Evidence Proves An Improved Diaper Helps Support Premature Infant Sleep

Nurses agree: New diaper is designed to help support uninterrupted sleep
Nurse recommended: New diaper is recommended and preferred by NICU nurses

Overview

Sleep in the NICU is critical for premature infants to grow and for their brains to mature and develop. However, necessary interventions in their care like diaper changes can cause stress, disrupt their sleep, impact vitals and energy needed to thrive. The more premature the baby, the less time the nervous system has to develop and the more likely these stressors will affect the brain, with potential long-lasting consequences.[1] This in-use based survey of Neonatal Intensive Care Unit (NICU) nurses at two hospitals assessed nurse reaction to a new P2 size Pampers preemie diaper and its ability to improve the sleep of preemies. Compared to the current standard of care Pampers size P2 diaper, **95% of NICU nurses surveyed said they would recommend the new Pampers Swaddlers Preemie P2 size diaper to other NICU nurses. More than 70% of the NICU nurses surveyed preferred this diaper (77%) and agreed it is designed to support uninterrupted sleep (71%).**

Background

Preemies & Sleep

The womb provides a natural environment that nurtures and protects baby's growth and development. Premature birth interrupts this process and abruptly takes the responsibility of supporting their critical needs from the womb to the artificial environment of the NICU.

Sleep & Calm State

The NICU brings many external stressors that can disrupt preemie sleep. Preemie babies sleep up to 90% of the time.[2] Sleep is essential to support brain development, the last major organ to develop in utero which continues after birth.[1] Sleep is further associated with improved weight gain and immune function, stabilization of heart rate and establishment of the circadian rhythm and diurnal melatonin cycle[3,4] and is also a part of other complex systems including stress hormones, immune function enhancements and increase in growth hormones.[3] In the NICU there can be as many as 200 stressful events, disruptions or handling events during a 24-hour period.[5] These include necessary procedures like medical assessments, repositioning and diaper changes, which can be stressful (6-8 per day)[6,7], as well as unnecessary interruptions like noise (>45 dB)[8] and poor-performing diapers. NICU nurses agree diaper leaks are disruptive to infants (95%).[9]

Parents in the NICU play an integral part in supporting their premature infant in handling stress. Support strategies include parent participation in skin-to-skin care, breastfeeding and maternal auditory and olfactory sensory stimulation.[8] Diaper changes are also important because they are among the first and most frequent activities for parents to care for their preemie. An easy to use and well-performing diaper can make diaper changes easier and more comfortable for their infant in the NICU and familiarize parents with diaper changes before they transition home.

Skin Care

Preemies are particularly sensitive to other stressors like the risk of skin compromise due to their immature skin. Since skin development occurs in the last trimester of pregnancy, preemie skin is thinner and less cohesive, which increases their susceptibility to skin damage and allows access of irritants, bacteria, viruses and allergens. Extra care of preemie skin for their health and comfort, then, is important since 1) the outermost layer, the stratum corneum (derived from the epidermis), plays a key role in protecting the infant from water loss and irritant exposure[10,11] and 2) the innermost layer, the dermis, has reduced amounts of key proteins like collagen and elastin, important in maintaining skin's structure. Given the lack of structural integrity of the skin, repetitive motions like rubbing can easily harm preterm skin as it lacks resiliency to mechanical trauma and tears more easily.[12] At birth, skin pH is more neutral (~6.5) and decreases rapidly with the formation of the acid mantle. However, this process is delayed in premature infants, leaving the skin more prone to breakdown[13] and more susceptible to pH changes due to prolonged exposure to urine, frequent or loose stool and/or bile salts. This increases the importance of a diaper to absorb urine and runny stool away from skin, as well as having diaper skin care regimens that help support pH balance of preemie skin and soft and flexible diaper materials that are low friction against delicate skin.

