



COMMENT

Turns out not where but who you're with that really matters

Terrie Eleanor Inder¹*Pediatric Research* (2020) 88:533–534; <https://doi.org/10.1038/s41390-020-1040-1>

An understanding of the impact of the environment, including the new enhanced single-family room (SFR) structure, on outcomes in the preterm infant is critical. The study by van Veenendaal et al.¹ in this edition of *Pediatric Research* expands on others' work by analyzing a level II neonatal facility SFR setting and concludes that the SFR environment was associated with lower rates of late onset sepsis, mediated by the lower use of intravenous and central venous catheters. The authors hypothesized that the presence of parents, who know their infants well, may have resulted in less antibiotic treatment for symptoms and signs that were interpreted by less familiar medical caregivers as concerning for late onset sepsis. It is important to note that the definition of "sepsis" included any culture positive infant, independent of treatment, and infants treated for ≥ 7 days with antibiotics after clinical signs of concern for sepsis with negative cultures.

This study compared two epochs from 2012–2014 and 2017–2018 with 1046 infants who were predominantly level II late preterm infants (<37 weeks' gestation and hospital stay ≥ 3 days) with average gestational age of 34–35 weeks. During this time of change to SFR environment, Family Integrated Care (FICare) was also introduced with parents being present to provide most of the care for their infants. Their SFR included a full parent bed for the parent to live and sleep in the room with their infant. The major mediator of the reduction in late onset sepsis, from 9.3% in the open bay to 5.3% in the SFR, was an approximately 50% reduction in vascular lines (peripheral and central) and use of parenteral nutrition. Although the reasons for the reduction in line use remain unclear, the authors hypothesized that the presence of the parents resulted in joint decision making and avoidance of painful procedures—both leading to reduced lines and parenteral nutrition. The authors also report a trend toward higher exclusive breastfeeding at discharge and a shorter length of stay.

Although infection rates in the neonatal intensive care unit have been consistently falling over the last two decades,² this study informs us that in a less intensively sick population of infants, the SFR environment may reduce the risk of late onset sepsis. Importantly, they define that the association is mediated by invasive vascular access, which may be avoided with parental engagement. This study did not evaluate early breast milk supply in the new SFR setting, but others have noted in a similarly designed study a significant increase in the availability of human milk in the SFR environment being a key driver of SFR-associated improved neurodevelopmental outcomes.³

In contrast to the current study, a study from a typical larger neonatal intensive care unit setting in Texas, USA, found an increased rate of sepsis documented following their renovation to SFR environment in 2015. They analyzed 9995 encounters in their 90-bed unit, with a trend toward increased sepsis rates in the SFR in the moderately preterm infant (OR 1.33, 95% CI 0.7–3.3) that

reached significance in the term/post-term infant (OR 1.79, 95% CI 1.2–3.3). It was noted that the trend was reversed toward lower infection rates in the preterm infants <32 weeks.⁴ Their definition of sepsis was based on medical records alone and not as carefully curated as the current study.

Single-family room environments have been noted to have numerous advantages, including enhancing parent–infant closeness and engagement in infant care⁵ and improved parental psychological wellbeing with reductions in maternal depression and parental stress in both parents.⁶ In these studies, based in Scandinavia, parents in the SFR were present 21 h/day compared with 7 h/day previously in the open bay unit. The SFR environment has also been associated with improved neurodevelopmental outcomes following discharge, with an approximate 3-point advantage in cognitive and language scores on Bayley III at 18–24 months.³ However, in our own neonatal intensive care unit setting in St. Louis, we documented a negative impact of SFR with lower language scores (–8.3 [95% CI –2.4 to 14.2], $p = 0.006$) and a strong trend toward worsening motor scores at 24 months follow-up. We attributed this to the sensory isolation within the SFR environment if the parental presence and engagement was low.⁷ A subsequent study in the same unit in St. Louis by Dr. Pineda's team demonstrated that the average presence of parents was higher in the SFR environment at 3.6 h/day compared to 2.4 h/day in the open bay environment.⁸ Notably, mothers reported more NICU stress in the SFR environment.

A recent meta-analysis of 13 study populations ($n = 4793$) concluded that there was no clear difference between room environments in cognitive neurodevelopment on the Bayley Scales of Infant and Toddler Development-III at 18–24 months (680 infants analyzed; mean difference 1.04 [95% CI –3.45 to 5.52], $p = 0.65$; $I^2 = 42\%$). However, the authors did note a lower incidence of sepsis (4165 infants analyzed; 108,035 days in hospital [hospitalization days]; risk ratio 0.63 [95% CI 0.50–0.78], $p < 0.0001$; $I^2 = 0\%$) and higher rates of exclusive breastfeeding at discharge (484 infants analyzed; 1.31 [1.07–1.61], $p = 0.01$; $I^2 = 0\%$) in SFRs than in open bay units. No other differences in neonatal outcomes were noted. This meta-analysis combined Scandinavian, Australian, and USA studies.⁹

Differences in these studies point to a clear explanation—it is "not where but who you're with that really matters" (the lyrics from "The Best of What's Around" by the Dave Mathews Band). In the studies documenting benefit from the SFR environment, parental presence is almost universal and routinely >12 h in duration with shared decision making. The current study adds to this literature by documenting that such parental engagement may assist in both prevention of invasive vascular devices, that are associated with increased sepsis, and more informed interpretation of their infant's clinical signs to better define the risk of sepsis.

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In the current study, it is not possible to untangle the effects of the SFR from the FICare model, with both promoting the presence and engagement of the family in care decisions. It appears that it is this critical combination that renders the benefits seen in this and other studies of the SFR, predominantly reported from Scandinavia.

In contrast, the studies documenting the adverse effects from the SFR environment, typically studies in the settings of large urban NICUs within the USA, parental presence averaged <4 h/day. Although this was increased compared to the open bay environment, it appeared associated with greater NICU stress in the mothers with both greater adult and infant isolation. Thus, without a structured program of parental support and engagement with their infant and shared decision making, this modest increase in parental presence may not offset the deficit in human language exposure which appears critical during the third trimester for language development.¹⁰

In conclusion, although much effort has been focused on the room type, it appears more pertinent to ask what is happening in any space in which an infant is being cared for in the neonatal intensive care unit. This appears just as relevant for shorter lengths of stay, as shown by the current study. It is worthy of note that it is common for medical rounds or records to lack any systematic documentation or summary review of the nature of the parent's presence or engagement, other than to discuss in a socially cursory manner. The SFR encourages greater presence of the parents to be "living" with their infant, enabling a family-centered model of care, with the combination in many studies resulting in reduced sepsis, enhanced human milk production, improved parental mental health and attachment and improved infant neurodevelopmental outcomes. To achieve the presence of parents for >12 h, and ideally 24 h/day, in the setting of the USA will require firm advocacy from the neonatal community as a fundamentally important facet of care. It is no longer "nice to have" but a "necessary element of care" for optimal outcomes. The provision of paid parental leave during the time of an infant's neonatal intensive care course for both parents should be federally mandated as medically necessary, and we must fight

for our infants' right to their parent's presence. The SFR environment greatly assists parents and staff with such a model of family-centered care but it is only a facilitator of the true key—the parents.

ADDITIONAL INFORMATION

Competing interests: The author declares no competing interests.

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