Cot Mattresses and Sudden Infant Death Syndrome (SIDS): An Annotated Bibliography.

Sherburn RE, Webb TE, Jenkins RO.
Detection of toxigenic bacteria in polyurethane foam from cot mattresses by polymerase chain reaction.

A sensitive methodology for PCR detection of Staphylococcus aureus or Bordetella pertussis DNA within cot mattress polyurethane foam was developed. The assay's applicability was evaluated on polyurethane foam from used cot mattresses. S. aureus DNA was detected in 42% of mattresses of sudden infant death syndrome (SIDS) victims and 29% of comparison group (no death) mattresses tested. B. pertussis DNA was detected in 50% of SIDS mattresses and 27% of comparison group mattresses. There was no significant statistical association between SIDS cases and the presence of S. aureus or B. pertussis DNA in cot mattress polyurethane.


Jenkins RO, Sherburn RE.
Growth and survival of bacteria implicated in sudden infant death syndrome on Cot mattress materials.

Aims: To compare growth and survival of selected bacteria implicated in sudden infant death syndrome (SIDS) on cot mattress polyurethane (PU) inner-foam and on different types of cot mattress cover materials. Methods and Results: Escherichia coli, Staphylococcus aureus or Streptococcus pyogenes were inoculated onto swatches of new-unused cot mattress PU inner-foam and onto three types of cot mattress covers (polyvinyl chloride, cotton and polyester). The influence of inoculation cell density, relative humidity (RH) and temperature of incubation on survival was assessed by recovery of cells in 0.85% NaCl, with viable cell enumeration by plate counting on selective and differential media. Utilization of carbon and nitrogen sources within cot mattress PU was assessed by following growth on aqueous leachate from PU, and by colorimetric determination of aromatic amines. Good survival capability (>206 d) was shown by all three test species on PU inner-foam and on polyester mattress cover at high RH (75%), but only by Staph. aureus on PU at low RH (25%). Aqueous soluble material from PU foam supports bacterial growth; removal of aromatic amines from aqueous leachate from PU accompanies growth of Staph. aureus. Conclusions: Staphylococcus aureus has good survival capability on cot mattress PU foam, even at low RH. Soluble material within PU can serve as carbon and nitrogen sources for bacterial growth. Significance and impact of the study: Prolonged survival of Staph. aureus on PU at low RH could explain, in the
context of the common bacterial toxins hypothesis, an increased risk of SIDS associated with used infant mattresses.


Sherburn RE, Jenkins RO.
**Aerial release of bacteria from cot mattress materials and the sudden infant death syndrome.**

Aim: To investigate aerial release of bacteria from used cot mattresses and to assess factors that may influence this process. Methods and Results: Movement on used mattresses, simulating that of an infant's head, significantly enhanced aerial release of naturally acquired bacteria from the polyurethane foams (total count data, P = 0.008; Staphylococcus aureus, P = 0.004) or from polyvinyl chloride covers (total count data, P = 0.001). Aerial release of naturally acquired bacteria from used cot mattresses showed high variability and was poorly correlated (R² < or = 0.294) with bacterial cell density within the materials. In experiments involving inoculation of S. aureus and Escherichia coli onto the polyurethane of unused cot mattresses, aerial release of the species correlated well (R² > or = 0.950) with inoculation density when simulated infant head movement was applied. Aerial release of these bacterial species from the material decreased with increase in width or aqueous content of the material, and was lower from polyurethane foam of a used cot mattress. Conclusions: Simulated infant movement and mattress related factors influence aerial release of bacteria from cot mattress materials. With simulated infant movement on cot mattress polyurethane foam, levels of airborne bacteria above the material are proportional to bacterial population levels inoculated onto the material. Significance and Impact of the Study: Cot mattresses harbouring relatively high levels of naturally acquired toxigenic bacteria, such as S. aureus, could pose a relatively high risk of infection to the infant's respiratory tract through increased aerial contamination. This has impact in the context of recent findings on cot mattress related risk factors for sudden infant death syndrome.


Sherburn RE, Jenkins RO.
**Cot mattresses as reservoirs of potentially harmful bacteria and the sudden infant death syndrome.**
FEMS Immunol Med Microbiol. 2004 Sep 1; 42(1):76-84.