Healthy Positioning

Intentional developmental positioning (how a caregiver positions a baby while awake or at rest to foster developmental growth) plays an integral role in a premature baby's healthy development. There are three key developmental positions in the isolette (prone, lateral and supine), as well as kangaroo care (prone). Depending on the baby's medical needs and abilities, positioning can improve lung mechanics, decrease reflux symptoms and support neuromotor development.[14-16] There are many additional potential health problems associated with a lack of supportive positioning. For example, poor hip positioning and ill-fitting diapers can have long-term effects on development and lower-extremity alignment.[17] This increases the importance of having well-fitting diapers that support healthy positioning and that if needed can enable diaper changes without the need to reposition the baby.

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Diapers in the NICU

The New Pampers Preemie diaper was designed and tested with NICU nurses. Through interviews, collaboration on diaper design, usage and feedback, the new diaper emerged to help minimize disruptions by improving skin and leak protection, comfort and ease of use while enabling healthy positioning to support and protect preemie sleep and development.

Guards against leaks to help minimize disruptions:

- Absorb Away Liner™ is soft with apertures that pull urine and runny stool away from skin while the absorbent core locks it away.
- Dual-layer leak guards around the legs and soft wrap-around sides provide coverage that helps prevent leaks.

Easy-to-use design and shaping support healthy positioning:

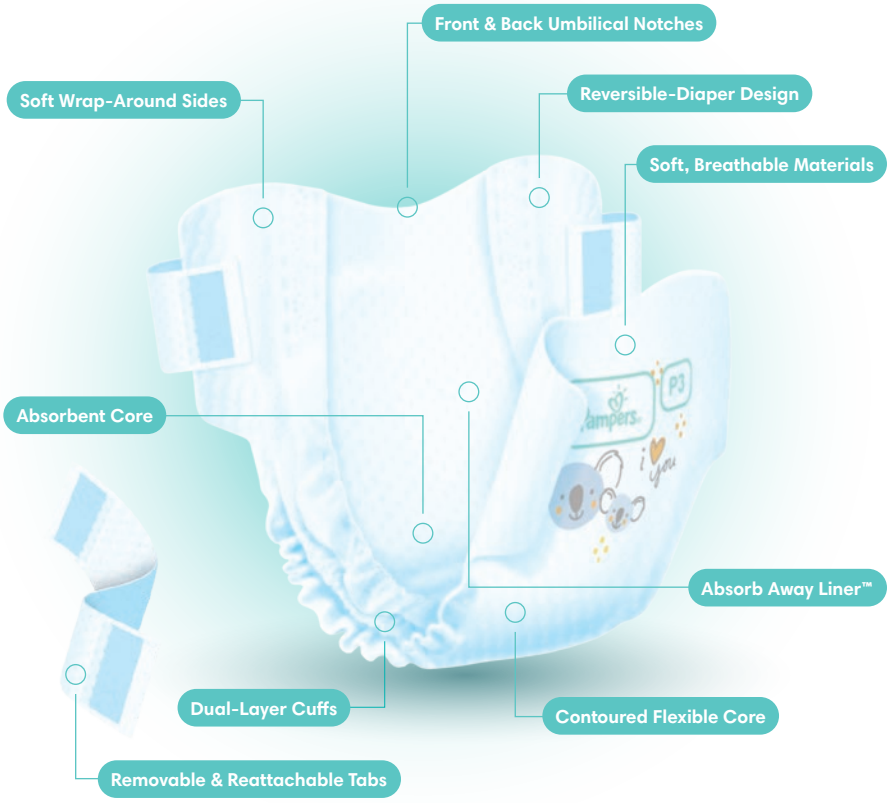
- Reversible diaper design has soft, stretchy tabs that fasten all over and reattach for a customizable fit around sensitive areas, leads or wires and for diaper changes in any position.
- Contoured, flexible core, front-back umbilical notches fit baby's shape and between the legs for proper hip positioning.

Provides breathable materials to help balance skin moisture:

- Breathable layers with thousands of micro-pores let air circulate inside the diaper to help keep skin dry.

Materials that provide better comfort to delicate skin:

- Soft and smooth materials help provide comfort and skin protection by lowering the friction against preemies' delicate skin.



