significantly in the intervention group compared with the control group, with an adjusted difference of 20.02 min ($p = 0.05$).
Li et al. 2025 China	Li et al. 2025	RCT	Control: standard information. Intervention: (1) Addressing Predisposing Factors—lectures day after birth; Concept Renewal—group discussions to challenge traditional beliefs; peer support groups. (2) Addressing Enabling Factors: pre-birth skills training; Incentive Mechanism: acknowledgement and reward; evaluation.	Infants aged birth to three months born in the obstetrics department of a tertiary hospital in Jiangsu Province between May and August 2024, along with their primary caregivers.	General Self-Efficacy Scale (GSES), pre-post questionnaire to assess knowledge, statistical analysis of data, rate of sleep safety caregiving practices among neonatal caregivers.	Diversified interventions possible through systematic analysis of barriers to sleep safety through the lens of predisposing, enabling and reinforcing factors. Can increase self-efficacy, improve communication and provide affirmative feedback exploring barriers to personalising intervention that is effective in improving behaviours.
Mathews et al. 2018 US	Aggelou et al. 2024	Longitudinal study	Enhanced health messaging provided to African American mothers during their hospital stay. Included both verbal and written materials emphasising the importance of following AAP guidelines to prevent both SIDS and suffocation. Mothers received follow-up telephone interviews at 2–3 weeks, 2–3 months and 5–6 months postpartum.	637 infants	Use of soft bedding; safe sleep practices. Interviews over time.	By final follow-up at 5–6 months, 43.0% of the enhanced messaging group used soft bedding the previous night compared with 52.4% in the standard group ($p = 0.02$). Use of soft bedding in the past week was 49.2% in the enhanced group compared with 59.6% in the standard group ($p = 0.01$). 26% reduction in soft bedding use the previous night and a 30% reduction in soft bedding use during the past week in the

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
						enhanced group compared with the standard group.
Abuhammad et al. 2024 Jordan	Aggelou et al. 2024	Quasi-experimental (non-equivalent group design).	The intervention was a structured educational program aimed at improving mothers' knowledge and attitudes towards infant sleep.	208 mothers Ninety-seven intervention (111 control) with infants aged 5–12 months.	Mothers' knowledge and attitudes about infant sleep, measured pre- and post-intervention.	Knowledge scores improved significantly from baseline to follow-up ($B = 0.236$, $p < 0.001$). Control group showed no significant improvement in knowledge over time. No significant positive impact on mothers' attitudes towards infant sleep. Positive correlation between mothers' knowledge and attitudes towards infant sleep. Mothers with higher knowledge scores also tended to have higher attitude scores ($B = 0.018$, $p < 0.001$).
Ostfeld et al. 2005 US	Ellis et al. 2021	Pre-post intervention surveys.	High school education program, face to face, group.	810 adolescents / parents.	Improve knowledge of SIDS risk.	Awareness that supine sleep position carried less risk and infant smoke exposure increased risk of SIDS improved post intervention.
Burd et al. 2007 US	Ellis et al. 2021	Pre-post intervention surveys.	Discussion covering nine risk factors, provision of a printed baby blanket and printed materials. Face to face, printed material, individual.	341 Native American women.	To complete a community-based efficacy study of a SIDS risk reduction methodology.	Pre-test identified significant safe sleep knowledge deficit, higher in Native American group. Intervention improved knowledge about all nine items in both groups.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Rienks et al. 2013 US	Ellis et al. 2021	Telephone surveys following campaigns.	Three media campaigns: digital, leaflet, posters.	1458 African Americans 18–64 yrs.	Evaluate campaign effectiveness among African Americans.	Exposure to three campaigns was successful in raising awareness of infant mortality disparity in African Americans.

Technology-based programs

While technology featured in several of the educational and community interventions listed above, interventions that only used technology such as Smartphone applications (apps) or social media messaging were also reported in the selected papers (n=7). Overall, interventions that only used these technologies had mixed results or provided insufficient data about their impact on safe sleep behaviours, particularly for high-risk populations. Interventions are listed in Table 6 and included:

- Videos or safe sleep advice provided via text or email.(13, 15, 30-33)
- Videos, quizzes or advice provided via smartphone applications as standalone or as additions to existing programs, including popular pregnancy apps.(13, 15, 30)
- Social media engagement.(13, 15)
- Using smartphone photography or uploading images to monitor adherence to safe-sleep practices.(13, 15, 34, 35)

Some interventions that used technology-based strategies only were found to have no statistically significant impact on reducing risk behaviours. For example, three linked RCTs by Carlin, Moon and Mathews and colleagues used safe sleep messaging but saw no impact on behaviour in two out of three interventions.(15, 31-33) Other technology-based interventions included in-person strategies or verification. For example, Nabaweesi and colleagues used photographs taken by mothers to effectively assess safe sleeping practices; however, this was also accompanied by a 90-minute home visit. The study found using photographs resulted in reliable assessments of sleep position and location compared with parental reporting and direct observation.(35) However, Canty and colleagues, who also used caregiver-provided photography, found no statistically significant improvement in sleep location, but improvements in other safe sleep criteria.(34)

One technological intervention only was reported to significantly improve adherence to safe sleep practices. Today'sBaby mHealth intervention sent educational videos based on Theory of Planned Behavior (TPB) over 60 days via text or email to participants.(33) Mothers who received the videos were more likely to place their infants in the supine position and practise room-sharing without bed-sharing compared with the control group, and demonstrated positive attitudes towards supine sleep positioning and room-sharing compared with the control group.(33)

Table 6—Technology-based interventions to reduce the risk of SUDI identified in the literature

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Moon et al. 2017 US	Aggelou et al. 2024	RCT	The TodaysBaby mHealth intervention delivered educational videos via text or email over a 60-day period. The videos addressed key safe sleep practices, including supine sleep positioning, room-sharing without bed-sharing, and avoiding soft bedding. The intervention also used the Theory of Planned Behavior (TPB) to influence maternal attitudes, perceived social norms and control over safe sleep decisions.	1263 mothers	Infant sleep position and location.	Mothers who received safe sleep (SS) videos were more likely to place their infants in the supine position (adjusted odds ratio [aOR] = 1.99; 95% CI 1.43 to 2.79) and were more likely to practise room-sharing without bed-sharing (aOR = 2.05; 95% CI 1.65 to 2.54) compared with the control group. 8.9% increase in supine sleep positioning (from 80.2% to 89.1%) and a 12.4% increase in room-sharing without bed-sharing (from 70.4% to 82.8%). Positive attitudes towards supine sleep (aOR = 8.25; 95% CI 4.72 to 14.43) and positive social norms for room-sharing (aOR = 7.14; 95% CI 5.35 to 9.53) were strongly associated with adherence to safe sleep practices.
Nabaweesi et al. 2019 US	Aggelou et al. 2024	RCT	Trained mothers to take and submit smartphone photographs of their infant's sleep environment. Assessed for compliance with safe sleep recommendations. Mothers received guidance during a 90-min home visit and follow-up photographs were submitted 2–4 weeks after the visit.	16 mothers	Sleep safety inter-rater reliability (IRR). Correlation between sleep safety assessments via photography, observation and parental reports.	76.5% of parents were observed placing their infants in the supine position and 82.4% of the photographs demonstrated supine sleep position. 94.1% of infants were observed sleeping in their parents' room, while 82.4% of photographs showed the same. There was perfect agreement (Kappa = 1.00) between expert coders for sleep position and soft items in the sleeping area without the baby present.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Canty et al. 2020 US	Aggelou et al. 2024	RCT	Intervention group received personalised feedback through the patient portal based on photographs of the infant's sleep environment submitted by mothers at one and two months. The feedback highlighted compliance with or deviations from the American Academy of Pediatrics (AAP) safe sleep guidelines, including recommendations for room-sharing, supine sleep position and removing soft objects or loose bedding from the sleeping area.	109 mothers	Feasibility of using patient portals for infant sleep safety; adherence to AAP safe sleep guidelines based on submitted photographs.	Two-month follow-up, 55.6% (intervention) met all safe sleep criteria, compared with 45.4% (control). Not statistically significant ($p = 0.75$) When excluding sleep location, 83% (intervention) met all safe sleep guidelines versus 68% (control) ($p = 0.46$).
Carlin et al. 2018 US	Ellis et al. 2021	RCT	Evaluate the impact of targeted messages about safe sleep and SIDS risk reduction on African American mothers' decisions regarding the infant sleep environment: Targeted and enhanced safe sleep messages. Control: Standard messaging emphasising AAP recommended safe sleep practices.	569 intervention / 625 control. African American mothers.	Reported sleep environment.	Sleep position. Digital supine position use decreased over time. Behaviour unchanged by enhanced message intervention.
Mathews et al. 2016 US	Ellis et al. 2021	RCT	Evaluate the impact of targeted digital messages about safe sleep and SIDS risk reduction on African American mothers' decisions regarding the infant sleep environment: Soft bedding. Control: Standard messaging emphasising AAP recommended safe sleep practices.	569 intervention / 625 control. African American mothers.	Reported use of soft bedding.	Decrease in use of soft bedding in the intervention group: previous night 43.0 vs. 52.4% in controls and over previous week 49.2 vs. 59.6% in controls.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Moon et al. 2016 US	Ellis et al. 2021	RCT	Evaluate the impact of targeted messages about safe sleep and SIDS risk reduction on African American mothers' decisions regarding the infant sleep environment: Sleep location. Control: Standard messaging emphasising AAP recommended safe sleep practices.	569 intervention / 625 control. African American mothers.	Reported sleep location.	Women receiving enhanced messages were no less likely to bedshare: no effect of intervention.
Krishnamurti et al. 2025	Krishnamurti et al. 2025	Prospective observational study	MyHealthyPregnancy App: inclusion of TodaysBaby safe sleeping and breastfeeding component with or without push notifications. Videos: 11 safe sleep; 13 breastfeeding.	7572 pregnant persons prenatal and postpartum.	App engagement data analysis.	TodaysBaby engagement rate was 18.8% with push notifications and 3.0% without. Engagement was highest in the initial weeks after enrolment, with a steady decline through pregnancy and very little postpartum engagement. Birthing parents at high risk of losing an infant to Sudden Unexpected Infant Death—a leading cause of infant death after one month of age—appear to engage with the app at the same rates as birth parents who are at low risk. Low engagement with quizzes.