Cot mattress materials were investigated as potential reservoirs of bacteria in relation to the sudden infant death syndrome (SIDS). The sleeping position of the infant significantly influenced bacterial population density of cot mattress polyurethane foams (p<0.0000001) and their covers (p<0.004). Staphylococcus aureus was isolated at significantly higher frequency (p<0.03) from the infant's head region of cot mattress.
Significantly higher bacterial population densities (p<0.001) were associated with polyurethane foams from non-integral mattresses (exposed polyurethane foam), when compared to those from mattresses completely covered by polyvinyl chloride (integral type mattress). The frequency of isolation of S. aureus from polyurethane foams from non-integral mattresses was also significantly higher (p=0.03) than from foams from the integral type. The following factors were significantly associated with increased frequency of isolation of S. aureus: from the polyurethane foam, previous use of non-integral mattresses by another child (p=0.03 for all sample sites, p=0.01 for torso region); from the covers, sleeping in the prone position (p=0.003 head region, p=0.001 torso region). Prone sleeping was also significantly associated with increased bacterial population levels (p=0.01) and increased frequency of isolation of Escherichia coli (p=0.02) from the torso region of cot mattress covers. These findings could explain some recently identified risk factors for SIDS associated with type and previous use of cot mattresses. Clostridium perfringens was isolated at very low frequency and Streptococcus pyogenes was not isolated from any cot mattress materials tested.


Aim: To identify risk factors for sudden infant death syndrome (SIDS) in the sleeping environment of Irish infants. Methods: A five year population based case-control study with parental interviews conducted for each case and three controls matched for age, place of birth, and last sleep period. A total of 203 SIDS cases and 622 control infants born 1994-98 were studied. Results: In a multivariate analysis, co-sleeping significantly increased the risk of SIDS both as a usual practice (adjusted OR 4.31; 95% CI 1.07 to 17.37) and during the last sleep period (adjusted OR 16.47; 95% CI 3.73 to 72.75). The associated risk was dependent on maternal smoking (OR 21.84; 95% CI 2.27 to 209.89), and was not significant for infants who were > or =20 weeks of age (OR 2.63; 95% CI 0.49 to 70.10) or placed back in their own cot/bed to sleep (OR 1.07; 95% CI 0.21 to 5.41). The use of pillows, duvets, and bedding with tog value > or =10 were not significant risk factors when adjusted for the effects of confounding variables, including maternal smoking and social disadvantage. However, the prone sleeping position remains a significant SIDS risk factor, and among infants using soothers, the absence of soother use during the last sleep period also significantly increased the SIDS risk (OR 5.83; CI 2.37 to 14.36). Conclusion: Co-sleeping should be avoided in infants who are <20 weeks of age, or whose mothers smoked during pregnancy. The prone position remains a factor in some SIDS deaths, and the relation between soother use and SIDS is a complex variable requiring further study.

Full-text downloading available at: [http://adc.bmjjournals.com/cgi/reprint/88/12/1058](http://adc.bmjjournals.com/cgi/reprint/88/12/1058) (Not a U.S. Government Website)
Infant care practices related to cot death in Turkish and Moroccan families in the Netherlands.
Arch Dis Child. 2003 Sep; 88(9):784-8.

From 1979 to 1993 Turkish infants had a significantly higher cot death risk compared to Dutch infants. In contrast Moroccan infants had a risk of cot death that was approximately three times lower compared to Dutch infants during the same period. This study shows that these differences have disappeared, while differences still exist in infant care practices between these ethnic groups. At 28 well-baby clinics, questionnaires were distributed for this sample selection. The response was 82%. Data were collected on 55 Turkish, 54 Moroccan, and 210 Dutch families. Less than 7% of these three ethnic groups still placed infants in the prone position. Moroccan mothers hardly smoked. Turkish people used pillows and Moroccan people used soft mattresses more often. Moroccan families practiced swaddling more widely. Length of maternal residence influenced some care giving practices. As a result of this study, subgroup specific intervention campaigns for safe sleeping can be developed for Turkish and Moroccan families.

Full-text downloading available at: http://adc.bmjjournals.com/cgi/reprint/88/9/784 (Not a U.S. Government Website)

Effect of a sudden infant death syndrome risk reduction education program on risk factor compliance and information sources in primarily black urban communities.

