

Accumulation of dirt, bacteria and fungi in and on mattresses

Jenkins RO and Sherburn RE. Growth and survival of bacteria implicate in sudden infant death syndrome on cot mattress material. Journal of Applied Microbiology 2005; 99:573-579

Bacterial infections and the presence of bacterial toxins have been reported for many sudden infant death syndrome cases and a common bacterial toxins hypothesis for SIDS has been proposed.¹ Toxigenic bacteria implicated in SIDS include *Staphylococcus aureus*, *Escherichia coli*, *Clostridium perfringens* and *Streptococcus pyogenes*.² *Staphylococcus aureus* is the species that best fits a mathematical model proposed for the bacterial toxins hypothesis.³ This bacteria has been isolated more frequently from nasal passages of SIDS patients and its toxins detected more frequently in the tissues and feces of SIDS infants than from control group infants.^{3,4,5} Several studies have provided evidence for a link between SIDS and cot mattress type or bedding used. An increased risk of SIDS was associated with sleeping on older mattresses not completely covered with polyvinyl chloride (PVC).⁶ A subsequent study concluded that routine use of an infant mattress previously used by another child was associated with an increased risk of SIDS.⁷ The use of waterproof wool under-blanket has been reported to reduce the risk of SIDS.⁸ In New Zealand, changes in infant care practices including wrapping a mattress in a thick impermeable cover have been associated with a decreased risk of SIDS.⁹ Sleeping prone on natural-fiber mattresses and sheepskin bedding as also been associated with an increased risk of SIDS.¹⁰ Synthetic mattress covers, when compared with common cotton covers, are known to reduce colonization of mattresses with bacteria and fungi.¹¹ The prone sleeping position has been shown recently to significantly increase bacterial population levels associated with, and the frequency of isolation of both *Staph. aureus* and *E. coli* from cot mattress materials. Mattresses with exposed polyurethane (PU) foam and previous use of these types of mattresses by another child have been shown to be significantly associated with increased frequency of isolation of *Staph. aureus* from cot mattress PU foams. Increased aerial contamination has been reported following simulated infant head movement on cot mattresses harboring relatively high levels of naturally acquired toxigenic bacteria; such mattresses are considered to pose a relatively high risk of infection of the infant's respiratory tract through inhalation.^{12,13} In an *in vitro* study *E. coli*, *Staph. aureus* and *Strep pyogenes* were inoculated onto swatches of new, unused cot mattress PU inner foam and onto three types of cot mattress covers. The influence of inoculation cell density, relative humidity and temperature of incubation on survival was assessed. The study conclusion was that *Staph aureus* had good survival capability on cot mattress PU foam even at low relative humidity. Soluble material within PU can serve as carbon and nitrogen sources for bacterial growth.² These findings could explain the lowered risk of SIDS associated with use of a waterproof cover above the mattress and the increased risk of SIDS associated with sleeping on older mattresses not completely covered with PVC or use of infant mattresses previously used by another child.

-
- ¹ Morris JA. The common bacterial toxins hypothesis of sudden infant death syndrome. *FEMS Immunol Med Microbiol* 1999; 2:11-17.
- ² Jenkins RO and Sherburn RE. Growth and survival of bacteria implicate in sudden infant death syndrome on cot mattress material. *Journal of Applied Microbiology* 2005; 99:573-579.
- ³³ Blackwell CC, MacKenzie DAC, James VS et al. Toxigenic bacteria and sudden infant death syndrome (SIDS) nasopharyngeal flora during the first year of life. *FEMS Immunol Med Microbiol* 1999; 25:51-58.
- ⁴ Murrell WG, Stewart G, O'Neill C et al. Enterotoxigenic bacteria in the sudden infant death syndrome. *J Med Microbiol* 1993; 39:114-127.
- ⁵ Zorgani A, Essery S, Al Madani O et al. Detection of pyrogenic toxins of *Staphylococcus aureus* in sudden infant death syndrome. *FEMS Immunol Med Microbiol* 1999; 25:103-108.
- ⁶ Brooke H, Gibson A, Tappin D et al. Case control study of sudden infant death syndrome in Scotland, 1992-5. *Br Med J* 1997; 314:1516-1520.
- ⁷ Tappin D, Brooke H, Ecob R et al. Used infant mattresses and sudden infant death syndrome in Scotland: case control study. *Br Med J* 2002; 325:1007-1009.
- ⁸ Wilson CA, Taylor BJ, Laing M et al. Clothing and bedding and its relevance to sudden infant death syndrome: further results from the New Zealand Cot Death Study. *J Pediatr Child Health* 1994; 30:506-512.
- ⁹ Ford RPK, Sculter PJ and Cowan S. Changes in infant sleep practices in Canterbury. *N Z Med J* 2000; 113:8-10.
- ¹⁰ Ponsonby AL, Dwyer T, Gibbons LE et al. Factors potentiating the risk of sudden infant death syndrome associated with the prone position. *N Engl J Med* 1993; 329:372-382.
- ¹¹ Pitten FA, Kalveram CM, Kruger U et al. Reduction of colonization of new mattresses with bacteria, molds and house dust by complete Mattress covers. *Hautarzt* 2000; 51:655-660.
- ¹² Sherburn RE and Jenkin RO. Cot mattresses as reservoirs of potentially harmful bacteria and the sudden infant death syndrome. *FEMS Immunol Med Microbiol* 2004; 42:76-84
- ¹³ Sherburn RE and Jenkin RO. Aerial release of bacteria from cot mattress material and the sudden infant death syndrome. *J Appl Microbiol* 2004; 98:293-298.