Quality improvement initiatives

Quality improvement (QI) initiatives in hospital settings were the most prevalent form of intervention identified in the literature, with 29 reported interventions cited (see Table 7). All published QI interventions were from the US and varied widely in their size and scope; with some citing a unit, ward or hospital rather than a total number of participants. Based in hospital or health service locations, QI initiatives included:

- QI initiatives that aimed to improve safe sleep environments, policies, cultural change and staff knowledge within hospital settings.(13, 14, 17, 18)
- QI initiatives that aimed to improve staff knowledge of safe sleeping practices for improved knowledge transfer.(13, 14, 17, 18)
- QI initiatives that aimed to improve home practices post-discharge, through implementing education programs, environmental modification and advice processes provided by health workers once QI improvement initiatives were implemented.(13, 14, 17, 18)

Quality improvement initiatives that focused on safe sleep spaces within hospital settings reported clear improvements in safe sleep practices for infants by their caregivers and hospital staff. These included replacing the crib to prevent staff propping up mattresses rather than maintaining a flat sleep surface, educating staff to not leave items inside cribs, improved bedding options and providing guides for safe sleep practices on or around cribs.(12-14, 17, 18) Interventions reported improvements over time, up to two years post intervention.(36) Crib audits were the most common tool to measure program success, though some also used staff or parent surveys or focus groups.(13, 14, 17, 18) Compliance was high for several studies.(13, 14, 17, 18)

Interventions that included parental education reported continued positive outcomes when follow-up was recorded. For example, Gelfer and colleagues reported significant improvements in parental home adherence following a safe sleep QI intervention in a neonatal intensive care unit.(21) Krugman and colleagues reported that, after a QI initiative in a newborn nursery addressing staff beliefs as well as parental education about sudden unexpected infant death risks, average SUDI rates fell from 1.08 infants per 1000 births to 0.48 after intervention for the community.(22) However, not all QI initiatives reported follow-up outcomes for parents after discharge from their health service.(17)

Table 7—Quality improvement interventions to reduce the risk of SUDI identified in the literature

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Brashears et al. 2020 US	Aggelou et al. 2024	Quality improvement (QI) project (prospective)	Updated screening forms to include four specific Pregnancy Risk Assessment Monitoring System (PRAMS) questions relevant to infant sleep, followed by education tailored to each caregiver's needs. Multiple well-child visits. A board book about safe sleep provided. Callback 2 weeks after to rescreen for sleep practices.	199 caregivers of infants 0–6 months.	Identification of unsafe sleep practices; targeted education effectiveness; reduction of unsafe practices. Statistical analysis pre-post-intervention. Evaluation by participants. Post-intervention evaluation using PRAMS questions.	55.8% caregivers reported one or more unsafe sleep practices using the new screening form. Follow-up screening 2 weeks later showed a significant reduction in unsafe sleep practices, although the exact percentage of reduction was not provided. A chi-square test indicated a significant decrease in unsafe behaviours post-intervention ($p = 0.046$).
Bittle et al. 2019 US	Salm Ward et al. 2022	QI initiative	Decrease infant drops during the early postpartum period.	Nurses and parents, mother and baby unit.	Crib audit, parent survey, chart audit.	No infant drops during QI; 50 mothers required intervention for unsafe sleep practices.
Carrier 2009 US	Salm Ward et al. 2022	QI initiative	Change unit culture to safety and quality by implementing SIDS prevention in parent education.	Nurses; physicians; parents, NICU.	Staff survey, chart audit, focus group.	Improvement in all knowledge items; 100% compliance with documenting teaching.
Dufer & Godfrey 2017 US	Salm Ward et al. 2022	QI initiative	1) Increase parent knowledge of safe sleep practices; 2) Change clinical practice for parent discharge education.	Parents NICU	Parent survey	Improvement in all knowledge items; high parent self-reported home safe sleep practices compliance.
Erlick et al. 2021 US	Salm Ward et al. 2022	QI initiative	Improve sleep safety for hospitalised infants through parent teaching, staff education, environment, policy.	Paediatric inpatient Nurses; parents; other staff.	Chart audit, staff survey, parent education.	Safe sleeping documentation was included in at least half of charts; staff liked tools.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Frey et al. 2020 US	Salm Ward et al. 2022	QI initiative	1) Determine provider baseline SSP knowledge; 2) Provide provider SSP education; 3) Improve SSP adherence.	Paediatric inpatient Nurses; physicians; parents.	Crib audit, staff survey.	Significant increases in flat crib, no objects, and no over-bundling; overall SSP adherence increased by 12.5%.
Gelfer et al. 2013 US	Salm Ward et al. 2022	QI initiative	Increase percentage of infants following SSPs: supine position, no objects, firm surface, parent practices, environment, policy.	NICU Nurses; parents.	Crib audit, parent survey, focus group.	Significant increases in position, firm, no soft objects, and parent home adherence.
Geyer et al. 2016 US	Salm Ward et al. 2022	QI initiative	Improve sleep environment safety for inpatient infants, supine position, no objects, parent education, staff education, environment, policy.	Paediatric inpatient nurses; physicians; parents; other staff.	Crib audit	Significant increase in no objects; positioning increased (not significant); sustained 1 y later.
Hwang et al. 2015 US	Salm Ward et al. 2022	QI initiative	Increase percentage of infants engaging in SSPs, supine position, no objects, flat crib, parent education, staff education, environment, policy.	2 NICUs Nurses; parents.	Crib audit, other.	Significant increase for each SSP; overall compliance significantly increased by 53.8%.
Hwang et al. 2018 US	Salm Ward et al. 2022	QI initiative	Increase percentage of infants engaging in SSPs (and each SSP component) to 90% in 2 y. Supine position, no objects, flat crib, parent education, staff education, environment, policy.	10 NICUs Nurses; physicians; parents.	Crib audit	Significant increase for each SSP; overall compliance significantly increased (47.7% e81%).
Kellams et al. 2017 US	Salm Ward et al. 2022	QI initiative	(1) Increase rate of mothers reporting SS information to > 90%; (2) Increase rate of supine position, no objects, parent teaching,	8 maternity units; nurses; parents.	Crib audit, other.	Mothers reporting SS information increased (72% e95%); 88% of infants were in SS environment, 93% in supine position.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
			infants engaging in SSPs to > 90%, sleep location, pacifier, parent education, staff education, environment, policy.			
Krugman et al. 2018 US	Salm Ward et al. 2022	QI initiative	Reduce sudden unexpected infant death cases in the surrounding community. Supine position, no objects, parent teaching, staff beliefs.	Newborn nursery nurses; nurse practitioners; physicians; parents; other staff.	Staff survey, chart audit; focus group.	Average sudden unexpected infant death rates fell from 1.08 infants per 1000 births to 0.48 after intervention.
Leong et al. 2019 US	Salm Ward et al. 2022	QI initiative	Improve adherence to SSPs: supine position, sleep location, no objects, staff beliefs, parent education, staff education, environment.	Paediatric inpatient nurses; parents.	Crib audit, staff survey.	Significant increase by 35% in SS environment; by 31% in overall compliance.
Leong et al. 2020 US	Salm Ward et al. 2022	QI initiative	Increase compliance of Alone, Back, Crib to >25% Supine position, no objects, sleep location, parent education, staff education, environment.	3 paediatric inpatient campuses: nurses; nurse practitioners; physicians; parents; other staff.	Crib audit	Significant increase by 33.9% in SS environment; overall ABC compliance from 4.4% to 32.5%
Macklin et al. 2016 US	Salm Ward et al. 2022	QI initiative	1) Increase safe sleep practices to >90. 2) Increase safe sleep parent education to >90% by end of project: supine position, no objects, parent teaching, sleep location, flat crib, parent education, staff education, environment, policy.	8 children's hospitals: nurses; physicians; parents; other staff.	Crib audit, other.	Significant increases in overall compliance (32.6% e58.2%) and parent education (48.2% e75.4%).