Background: In the US, a higher incidence of sudden infant death syndrome (SIDS) and a slower decline in the incidence of SIDS has been found among blacks when compared with white infants. The continued racial disparity in SIDS is thought to be attributable to lack of compliance with SIDS risk reduction recommendations. Objectives: To better understand the disparities in SIDS risk reduction behaviors, we sought to study compliance and information sources related to SIDS among primarily black communities in a city with a high SIDS incidence rate before and after a targeted educational campaign. Design: Pre- and post-SIDS Risk Reduction Education Program telephone surveys were performed in targeted Chicago communities with at least 86% blacks. Data collection for Survey 1 was from September 22 to November 4, 1999. Data collection for Survey 2 was from November 17, 2001, to January 12, 2002, 24 months after the aggressive implementation of a comprehensive, ethnically sensitive risk reduction program. Results: Survey 1 analyzed data from 480 mothers with an infant <12 months of age (327 black, 66 white, and 87 Hispanic) and Survey 2 had 472 mothers (305 black, 77 white, and 90 Hispanic). The incidence of nighttime prone sleeping at Survey 1 was 25% among black respondents, 17% in whites, and 12% in Hispanics and decreased (but not significantly) among all groups by Survey 2. Overall, in Survey 2 compared with Survey 1, fewer mothers reported putting their infants on an adult bed, sofa, or cot both during the day and at night, with the biggest change seen in black mothers for daytime naps.
Despite the same educational initiative, blacks increased the use of pillows, stuffed toys, and soft bedding in the sleep environment as compared with whites. More mothers in Survey 2 than in Survey 1 said that they noticed their infants sleeping on their back during the newborn hospitalization. Significantly more black and white mothers in Survey 2 compared with Survey 1 reported that a doctor or nurse had told them what the best position was for putting their infants to sleep, and all 3 groups said that the health care providers indicated that placing the infant on its back was the best sleep position. In examining the relationship between information sources and SIDS risk behaviors, among all groups observation of sleep position in hospital had no effect on behavior after newborn discharge; however, specific instruction by a nurse or doctor in the hospital about how to properly place the infant for sleep influenced behavior after the mother left the hospital. Conclusions: The Surveys indicate the greatest impact of the SIDS risk factor educational initiative targeted at black communities was changing behaviors regarding safe sleep locations by reducing the incidence of infants placed for nighttime and daytime sleep in adult beds, sofas, or cots. Although these data indicate considerable progress as a result of the targeted educational initiative, our findings suggest that cultural explanations for specific infant care practices must be more clearly understood to close the gap between SIDS risk factor compliance and apparent knowledge about SIDS risk factors.

Full-text downloading available at: http://www.pediatrics.org (Not a U.S. Government Website)

Tappin D, Brooke H, Ecob R, Gibson A.

**Used infant mattresses and sudden infant death syndrome in Scotland: case-control study.**

BMJ. 2002 Nov 2; 325(7371):1007.

Objective: To examine the proposition that a used infant mattress is associated with an increased risk of sudden infant death syndrome. Design: Case-control study. Setting: Scotland (population 5.1 million, with about 53 000 births a year). Participants: 131 infants who died of sudden infant death syndrome between 1 January 1996 and 31 May 2000 and 278 age, season, and obstetric unit matched control infants. Main Outcome Measures: Routine use of an infant mattress previously used by another child and place of last sleep. Results: Routine use of an infant mattress previously used by another child was significantly associated with an increased risk of sudden infant death syndrome (multivariate odds ratio 3.07, 95% confidence interval 1.51 to 6.22). Use of a used infant mattress for last sleep was also associated with increased risk (6.10, 2.31 to 16.12). The association was significantly stronger if the mattress was from another home (4.78, 2.08 to 11.0) than if it was from the same home (1.64, 0.64 to 4.2). Conclusion: A valid significant association exists between use of a used infant mattress and an increased risk of sudden infant death syndrome, particularly if the mattress is from another home. Insufficient evidence is available to judge whether this relation is cause and effect.

Full-text downloading available at: http://bmj.bmjournals.com/cgi/reprint/325/7371/1007 (Not a U.S. Government Website)
Colditz PB, Joy GJ, Dunster KR.
Rebreathing potential of infant mattresses and bedcovers.

Objective: To establish the CO2 dispersion and retention properties of some mattresses and bed coverings commercially available in Australia. Methods: Five mattresses were studied in (i) an in vivo model in which an infant's head was covered by a headbox, rebreathing was allowed to occur, and the final steady state CO2 concentration was measured; and (ii) an in vitro model in which 5% CO2 in a headbox was allowed to disperse, and the time taken for the concentration to reach 1% was measured. Five types of bedcover were studied in (i) an in vivo model in which an infant's head was covered by a bedcover and the final steady state CO2 concentration was measured; and (ii) an in vitro model in which 5% CO2 under a bedcover was allowed to disperse, and the time taken for the concentration to reach 1% was measured. Results: The steady state CO2 concentrations ranged from 0.6% to 3.0% for the mattresses (P < 0.05). The time for CO2 to disperse ranged from 5.5 min to 30.4 min (P < 0.05). Steady state CO2 concentrations ranged from 2.5% to 3.6% for the bed coverings (P > 0.05). The time for CO2 to disperse ranged from 5.4 min to 7.7 min (P > 0.05). Conclusions: Some commercial cot mattresses and bed coverings allow high concentrations of CO2 to accumulate in rebreathing environments. Some mattress types studied were more diffusive to CO2, whereas there was no difference between the bedcovers studied. This may have implications for vulnerable infants at risk of sudden infant death syndrome.

Full-text available at: http://bmj.bmjjournals.com/cgi/reprint/325/7371/1007 (Not a U.S. Government Website)