Key Survey Findings

The in-use survey found that NICU nurses, compared to their current Pampers P2 size diaper…

Overall

- **Prefer the new Pampers P2 diaper**
  77% of NICU nurses prefer the New Pampers Preemie Diaper compared to their usual P2 size Pampers diaper.

  NICU nurse testimonials: "So much better than the old diapers!," "I hope we switch to this diaper," "Let's get these" and "I like this diaper more than the diapers previously used."

- **Would recommend the new Pampers P2 diaper**
  95% of NICU nurses would recommend the New Pampers Preemie Diaper to other NICU nurses compared to their usual P2 size Pampers diaper.

  NICU nurse testimonials: "These are so much more compatible with our NICU care," "You can change the baby's diaper much easier if they are laying on their stomach than you can with the regular P-2 diapers. This is especially helpful for babies who are on a ventilator."

Available in sizes P3 and P2

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Key Survey Findings (Cont.)

Sleep & Calm State

- **Agree the new Pampers P2 diaper is designed to support sleep**
  71% of NICU nurses agree that the New Pampers Preemie P2 size diaper is designed to support uninterrupted sleep.

  NICU nurse testimonials: "It helps babies sleep better by not disturbing their sleep by easily being able to change the diaper," "My favorite quality about the new diapers is that they are very soft, which is great for skin integrity and infant comfort. My patient did not wake up in between care times or leak out of the diapers."

Skin

- **Agree the new Pampers P2 diaper protects delicate skin**
  82% of NICU nurses agree the new Pampers P2 diaper locks away urine and runny stool, protecting delicate skin.

  NICU nurse testimonials: "I feel like they provide better leakage protection in sides of diaper," "Very absorbent," "This diaper is very soft and seems to be gentle on the babies' skin," "It's softer, leaks less," "Less leakage more flexible materials, much softer than prior diaper."

Healthy Positioning

- **Agree the new Pampers P2 diaper enables diaper changes in any position**
  82% of NICU nurses agree the reversible diaper and all-over fastening enable diaper changes in any position.

  NICU nurse testimonials: "LOVE the double-sided Velcro straps. Much softer than the usual P-2 diapers we use," "Less disruption while changing diapers because you can change them in both supine and prone positions," "It [diaper] is versatile."

Results

Hospital NICUs continually seek to provide better outcomes for the premature infant through practices that help protect and promote sleep. As premature infants transition from the womb to the NICU and home, sleep supported by a well-performing diaper through partnership with NICU nurses can help minimize disruptions to these babies and help support better outcomes.

Support Sleep: Reversible Diaper Design & Leakage Protection Minimize Disruption

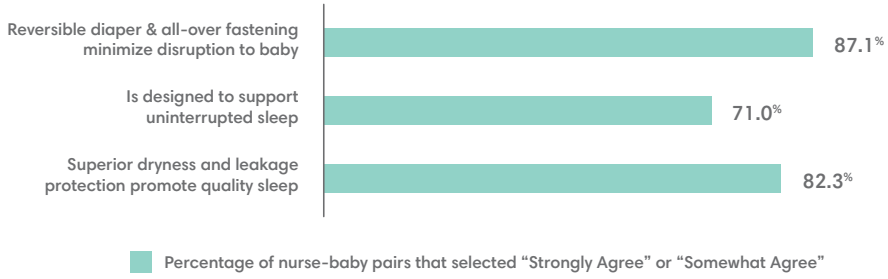
Nurses agreed that the diaper is designed to support uninterrupted sleep (71%). More than 80% of nurses surveyed agreed the reversible diaper and all-over fastening minimize disruption to baby (87%) and agreed the diaper has superior dryness and leakage protection to promote quality sleep (82%).

Support Skin Care: Pampers Improved Absorbency* and Gentle Materials Help Protect Delicate Skin

The majority of nurses surveyed agreed the diaper has soft, gentle materials (97%) and locks away urine and runny stool to protect delicate skin (82%). Compared to the current standard of care, the P2 size diaper was preferred, among those with a preference, for providing the gentlest skin protection for babies (77%).