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
Macklin et al. 2019 US	Salm Ward et al. 2022	QI initiative	1) Increase safe sleep practices compliance to 80%; 2) Provide SS parent education to >90% over 12-m period: supine position, no objects, parent teaching, sleep location, staff education, environment, policy.	3 children's hospitals, 6 birth units (maternity, well-baby, special care); nurses; physicians; parents.	Crib audit	Significant increase in SSP (37% e59.6% children's hospitals and 59.3% e72.5%, birthing centres); and for SS parent education (68.8% e94.7%, children's and 85.5% e100%, birthing).
Macklin et al. 2020 US	Salm Ward et al. 2022	QI initiative	Increase safe sleep practices compliance to >80% over project period: Supine position, no objects, parent teaching, sleep location, flat crib, parent education, staff education, policy.	10 NICUs, paediatric inpatient nurses; physicians; parents; other staff.	Crib audit, chart audit.	Significant increase in SSP compliance (2% e79% for inpatient; 35% e75% for NICU).
Mason et al. 2013 US	Salm Ward et al. 2022	QI initiative	Improve SSP compliance to >75%. Supine position, no objects, parent teaching, sleep location, parent knowledge, intentions, parent education, staff education, environment, policy.	NICU, special care nursery, postpartum. Nurses; parents.	Crib audit, parent survey, focus group.	Significant increase in SSP compliance (25% e58%); most parents (95%) planned to use supine
McMullen et al. 2016 US	Salm Ward et al. 2022	QI initiative	Increase SSP for infants to 100% in each unit: Supine position, no objects, parent teaching, sleep location, flat crib, appropriate bundling, staff beliefs, environment, policy.	Paediatric inpatient, NICU, mother-baby unit: Nurses; parents; other staff.	Crib audit, staff survey, chart audit.	Significant increase in SSP compliance (70% e90%); some improvements in staff knowledge/ agreement, but not as high as expected.
Mercier et al. 2007 US	Salm Ward et al. 2022	QI initiative	Increase: (1) sleep position assessment to 100%; (2) counselling	12 birthing hospitals:	Chart audit	Significant increase in position assessment (12.7% e55.7%), smoke counselling

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
			about tobacco smoke to 90%; (3) counselling about sleep position to 90% of families: Supine position, parent teaching.	Nurses; physicians; parents.		(22.7% e52.6%); increase in position counselling (46.4% e68.3%.
Patrick et al. 2021 US	Salm Ward et al. 2022	QI initiative	Determine effectiveness of QI to create a hospital SS environment for all newborns and infants: Supine position, no objects, parent teaching, flat crib, appropriate bundling, parent knowledge, intentions.	Well-baby nursery (WBN); neonatal intensive care unit; paediatric inpatient; nurses; parents.	Crib audit, staff survey, parent survey, chart audit, other.	SSP compliance increased from 0% to 90% (WBN), from 0% to 100% (NICU), and from 8.3% to 20% (paediatric).
Rholdon, 2017 US	Salm Ward et al. 2022	QI initiative	Establish whether a formal educational program would improve SSP: Supine position, sleep location; no objects, firm surface, parent education, staff education.	Paediatric inpatient nurses.	Crib audit; other.	Significant increase for no soft objects / loose bedding (from 20% to 50%); increase for other aspects.
Rowe et al. 2016 US	Salm Ward et al. 2022	QI initiative	Increase proportion of inpatient infants in a SSP environment by [date] and sustain improvement through 1 y: Supine position, no objects, parent teaching, flat crib, appropriate bundling, staff beliefs, knowledge.	Children's hospital nurses; physicians; parents; other staff.	Crib audit, staff survey, other.	Significant increase of SS environment (23% e34.1%), flat surface (24.2% e42.2%); significant decrease in position devices (57.6% e33%); position and no soft objects not significant.
Shadman et al. 2016 US	Salm Ward et al. 2022	QI initiative	Increase % of infants sleeping in complete adherence to AAP guidelines to 90% within 12 months:	Children's hospital general care unit:	Crib audit, staff survey, parent survey.	Significant increase in SS compliance (0% e26.9%); significant increase in staff knowledge;

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
			Supine position, parent teaching, sleep location, flat crib, appropriate bundling, staff knowledge, parent knowledge, practices.	Nurses; physicians; parents.		improvements in parent at home SSP.
Shaefer et al. 2010 US	Salm Ward et al. 2022	QI initiative	Change nurses' SSP that can be monitored through QI processes: Supine position, parent teaching, appropriate bundling, staff beliefs, knowledge, parent education, staff education, policy.	7 maternity units: Nurses; parents.	Crib audit, staff survey, parent survey, focus groups, other.	Significant increase in staff knowledge / opinion; position (80.7% e91.9%); appropriate swaddling; and parent report of education.
Uduwana et al. 2020 US	Salm Ward et al. 2022	QI initiative	1) Improve SSP compliance rates by 20% (to 27%); 2) Improve documentation from 50% to 60% by end of year; Supine position, no objects, flat crib, appropriate bundling, staff beliefs.	NICU nurses; parents. Parent education, staff education, environment, policy.	Crib audit, staff survey, chart audit.	Significant increase in overall SSP compliance (7% e96%) and documentation (50% e62%).
Voos et al. 2015 US	Salm Ward et al. 2022	QI initiative	Develop a SS model and increase percentage of infants in a SS environment: Supine position, sleep location, no objects, flat crib, parent education, staff education, environment, policy.	NICU nurses; physicians; parents; other staff.	Crib audit	SS compliance increased (21% e88%) over 1.5 yrs.
Kuhlmann et al. 2016 US	Cole et al. 2022	Pre-post intervention evaluation. QI initiative	Safe Sleep Toolkit training in private obstetrical group practice. Increase promotion of the American Academy	Pregnant women (n = 111) (56 pre-intervention and 56 post-intervention).	Surveys administered by a research assistant to mothers	Significantly more post-intervention women reported their provider had discussed safe sleep (78%vs 32%).

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
			of Paediatrics guidelines for infant safe sleep. Improve provider and maternal knowledge of safe sleep.		following appointments One-month post intervention, surveys were readministered and results were compared. Quantitative analysis.	Provider-reported discussion with women increased significantly for all safe sleep guidelines (82%–90% vs 8%–12%). Increase in women able to identify all 19 safe sleep elements (11%–31%). Intention to put an infant to sleep with blankets reduced (32%–13%). Health providers reported barriers: lack of familiarity with guidelines (n = 6, 55%), lack of time (n = 8, 73%), belief that safe sleep discussion was family practice or paediatric providers' responsibility (n = 6, 55%), and lack of structured process (n = 6, 55%).
Hsu et al. 2023 US	Hsu et al. 2023	Pre- and post-intervention QI study.	Quality Improvement initiative based on Plan Do Study Act methodology. Crib audits to measure success. Education: bassinet cards with “the A.B.C’s of safe sleep” information. Education: nursing education sessions including a 10-minute PowerPoint presentation on safe sleep environments. Environmental modification: bassinets replaced to have firm mattresses and to	All newborns born in hospital between Sept 2020 and May 2021. 210 crib audits (95 pre, 105 post).	Crib audits	Overall safe sleep practices improved from 32% (30/95) pre-intervention to 75% (86/115) post-intervention (P<0.01). Infants sleeping in a safe environment – 35% (36/95) pre-intervention – improved to 83% (96/115) post-intervention (P<0.01). Pre-intervention – 78 unsafe items found. Post-intervention – 26 unsafe items found.

Source	Cited in	Study design	Intervention	Participants	Outcome measurement	Key findings
			be unable to be 'propped' by nurses.			

Question 3: Harm minimisation strategies for co-sleeping

To determine what harm minimisation strategies effectively reduce the risk of SUDI associated with co-sleeping, we extracted data from articles that aimed to reduce the risks associated with co-sleeping–related SUDI events. Harm minimisation regarding co-sleeping aims to provide a safe environment to caregivers who wish to sleep with their infant, through providing environmental modifications to prevent suffocation from bedding, soft mattresses and pillows, unsafe items in the bedding area, smothering by another individual while sleeping, and other hazards that have been identified as increasing the risk of SUDI. Providing a safe sleeping space for the caregiver to use for the infant is one such technique.(12-15, 20)

Environmental modifications

Providing safe sleeping surfaces, bedding and other equipment has been used in interventions to reduce the risk of SUDI and associated harms involved in co-sleeping (n=14). These interventions targeted high-risk communities. All equipment interventions included an educational component and many had community intervention components, with many including extended family members as well as primary caregivers, as seen in Table 8, below. All interventions that provided a safe sleeping space reported improved safe sleeping recommendation adherence, and included:

- Bedtime Basics for Babies campaign, crib distribution and safe sleep education, which improved knowledge of safe sleep positioning from 76% to 94%, and decreased bed-sharing from 38% to 16%, with 90% of parents using the crib.(37)
- Pepi-Pod program in Australia, which provided a safe sleeping space alongside culturally appropriate safe sleep education for Aboriginal and Torres Strait Islander families. They reported that Pepi-Pods were accepted and used by families, and that they improved safe sleep recommendation adherence.(38)
- Pepi-Pod program in New Zealand for high-risk infants, found to be acceptable and improved safe sleep recommendation adherence.(39)
- Pepi-Pod program trial in the UK, which reduced sofa co-sleeping to 6% vs 23% of controls and decreased mean bed-sharing hours to 2.6 per night compared with 6.8 in controls.(40)
- Safe Start intervention that included structured educational sessions alongside two-week well-child visits, with follow-up home visits to assess continued compliance, as well as the provision of a sleep sack and a portable crib.(37)
- Cribs for Kids campaign, which provided cribs and safe sleep education for low-income families. They reported 100% reported use of the distributed crib, with no SUDI deaths reported.(41)
- My Baby's Sleep (MBS) intervention, which included four in-home sessions spaced over seven months, focusing on safe sleep environment, sleep practices, co-caregiver involvement, and provided a travel bassinet and safe sleep board book, for high-risk African American families.(42)
- Maternal Infant Health Program (MIHP) distributed cribs for high-risk families, 99% use and increased knowledge of safe sleeping.(43)
- Crib provided for low-income families, 90% crib use and improvements in safe sleep knowledge.(44)

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- Crib distribution and education in a group environment for families with demonstrated financial need, found that safe sleep knowledge increased significantly and most maintained knowledge at follow-up.(45)
 - Longitudinal Infant and Family Environment (LIFE) study, which provided a safe sleep baby box and conducted four follow-up sessions to confirm compliance. They found significant behavioural change immediately, but this decreased gradually over time.(12)
 - PA Safe Sleep Environment Toolkit, a comprehensive program that included a baby box with a firm foam mattress and a cotton fitted sheet provided. This was combined with a 15-minute educational video and follow up home visit. This program demonstrated 16.1% decrease in SUIDs (Sudden Unexpected Infant Death) for infants born in hospitals implementing the program.(20)

The only control study equipment modification interventions that did not show a statistically significant difference between intervention and control groups were where both groups were provided with different types of safe sleep surfaces, namely a traditional Māori Wahakura or a Pepi-Pod (interventions), versus a standard crib or bassinet (control).(40, 46) However, as both items were used by participants, the studies reported improved safe sleeping behaviours for both intervention and control groups.(40, 46) Therefore, their results do not reduce, but rather add to, the reported effectiveness of environmental modification interventions.

Table 8—Environmental modification interventions to reduce the risk of SUDI identified in the literature

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
McDonald et al. 2017 US	Aggelou et al. 2024	RCT	The Safe Start intervention included a structured educational session delivered by a health educator during the infant's 2-week well-child visit (WVC). The session emphasised four key safe sleep recommendations: baby sleeping alone on the back, in a crib, and in a smoke-free environment. Parents were also provided with a sleep sack and a portable crib to promote adherence to safe sleep guidelines. Follow-up home visits were conducted at 2–4 weeks and 2–3 months to assess continued compliance with the safe sleep recommendations. Designed to increase parental self-efficacy and belief in the effectiveness of safe sleep practices.	235 participants Parents / guardians.	Safe sleep behaviours, knowledge, beliefs, intentions, skills, and practices related to safe sleep.	Intervention: greater adherence to safe sleep practices. 88% followed all four recommended practices compared with 65% in the standard care group at the first follow-up ($p < 0.001$). Educational session improved parents' knowledge, intentions and reported behaviours regarding safe sleep. Intervention group showed significantly higher compliance with safe sleep practices than the control group, especially regarding crib use and sleeping without soft objects.
Salm Ward et al. 2021 US	Aggelou et al. 2024	Single-arm feasibility and acceptability study.	My Baby's Sleep (MBS) intervention included four in-home sessions spaced over seven months, starting during the last trimester of pregnancy and continuing until the infant was about four months old. The sessions covered topics such as planning the infants sleep environment, co-caregiver involvement, and addressing common challenges such as infant fussiness and sleep transitions. Families also received a travel bassinet and safe	17 participants (eight mothers, nine co-caregivers) from eight African-American families.	Feasibility, acceptability, maternal self-efficacy, support, knowledge, attitudes and sleep practices.	The intervention had high acceptability, sessions rated as highly helpful. Co-caregivers also expressed positive feedback. Mothers and co-caregivers reported an increase in their understanding of safe sleep practices. Interactive materials, such as the Safe to Sleep® videos and card-sorting activities beneficial.

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
			sleep board book to facilitate the intervention.			
Baddock et al. 2017 New Zealand	Ellis et al. 2021	RCT	Provision of a woven flax bassinet (Wahakura) designed to provide a consistent infant sleep environment. Control: Usual bassinet.	98 intervention; 101 control. Māori pregnant women living in low socioeconomic areas.	To compare an indigenous sleep device (Wahakura) for infants at high risk for sudden unexpected death with a bassinet, for measures of infant sleep position, head covering, breastfeeding, bed-sharing and maternal sleep and fatigue.	No significant differences in infant risk behaviours in Wahakura compared with bassinets. Increase in sustained breastfeeding in the Wahakura group.
Carlins et al. 2007 US	Ellis et al. 2021	Evaluation	Evaluate Cribs for Kids campaign, crib distribution and safe sleep education. Face to face, printed material, infant sleep space, individual.	150 Low-income families.	Crib distribution and reported SUDI deaths.	100% reported use of the distributed crib. No SUDI deaths reported for the crib distribution families (still resident in locality).
Young et al. 2018 Australia	Ellis et al. 2021	Test of concept trial	Pepi-Pod program. Pepi-Pod provided as safe sleep space with culturally appropriate education. Face to face, printed material, infant sleep space, individual.	158 Aboriginal and Torres Strait Islander caregivers.	Pepi-Pod program evaluation.	Pepi-Pods acceptable to and used by families; improved safe sleep recommendation adherence.
Engel et al. 2017 US	Ellis et al. 2021	Pre-post surveys and observation.	Maternal infant health program (MIHP). Crib distribution and safe sleep education. Face to face, printed material, infant sleep space, individual.	75 Low-income, racial minorities, and migrant worker status selected families.	Identify changes in knowledge and how many parents used the cribs.	99% using the distributed crib. Increased knowledge supine position (59% pre–89% post).

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
Cowan 2015 New Zealand	Ellis et al. 2021	Evaluation of program implementation.	Pepi-Pod program. Pepi-Pod provided as safe sleep space with culturally appropriate education.	3616 Infants aged < 2 weeks, smoke-exposed, premature or low birthweight, or local safety assessments.	Distribution, follow-up and user- feedback records.	Māori infant mortality rate decreased. Pepi-Pods acceptable to and used by families; improved safe sleep recommendation adherence.
Hauck et al. 2015 US	Ellis et al. 2021	Prospective cohort study.	Bedtime Basics for Babies campaign. Crib distribution and safe sleep education. Face to face, printed material, infant sleep space, individual.	6515 (1) No crib in the home; (2) Low-income status; (3) At least one risk factor for SIDS and sleep-related death (ethnicity, maternal smoking, pre-term or low birthweight, or sibling of a SIDS infant).	Evaluate Bedtime Basics for Babies campaign, crib distribution and safe sleep education impact.	Knowledge of sleep position improved from 76% to 94%, bed-sharing decreased from 38% to 16%, 90% of parents used a crib.
Yuill et al. 2017 UK	Ellis et al. 2021	Feasibility study	Plastic baby box, bed and safe sleep education. Control: Usual care. Face to face, printed material, infant sleep space, individual.	79 intervention, 70 control. Young parents, parents who had smoked in pregnancy and those known to be substance users.	Feasibility study evaluation for RCT to introduce UK version of Pepi-Pod program.	Intervention reduced sofa co-sleeping to 6% vs 23% of controls and decreased mean bed-sharing hours to 2.6 per night compared with 6.8 for controls.
McIntosh et al. 2018 New Zealand	Ellis et al. 2021	RCT	Pepi-Pod program. Pepi-Pod provided as safe sleep space with culturally appropriate education. Control: Better than usual care and infant sleep space.	101 intervention, 110 control. Māori and Pacific women.	Assess acceptability and effectiveness at improving SUDI protective knowledge and safe sleep practice from	Improvements seen in both I/V and control groups because of more than usual care provision for control group, as all participants were given a cot.