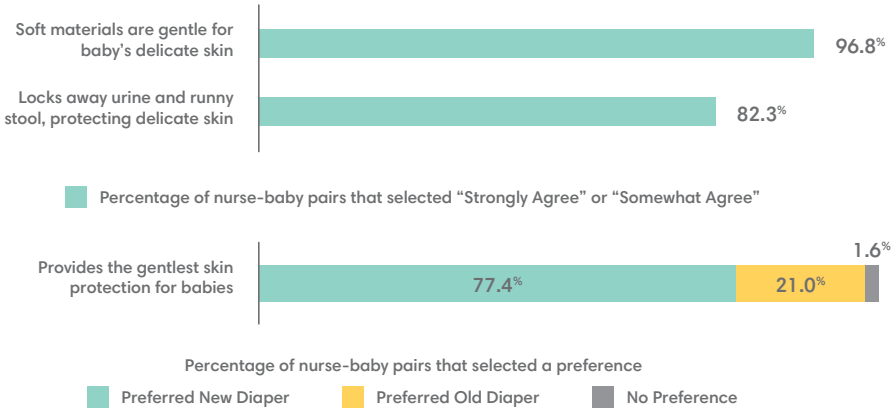
Improved Diaper Helps Support Sleep*

Nurse evaluation after use***



Improved Diaper Helps Support Skin Care

Nurse evaluation after use***



* vs. product replaced | **The survey questions used a preference scale with possible answers as "trial diaper," "usual diaper" and "no preference" | ***The survey questions used a 1-5 scale with answers ranging from "strongly disagree" to "strongly agree"

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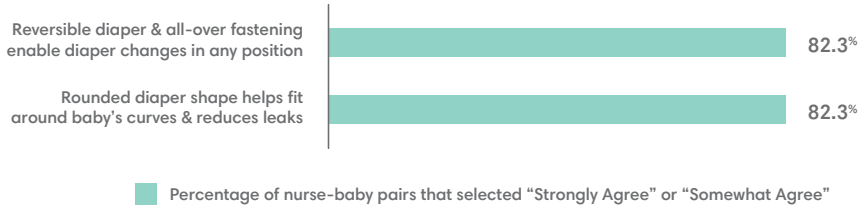
Results (Cont.)

Support Healthy Positioning: All-Over Fastening and Reattachable Tabs Support Changes in Any Position

More than 80% of nurses agreed the all-over fastening enables diaper changes in any position (82%) while the rounded shape helps fit around baby's curves and reduces leaks (82%).

Improved Diaper Helps Support Healthy Positioning*

Nurse evaluation after use***



Conclusion

The new Pampers Preemie size P2 diaper, designed and tested with nurses, helps support sleep with features to reduce sleep disruptions by improving comfort and use related to diaper performance: soft, breathable materials to help protect delicate skin, reversible diaper design with all-over fastening to change baby in any position, contoured flexible core and front-back umbilical notches to support healthy positioning and Absorb Away Liner and dual leak guards to help protect from leakage.

95% of NICU nurses said they would recommend the new diaper to other NICU nurses.

About the Survey

The in-use based survey of NICU nurses was conducted at two hospitals (Raleigh, NC, and Arlington, VA). Babies participating were male and female babies in hospital NICU units currently wearing P2 size diapers. The approximate weight range of these babies was

< 1.8kg (<4lb) and all babies were <31 weeks gestational age. The new Pampers Preemie Swaddlers size P2 was used at the discretion of the NICU nurses.

The study included n=62 nurse-baby pairs made up of 11 babies and 52 nurses. The participating infants exclusively wore up to 64 Pampers size P2 diapers. The nurses completed a survey for each baby they cared for at the end of care. During data analysis, the primary comparison was the statistical comparison between the nurses' preference for the product they would have typically used (current standard of care Pampers Swaddlers Preemie diaper, size P2) versus the new P2 diaper using a binomial test with $p<0.05$. The questionnaire data was tabulated separately for each question.

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