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
			Face to face, printed material, infant sleep space.		the Pepi-Pod program compared with usual care.	
Salm Ward et al. 2018 US	Ellis et al. 2021	Cohort study	Crib distribution and safe sleep education. Face to face, printed material, infant sleep space, group interactive.	208 high-risk parents (demonstrated financial need).	Compare parental knowledge and practices related to infant sleep before and after receipt of safe sleep educational program and a crib.	Knowledge of recommendations about position, surface, environment, pacifier, smoking and breastfeeding increased significantly between pre- and post-test and most maintained knowledge at follow-up.
Hauck et al. 2015 US	Cole et al. 2022	Longitudinal study	To describe parental knowledge and practices regarding infant sleep position, bed-sharing, pacifier use, and feeding practices before and after receipt of a free crib and safe sleep education.	n= 4786 Low-income families with an infant.	Parents completed surveys before (prenatal and postnatal) and 1–3 months after crib and safe sleep training receipt (follow-up). Descriptive and bivariate analyses were completed.	76% who completed the survey prenatally and 77% postnatally stated correctly that the recommended sleep position for healthy babies was on their back, this increased significantly to 94% of mothers stating that the recommended sleep position was on the baby's back. Only 8% of parents intended to bedshare when asked prenatally, while 38% had bedshared the previous night when asked postnatally. After the intervention, bedsharing rates decreased to 16%. 90% reported that the baby slept in a crib after the intervention, compared with 51% postnatally. Parental knowledge of recommended infant sleep position improved from 76% (prenatal) and 77% (postnatal) to 94% after crib receipt.

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
Stringer et al. 2025 US	Stringer et al. 2025	Program evaluation	PA Safe Sleep Environmental Audit Tool: hospital- and community-based infant safe sleep education, interventions and resources focused on improving nurses' knowledge and practice, birth parents' knowledge and behaviours, social media access, and reducing local community infant sleep-related deaths (SRDs). 15-minute educational video about infant safe-sleep practices, a baby box with a firm foam mattress and a cotton fitted sheet, and a postpartum home visit.	Staff and patients from 21 birthing hospitals: nurse leaders for infants from prenatal to birth to 6 months post live birth.	Progress You Made Survey. Statistical analysis of results: improved knowledge, confidence gained in education. Pre- and post-implementation audit of sleeping spaces in hospitals. City data SUDI pre- and post-implementation. Social media reach count.	16.1% decrease in sudden unexplained infant death for infants born in hospitals implementing PA Safe Sleep Program. 31% of families of infants born across the state received safe sleep education. Hospitals: 94.3% safe sleep position; significantly lower proportion of infants found with unsafe items in cribs (post 17.8% vs pre 29.7%). Survey: (91.2%) completed; nurses reported making substantial or exceptional progress in acquiring factual knowledge about SRD in infants (74.4%), understanding environmental risks for SRD (78.1%), taking corrective actions (83.1%), and being more proactive (83.4%) regarding safe sleep practices.
Shin et al. 2023 US	Shin et al. 2023	Prospective longitudinal study	Longitudinal Infant and Family Environment (LIFE) study. Provided 15-minute educational video about infant safe-sleep practices, a baby box with a firm foam mattress and a cotton fitted sheet, and a postpartum home visit. Data collected through 4 self-administered surveys to track safe sleeping attitudes over time.	411 pregnant people, prenatal and postpartum. Infants from birth to 6 months.	Descriptive statistics. Prevalence Data collected from Longitudinal Infant and Family Environment (LIFE) study. Baseline data were collected before intervention (i.e. before watching the educational video) in the hospital (Time 1). Follow-up data were collected during the 7-day home visit	Less likely to use unsafe items in infants' sleeping areas over time. More frequent bed sharing at 3-month and 6-month follow-ups, compared with the baseline. Before intervention, 75.6% reported intention to use unsafe items in their baby's sleeping areas. However, the use of unsafe items in sleeping areas decreased over time, with 65.2%

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
					(Time 2) as well as through online surveys at 3 months (Time 3) and 6 months (Time 4).	reporting it at Time 2, 52.2% at Time 3, and 52.1% at Time 4. 3.6% of women reported intention to share a bed with their infants 'often' or 'always' at baseline, percentage increased over time to 6.7% at Time 2, 18.7% at Time 3, and 22.1% at Time 4. Frequency of reporting 'often' or 'always' room-sharing without bed-sharing decreased at Time 4 (76.2%) from 92.8% at Time 2 and 90.7% at Time 3. All participants at baseline and 97.5% at Time 2 reported planned or actual use of supine position. However, percentage who used supine position decreased from (83.4%) at Time 3 to 78.7% at Time 4.

Community-based interventions

Interventions that focused on home or community-based, targeted interventions included strategies such as intensive case management, home visiting, peer educators or ambassadors, and personalised counselling (n=12). These interventions focused on high-risk families, as seen in Table 9, below. For example, a vulnerable baby service in Manchester, UK, was found to decrease SUDI rates from 1.8/1000 to 0.52 in 2011.(47)

Some home visit interventions were found to improve safe sleep knowledge and self-efficacy in some studies.(12-15, 20) However, several interventions, for example the Nurse-Family Partnership Program, did not report on the effectiveness of these visits in ensuring safe sleep practices; rather, studies reported on engagement with the programs themselves.(48)The selected systematic review by Garstang and colleagues described several studies that reported engagement with the program but reported no outcomes associated with improvements to safe sleep behaviours.(16) Such programs included SafeCare, a home treatment program for child abuse and neglect, and Differential Response and Motivational Interviewing interventions for infant safety that were compared to standard responses for welfare case management for high-risk families with infants.(16) As these studies did not report on safe sleep outcomes, they have not been included in Table 9.

Table 9—Community-based interventions to reduce the risk of SUDI identified in the literature

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
Huber et al. 2024 US	Aggelou et al. 2024	Mixed methods	Community-level ISS (safe sleep) and breastfeeding promotion using conversational approaches, peer counselling, home visits, and risk-mitigation strategies. Focus on marginalised groups (Black, American Indian or Alaskan Native, rural populations).	Seven key informants. American Indian or Alaskan Native, Black, Asian American and Pacific Islander groups showing lowest outcomes, and geographic disparities (urban vs rural).	Interviews; PRAMS and OPAS data.	The intervention showed partial effectiveness. Although high provider recommendation rates were achieved (92%–97%), actual adherence to safe sleep practices was lower (76% of parents reported placing infants to sleep alone). Disparities remained based on race/ethnicity and geography.
Ahlers-Schmidt et al. 2014 US	Ellis et al. 2021	Evaluation surveys	Safe sleep community baby shower: face to face, printed material, infant sleep space, group.	180 African American women.	To describe participants' knowledge and intentions regarding safe sleep following a community baby shower.	High levels of safe sleep knowledge and stated intentions to follow safe sleep recommendations were reported by participants.
Ahlers-Schmidt et al. 2019 US	Ellis et al. 2021	Evaluation surveys	Safe sleep community baby shower: face to face, printed material, infant sleep space, group.	845 pregnant women of low socioeconomic status or with high risk of infant mortality.	To evaluate outcomes of Safe Sleep Instructor-led community baby showers, which included safe sleep promotion, breastfeeding promotion and tobacco cessation education.	Significant increases were observed in baby shower participants' reported plans to follow the AAP safe sleep guidelines (all $p < 0.001$).
Dillon 2012 UK	Ellis et al. 2021	Service case study	Vulnerable baby service: multi-agency case planning meetings and a public health approach	1047 caregivers. Alcohol / substance misuse, violent criminal history, previous child not living with parent, late antenatal booking,	Reduction in SUDI, infant deaths.	Infant deaths reduced by 60% in Manchester. SUDI rate decreased from 1.8/1,000 to 0.52 in 2011.

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
			Engage vulnerable families in the design of their support package with the aim to reduce risks of SUDI. Face to face, interactive.	homelessness with mental health / domestic abuse / probation, hearing-impaired.		
Hutton et al. 2017 US	Ellis et al. 2021	RCT	Home visiting education with Baby Book. Control: Usual brochures for safe sleep knowledge. Face to face, printed material, individual.	160 intervention 122 control Low SES mothers.	Safe sleep knowledge and adherence.	Safe sleep knowledge increased across all time points for both groups. Bed-sharing was higher and exclusive crib use lower in the brochure group. Greater dialogue and emotional engagement were reported with use of the book.
Kemp et al. 2013 Australia	Ellis et al. 2021	RCT	Maternal Early Childhood Sustained Home-visiting (MECSH) program. Control: Usual care. Face to face, individual, interactive.	111 intervention 97 control Vulnerable parents: one of a list of risk factors.	Sustained nurse home visiting score/%. Pre- and postnatal outcomes and the characteristics of the MECSH program intervention.	Fewer instrumental deliveries; improved health and wellbeing scores; improved coping and self-efficacy in parenting in the intervention group.
Olds et al. 2014 US	Ellis et al. 2021	RCT	Nurse-Family Partnership Control: Usual care Face to face, individual, interactive	458 intervention 680 control African American mothers living in highly disadvantaged urban neighbourhoods.	All-cause maternal mortality and preventable cause infant mortality.	Intervention group mothers less likely to die from all causes and offspring less likely to die from preventable causes.
Cowan 2008 New Zealand	Ellis et al. 2021	Evaluation of a pilot study	6 + 1 peer education. Face to face, printed materials, individual, interactive.	7 Women and their partners who had successfully quit smoking during pregnancy.	To achieve high levels of awareness of 6 + 1 information in communities that make low use of traditional health services, to achieve 50 '6 + 1' conversations in 1 month.	Link workers (parents) reported 70 6 + 1 conversations; total of 90 6 + 1 conversations reported at evaluation. Hard to reach became 'easy to reach' by changing the communication paradigm.

Source	Cited in	Study design	Intervention	No of participants	Outcome measurement	Key findings
Ingoldsby 2013 US	Garstang et al. 2021	Quasi-experimental	Flexible delivery of nurse-family partnership (NFP) program, with families given more choice over content and timing of delivery of NFP at intervention sites compared with standard NFP at control sites	2419 Families receiving NFP: low-income first-time parents	Retention in NFP program Number of home visits achieved.	Lower risk of drop-out for mothers at intervention sites (HR, 0.42; 95% CI, 0.21–0.84, $p = 0.015$). More home visits but small treatment difference of 1.4 visits (95% CI, 0.58–2.2, $p < 0.001$).
Folger 2016 US	Garstang et al. 2021	Quasi-experimental	Community-based enriched home visiting (CBE-HV) compared with standard home visiting at different locations and pre- and post-implementation analysis. CBE-HV worked with community stakeholders with parent support groups, material support for families in crisis and work with families who missed appointments.	5707 African American first-time parents with one or more of: low income, being unmarried, under 18 years, or incomplete antenatal care.	Retention in program Number of home visits.	CBE-HV families stayed in program for 166 days longer (461 vs 295, $p < 0.01$) and had additional 7 home visits (24 vs 17, $p = 0.02$) CBE-HV sites had a lower risk of attrition 69% retained at 6 months vs 58% prior to CBE-HV($p = 0.03$), at 12 months 55% vs 34% ($p < 0.01$).

Decision-making mechanisms for co-sleeping

Several selected studies argued that addressing the reasons why caregivers choose to co-sleep was critical in understanding and reducing the associated risks. To understand why caregivers choose to co-sleep, Pease and colleagues conducted a systematic review of qualitative research into decision-making processes for caregivers concerning safe sleep practices. They reported on 16 papers from 13 studies that discussed concerns, advice and barriers to implementation of safe sleeping recommendations. These papers included a focus on high-risk populations.(5) They found that in order for safe sleep advice to be successfully implemented by caregivers, interventions needed to be based on credible advice that was easily understood, was consistent with other sources, and extended to include all carers of the infant (such as fathers and extended family members). Without consideration of the impact of other sources of information, such as older family members and online sources, caregivers may ignore safe sleeping advice provided by health professionals.(5)

Through analysis of qualitative data, Pease and colleagues also found that harm minimisation strategies concerning co-sleeping needed to take into account the decision-making processes that lead to co-sleeping, including expectations of infant sleep, convenience for breastfeeding, and disruptions to night-time routines, which altered participant tolerance for some unsafe sleep practices.(5) Strategies required linkages to be made between safe sleep advice and how these strategies reduced risk, as feelings of being 'told' or just given rules and expected to follow them without question was linked to caregivers ignoring safe sleep advice.(5, 14) For example, some unsafe practices such as co-sleeping as a way to monitor an ill child, or using cot bumpers or pillows were seen in terms of comfort or safety; messaging from health professionals therefore needs to contextualise safe sleep messages in similar terms of comfort and safety, addressing such concerns while recognising parental autonomy.(5, 14) Pease and colleagues argued that, if caregiver safety concerns were not addressed with clear causal linkages in safe sleep messaging, then decision-making processes would prioritise the caregivers' own safety strategies.(5)

Other studies also argued for the consideration of decision-making processes to improve safe sleep messaging in health initiatives. For example, an Australian study identified in Cole and colleagues found that if parents were concerned with plagiocephaly, commonly referred to as 'flat head', unsafe items such as pillows were often purchased that were marketed as products to reduce a flat head, frequently initiating use at about one-month postpartum.(14) Parents reported in this study that plagiocephaly was more concerning than placing their infant on their back to reduce SUDI risk, as "plagiocephaly was more of a reality" for them at that time.(14, 49) This example demonstrates that medical misinformation and conflicting advice may reduce adherence to SUDI recommendations. Such decision-making mechanisms require consideration in interventions associated with reducing the risk of SUDI associated with co-sleeping.(5, 14)

Discussion

Modifiable risk factors for SUDI identified in selected papers included:

- Infants who did not share a room with their mother or caregiver were 19 times more likely to die of sleep-related suffocation and almost eight times more likely to die of unexplained infant death compared with infants who shared a room with their caregiver.(10)
- The use of soft bedding, heads covered by bedclothes, unsafe items in sleeping areas, non-supine sleep position and co-sleeping or shared sleep surfaces were also identified as increasing the risk of SUDI.(10, 11)
- Both prenatal and postnatal illicit drug exposure, smoking or other chemical exposure was found to be a statistically significant risk factor for SUDI.(11, 12)
- Protective factors that reduced risk of SUDI identified in the literature included breastfeeding, pacifier use and infants sleeping in the supine position.(11)

Modifiable risk factors identified were largely consistent with current safe sleeping literature and guidelines. Overall, these findings support recommendations for an infant to share the same room but with their own sleep surface, without soft bedding or other objects in the sleeping area, in a supine position. Avoiding exposure to illicit substances and both prenatal and postnatal smoking is also supported.

Overall, the interventions identified in selected papers found that:

- Harm minimisation initiatives that provide a safe space to sleep for high-risk populations, in conjunction with education and other initiatives, were effective in reducing unsafe sleep behaviours, particularly in the early months of life.(5, 13-17, 20)
- Educational initiatives, when conducted in isolation, were not always effective in reducing high-risk behaviours, even if knowledge was increased.(13-16)
- Quality improvement initiatives that aim to improve health service knowledge and use of safe sleeping practices could reduce SUDI risk, improve safe sleeping practices, and could continue to improve practices for families post-discharge, although statistical analysis and follow-up was limited in these studies.(12, 13, 15, 17)
- Targeted, evidenced-based screening questionnaires, for example using PRAMS, allowed for individualised education and / or equipment provision that improved safe sleeping practices in the short and medium term.(13)
- Understanding the barriers to safe sleeping and the drivers of co-sleeping were critical to improving safe sleep practices.(5)
- Interventions that relied on digital messaging alone, without integration of other strategies, were not found to be effective in improving safe sleep practices.(15, 16)
- Adherence to safe sleep practices was seen to decline over time in multiple varied interventions that included follow-up.(5, 10, 13-16)
- Technologically based initiatives had poor or mixed results and were more effective when combined with other initiatives.(13, 15, 30)

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- Not all interventions included follow-up, statistical analyses, or linked outcomes to SUDI data.(5, 13-16)

Overall, selected studies from primary intervention and systematic reviews found initiatives that used combined approaches to SUDI prevention and co-sleeping harm minimisation were most effective. Initiatives that combined culturally appropriate education, informed and up-to-date health professionals and safe hospital environments, follow-up protocols and the provision of safe sleeping equipment, were the most effective at improving adherence to safe sleep practices.

However, a disconnect between knowledge and practice was also identified in some studies. For example, a 2012 Australian study reviewed by Cole and colleagues found 33% of participants reported bed-sharing at 0–1 month; however, by 6–12 months, the prevalence of surface sharing had increased to 58%.(14, 50) This study and others included in this Evidence Check highlight that knowledge of safe sleeping practices is not necessarily enough to ensure safe behaviours and reduce SUDI rates. Further, as Cole and colleagues argued, most studies relied on self-reported data, which may be influenced by stigma about caregiver use of unsafe sleep practices that could arguably contribute to the underreporting of unsafe sleep practices.(14) Strategies such as continued QI initiatives, harm minimisation through providing safe spaces to sleep, and interventions that use a combination of approaches may be required to emphasise safe sleep messaging. Further exploration of the barriers to safe sleep practices, for example why individuals may choose to co-sleep, may also be required.

Applicability and recommendations

Recommendations

Following this Evidence Check, the research team suggests NSW Health considers the recommendations, and their strength of evidence outlined in **Table 10**.

Table 10—Evidence Check recommendations

Findings	Recommendation	Quality of evidence
Infants that sleep in a different room than their caregiver may be up to 19 times more likely to experience SUDI.	Consider the importance of “same room, different sleep surface” recommendations.	High
The use of soft bedding, unsafe items in bedding area, and infants found with heads covered with bedclothes posed a significantly higher risk of SUDI.	Consider the importance of safe sleeping messages that inform caregivers of safer bedding options (e.g. safe sleeping bags, uncovered heads, no pillows) and the impact of untested products promoted to assist infant sleep (e.g. plagiocephaly ‘prevention’ pillows).	High
Prenatal drug exposure increases the risk of SUDI	Consider strategies that highlight the dangers of prenatal drug exposure to prevent harm.	High
Sharing a sleep surface with another person or animal increases the risk of SUDI and sleep-related suffocation death.	Consider that sharing a sleep surface (e.g. bed or couch) without a safe sleeping space for the infant is not recommended and should be avoided. Consider initiatives that provide a safe sleeping space (e.g. baby box or Pepi-Pod) to reduce risk.	High
Infants not placed to bed on a safe sleep surface were at higher risk of sleep-related suffocation death.	Consider initiatives that provide access to, educate about and emphasise the use of approved safe sleep surfaces. Consider review of the regulatory environment for devices sold as safe sleep surfaces.	High

Infants not placed in the supine position to sleep were at increased risk of SUDI or suffocation death.	Consider the importance of the supine position in safe sleep initiatives.	High
Interventions delivered in combination were more effective than those delivered in isolation.	Consider developing comprehensive interventions that use multiple interventions rather than a single intervention alone.	High
Misinformation about safe sleeping from health professionals may contribute to unsafe sleep practices, particularly for high-risk communities.	Consider QI strategies that improve health professionals' knowledge of safe sleep practices, particularly for those caring for pre-term or vulnerable infants, and families from high-risk communities.	High
Providing safe sleep surfaces and sleep items were reported to ease decision making, improve knowledge and self-efficacy and reduce SUDI risk.	Consider initiatives that ease decision-making processes through providing safe alternatives to co-sleeping (for example, Pepi-Pods, baby boxes, cribs with safe sleep bedding).	High
Bed-sharing increases the risk of SUDI.	Consider that bed-sharing is not recommended and should be avoided.	Moderate
Decision making mechanisms for co-sleeping are multiple and complex.	Consider all caregivers and alternative sources of information in safe sleeping initiatives.	Moderate
Digital-only interventions were found to be mostly ineffective at changing safe sleeping practices.	Consider interventions that combine approaches with face-to-face contact such as home visits.	Moderate
Knowledge of safe sleeping practices may not guarantee safe sleep behaviour.	Consider research that addresses barriers to safe sleep practice implementation.	Moderate

Limitations

As this is a rapid review it may not have identified all relevant sources of evidence. The research team recognises that this limits the comprehensiveness of the search and potentially the results and recommendations themselves. While effective for identifying key primary papers and published reviews to address the research questions, it was limited by strict inclusion and exclusion criteria agreed upon by all stakeholders in our Search Strategy document. Other research may have been missed. Data extraction has been narrative and does not include statistical analyses.

Further, we identified papers during screening that did not meet selection criteria but contained analyses of current SUDI guidelines worldwide. An environmental scan of guidelines may inform guideline development. For example, NSW Health may consider the following papers:

- Stahn et al. Does Bed-Sharing Increase the Risk for Sudden Infant Death Syndrome? — A Review of the Literature and Official Guidelines of Selected EU Countries. *Zeitschrift für Geburtshilfe und Neonatologie*. 2021;225(5):397
- Subramonian et al. Interventions for the Prevention of Sudden Infant Death Syndrome and Sudden Unexplained Death in Infancy: A Review of Guidelines. 2020.
- Moon et al. The Tension Between AAP Safe Sleep Guidelines and Infant Sleep. *Pediatrics*. 2024;153(4):01. doi: <https://dx.doi.org/10.1542/peds.2023-064675>

Conclusion

This Evidence Check provides an overview of peer-reviewed papers from 2020 to 2025 about modifiable risk factors, interventions and harm minimisation strategies to reduce SUDI in infants aged 0–12 months. While evidence that identified modifiable risk factors included robust statistical analyses, not all interventions included follow-up, statistical analyses or linked outcomes to SUDI data, and sample size differed widely in selected studies.

This review included strategies that acknowledged the widespread use of co-sleeping and interventions that have been established and evaluated to reduce this risk. Modifiable risk factors remain consistent with previous studies, specifically, an infant sleeping in a different room from the caregiver before six months of age, soft bedding and items in the sleep area, and shared sleep surfaces without a safe sleeping space for the infant remain contributing factors for SUDI risk.

We found that improving knowledge of safe sleep practices alone may not necessarily lead to better safe sleep behaviours, and that combined approaches were more effective. Similarly, technology can be used to reinforce safe sleep messaging but is more effective when combined with other approaches such as home visits.

Overall, the Evidence Check found environmental modification strategies that provide a suitable safe sleeping surface, combined with educational or other support, have led to significant improvements in safe sleep practices, particularly for at-risk communities. Quality improvement initiatives in hospital and other health service settings that target health professionals, environmental improvements and caregiver education can also lead to improvements in safe sleep behaviours, potentially reducing the risk of SUDI.

Appendices

Appendix 1

Table 11—Search Strategy to address selection criteria

	Key words	Search terms	Search strings
Population	Infants aged 0–12-months and their parents/carers. High-risk cohorts within this population. This is defined as populations with risk factors that may increase the risk of SUDI. * infants are defined as 23 months and under for MEDLINE.	Newborn infants Paediatrics Infants Human Infant care.	newborn* or infant* or infancy or baby or toddler* *High-risk cohorts will be identified through secondary screening.
Study type	Systematic reviews Meta-analysis Randomised controlled trials.	Meta-analysis Systematic reviews.	exp Meta-Analysis/ exp Meta-Analysis as Topic/ “Systematic Review”/ Systematic Reviews as Topic/ Scoping Review/ Scoping Review as Topic/ Review Literature as Topic/ “Review”/ and ((selection criteria or data extraction).ab. or (systematic or scoping or integrative or integrated or quantitative or rapid or mapping or umbrella or meta or mixed methods or living or realist or pragmatic).ti. or (review adj2 (evidence or guideline*))).ti,bt.) (meta analy* or metaanaly* or meta synthesis or metasynthesis or metaregression or meta regression or review of reviews or overview of reviews or evidence syntheses* or knowledge syntheses* or (research adj3 integrati*) or (pool adj3 (analy* or data)) or evidence report).ti,ab. ((systematic or scoping or integrative or integrated or quantitative or rapid or mapping or umbrella or meta or mixed methods or living or realist or pragmatic) adj2 (review* or overview or synthesis)).ti,ab. (cochrane or embase or medline or cinhal or science citation index or web of science or scopus or systematic search* or literature search*

			exp randomized controlled trial/ controlled clinical trial.pt. randomized.ab. placebo.ab. drug therapy.fs. randomly.ab. trial.ab. groups.ab.
Intervention	Interventions to mitigate risk factors associated with SUDI Public health interventions Clinical interventions Environmental modifications Policy and regulatory interventions.	Risk Prevention control prevention prevention and control preventive measures Harm reduction Risk reduction behaviour Risk reduction Early Intervention Health Promotion / methods Infant care / methods Safety Sleep Parental education Environmental modification Harm minimisation Intervention Risk factors sleep environment and positioning sharing a sleep surface loose bedding falling asleep on a couch or chair parental alcohol or drug use sleeping in devices such as slings carriers bassinets rockers car seats Pepi-Pods Risk reduction behaviour Accidental deaths.	*Interventions will be assessed through secondary screening. This is to ensure that no interventions are missed in the literature

Setting	Home settings Health service settings, including hospitals/maternity wards Community and residential care settings.	Swaddle Sleeping bag Back to sleep Co-sleep Bedsharing Infant mortality Sleep environment Positioning Bedding Sleep choice Beds Safe sleep environments Cot Bassinet Pod Moses basket Baby box Crib Sidecar crib Co-sleeping crib or cot or bassinet Swaddling.	(co sleep* or cosleep* or co bedding or cobedding or sleep arrangement* or bed arrangement* or shared sleep or (sleep* adj together) or bedshar* or (bed* adj2 shar*)),ti,ab,kf.
Outcome	Effectiveness Efficacy Harm minimisation.	Accidents Accidental death Airway management Health knowledge, attitudes, practices Sudden Infant Death Syndrome SUDI Cot Death Crib Death Death, Sudden Infant SID SIDS Sudden Infant Death Syndrome (PC) prevention and control Asphyxia Suffocation Strangulation Overlaying Entrapment Wedging Unintentional	Sudden Infant Death/ (cot death* or crib death* or sids or sudden infant death* or sudden unexpected death in infancy or unexpected infant death or unexplained infant death or sudden baby death or sudi or suid or ((perinatal adj (death* or mortalit*)) and sleep*)),ti,ab,kf. (exp asphyxia/ or suffocation/) and (infant* or bed* or accident* or unintention*)ti,ab,kf. (((asphyx* OR strangulation or suffocat*) adj5 (infant* or bed* or accident* or unintention*)) or assb or overlaying or entrapment or wedging).ti,ab,kf ((MH "Asphyxia") AND (XB (infant* or bed* or accident* or unintention*))) OR ((XB ((asphyx* OR strangulation or suffocat*) N4 (infant* or bed* or accident* or unintention*)) or assb or overlaying or entrapment or wedging))

		Sudden Infant Death / epidemiology Sudden Infant Death / etiology Sudden Infant Death / prevention & control* Risk Factors Risk Reduction Behaviour.	
Year	Published / produced from 1 January 2020 *If data saturation is not reached for systematic reviews; primary intervention studies 2024 to present.	2020, 2021, 2022, 2023, 2024, 2025.	2020 – Current.

Appendix 2

Table 12—Summary of key findings by publication

	Intervention	No of studies	Key findings
Aggelou et al. 2024	Parental education programs Digital health interventions Personalised counselling Hospital-based educational programs Mobile apps and online resources Home-visiting programs Community-based initiatives.	23	Combining different educational interventions leads to improved adherence to safe sleep practices and better infant health outcomes. Interventions that include both in-person education and digital reminders demonstrate better parental adherence and knowledge retention compared with single-method approaches.
Ellis et al. 2021	9 infant sleep space and safer sleep education programs 4 intensive or targeted home visiting services 3 peer educators / ambassadors 5 health education / raising awareness interventions 3 targeted health education messages using digital media.	23	Interventions moving from 'information giving' to 'information exchange' models using personalised, longer-term relationship-building models. More robust evidence of effectiveness is required.
Garstang et al. 2021	Nurse-Family Partnership program (NFP) Home visiting (CBE-HV); differential response (DR) SelfCare home treatment program (SC) (2) Intensive case management (ICM) (2) Comprehensive treatment program (2) Engaging Moms Program (EMP) Mobile phone Planned Activities Training (PAT) Internet training program.	28	Technology based programs = no significant difference Face-to-face programs with high-intensity family contact and close working and co-ordination between agencies and community support = better outcomes, long-term relationships not short-term engagement.
Ward et al. 2022	Quality Improvement interventions in hospital settings: crib audits; staff surveys; parent surveys; chart audits; focus groups; changes tested; parent education; policy changes; environment changes.	27	QI was an effective organisational change strategy; QI is effective in increasing safe sleep adherence in inpatient settings. Engage multi-disciplinary team / staff throughout QI process to gain consensus and buy-in. To increase consistency of parent education, consider using standardised tools that address common parent questions or concerns. QI efforts should engage leadership and include health departments, SIDS networks and community allies.

			Deliver mandatory staff education that targets multiple disciplines and uses several venues to address questions and concerns. Staff education should include evidence base for recommendations and/or regional experts to help address concerns; include local data to increase relevance; consider using unique approaches, such as bedside teaching of staff or observation of skills educating parents and point-of-observation corrections to parents and nursing staff by crib auditors; build-in cues to action to remind staff and facilitate habit changes, such as crib cards, posters, or EHR prompts; use free education materials from NICHD (staff and parent), health departments and SIDS networks. Update formal safe sleep policies to include staff training requirements (onboarding, continuing education) and parent teaching documentation requirements. For NICUs, include the definition of 'physiologically stable' and decision-making algorithm for assessing safe sleep readiness. Consider follow-up strategies to maintain changes. Bundled change approaches lead to rapid improvements but may limit ability to determine effectiveness of specific changes. A multi-unit collaboration with transparent data sharing and regular calls can help troubleshoot challenges and share ideas. Use P-D-S-A to test small changes.
Cole et al. 2022	Papers identified modifiable risks and barriers to implementation of safe sleep practices. Prevalence of modifiable factors, descriptive of reported outcome measures; awareness of infant safe sleep messages; challenges implementing safe sleep advice.	137	Cultural values and ethnicity have a strong influence on practices employed and the adoption of safe sleep messages. Interventions that provide practical strategies for creating safer shared sleeping environments relevant to family values and circumstances are more likely to engage caregivers than risk-elimination messages that advise that caregivers should never bed-share.
Li et al. 2025	Intervention: PRECEDE Stage—assessing the knowledge and self-efficacy of neonatal caregivers, barriers. PROCEED—execution of targeted interventions, followed by a thorough evaluation process that assesses assessments of the implementation, impact, and outcomes.	1	Diversified interventions possible through systematic analysis of barriers to sleep safety through the lens of predisposing, enabling, and reinforcing factors. Can increase self-efficacy, improve communication and affirmative feedback exploring barriers to personalise intervention effective to improve behaviours.
Stringer et al. 2025	PA Safe Sleep Environmental Audit Tool: hospital- and community-based infant safe sleep education, interventions, and resources focused on improving nurses' knowledge and practice, birth parents'	1	16.1% decrease in sudden unexpected infant death for infants born in hospitals implementing PA Safe Sleep Program. 31% of families of infants born across the state received safe sleep education. Hospitals: 94.3% safe sleep position;

	knowledge and behaviours, social media access, and reducing local community infant sleep-related deaths (SRDs): 15-minute educational video on infant safe-sleep practices, a baby box with a firm foam mattress and a cotton fitted sheet, and a postpartum home visit.		significantly lower proportion of infants found with unsafe items in cribs (post 17.8% vs pre 29.7%). Survey: (91.2%) completed; nurses reported making substantial or exceptional progress in acquiring factual knowledge about SRD in infants (74.4%), understanding environmental risks for SRD (78.1%), taking corrective actions (83.1%), and being more proactive (83.4%) regarding safe sleep practices.
Krishnamurti et al. 2025	MyHealthyPregnancy App: Inclusion of TodaysBaby safe sleeping and breastfeeding component with or without push notifications. Videos: 11 safe sleep; 13 breastfeeding.	1	TodaysBaby engagement rate was 18.8% with push notifications and 3.0% without. Engagement was highest in the initial weeks after enrolment, with a steady decline through pregnancy and very little postpartum engagement. Birthing parents at high risk of losing an infant to sudden unexpected infant death—a leading cause of infant death after one month of age—appear to engage with the app at the same rates as birth parents who are at low risk. Low engagement with quizzes.
Shin et al. 2023	Longitudinal Infant and Family Environment (LIFE) study. Provided 15-minute educational video about infant safe-sleep practices, a baby box with a firm foam mattress and a cotton fitted sheet, and a postpartum home visit. Data collected through 4 self-administered surveys to track safe sleeping attitudes over time.	1	Participants were less likely to use unsafe items (e.g. soft bedding) in infants' sleeping areas over time. Participants reported more frequent bed sharing at 3-month and 6-month follow-ups, compared with the baseline. Before intervention, 75.6% reported their intention to use one or more unsafe items in their baby's sleeping areas. However, the use of unsafe items in sleeping areas decreased over time, with 65.2% reporting it at Time 2, 52.2% at Time 3, and 52.1% at Time 4. While only 3.6% of women reported their intention to share a bed with their infants 'often' or 'always' at baseline, this percentage increased over time to 6.7% at Time 2, 18.7% at Time 3, and 22.1% at Time 4. Frequency of reporting 'often' or 'always' room-sharing without bed-sharing, decreased at Time 4 (76.2%) from 92.8% at Time 2 and 90.7% at Time 3. All participants at baseline and 97.5% of the sample at Time 2 reported they planned to use or actually used the supine position with their infants. However, the percentage of women who put their babies to sleep on their back decreased from (83.4%) at Time 3 to 78.7% at Time 4.
Hsu et al. 2023	Quality Improvement initiative based on Plan Do Study Act methodology. Crib audits to measure success. Education: bassinet cards with "the A.B.C.'s of safe sleep" information.	1	Overall safe sleep practices improved from 32% (30/95) preintervention to 75% (86/ 115) postintervention ($P<0.01$). Infants sleeping in a safe environment - 35% (36/95) preintervention - improved to 83% (96/115) postintervention period ($P<0.01$). Preintervention: 78 unsafe items found. Postintervention: 26 unsafe items were found.

	2. Education: nursing education sessions including a 10-minute PowerPoint presentation on safe sleep environments. 3. Environmental modification: bassinets replaced to have firm mattresses and to be unable to be 'propped' by nurses.		
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