object, came to mind as a fitting metaphor since it is a living thing which, under appropriate circumstances, grows into something quite mammoth. And some courageous thinkers bestowed animal life to this hypothetical seed, referring to it as an animalcule.

Thus did thinkers, from poets to physicians, think of the possibility—just the possibility—that there exists a world of invisible things; and that populating this world are microscopic creatures capable of corrupting the human body in a phenomenon called contagious disease. Two millennia ago Pliny (23 – 79 CE) wrote: “Nature is to be found in her entirety nowhere more than in her smallest creatures.”

— STANLEY M. ARONSON, MD

The Ecology of Neonatology In Rhode Island: Improving Care For Newborns

Marcia W. VanVleet, MD

In the planning and designing of new communities, housing projects, and urban renewal, the planners, both public and private, need to give explicit consideration to the kind of world that is being created for the children who will be growing up in these settings. Particular attention should be given to the opportunities which the environment presents or precludes for involvement of children with persons both older and younger than themselves.”

— Urie Bronfenbrenner

Neonatology has been making improvements in short-term outcomes since its “infancy” as a board-certified subspecialty in the 1970s. Most remarkable are the improvements in the survival of the most premature and those born at very low birth weights. However, through the articles contained in this special edition, you will realize that those in newborn medicine are now looking beyond the individual infant in its acute, critical state to the newborn’s development over time.

The “father of Head Start,” Cornell University child psychologist Urie Bronfenbrenner introduced (also in the 1970s) a theory of the ecology of human development. His theory stretched the psychologist to look beyond the individual child to the systems that support a child. His theory can be represented as a series of spheres or concentric circles expanding from the infant or individual child to those larger, like the school system and legislation. Within the representation of the theory the individual child is in the center, with the circles or systems defined as: 1) a MicrOSYSTEM with direct interactions with family, siblings, and peers, 2) an Exosystem with extended family, parent’s work environment, mass media, neighborhood and school board, and then 3) a Macrosystem with aspects of society such as the history, laws, culture, economic and social conditions. A 4th system is referred to as the Mesosystem which is the interactions or connections between Microsystems. Since the original introduction the theory has been refined to include a Chronosystem which captures the patterns of change over a person’s lifetime or sociohistorical across time (e.g. divorce in a family).2 Bronfenbrenner was in essence moving the field of human development from the traditional one-setting approach towards a child-centered approach across all settings.

Similarly, in Rhode Island we in neonatology or newborn medicine are approaching the improvement of neonatal outcomes across many settings and for longer periods of time. (Figure 1). For example, you could look at the construction of the new (Neonatal Intensive Care Unit) NICU as a direct intervention to improve the infant’s first microsystem with its family-centered approach. From here you can look at our developmental interventions with their emphasis on touch and complementary modalities as strengthening the skills of a family to meet the individual child’s needs, but also as strengthening the mesosystems relationships between medical care and the family. Teaching these care-augmenting techniques and skills brings to mind a statement by Bronfenbrenner that, “No society can long sustain itself unless its members have learned the sensitivities, motivations, and skills involved in assisting and caring for other human beings.”3

In this special edition you will see an example of how macrosystems with legislation developing the state-wide system-based approach to hearing screening can directly impact the child. You will read about our use of the latest simulation technology to improve delivery of care, to diagnosis problems areas, to establish new processes, and to train staff, before our big move. Then finally you will read how we are continuing to follow these smallest and most vulnerable newborns over the course of their childhood, as they transverse their expanding ecology, and then using this information to improve the acute care we
provide today. One aspect of our follow-up program could be seen as tracking these infants’ outcomes to see how NICU experiences translate as a chronosystem.

I am drawn to Urie Bronfenbrenner’s ideas about child development now in R.I. because of his emphasis on society’s responsibilities, and the need to invest both financially and otherwise to help children develop to their best potential. He stretched the responsibility beyond those who work directly with children to those who plan and build the places children will be (see highlighted quote). It is this responsibility that we embraced in developing and designing the new NICU and in the constant improvement in the other programs we provide for infants and their families. These are exciting times to be caring for newborns, with opportunities to build buildings to better meet the needs of children, and to build systems that better support those who care for children. But it is especially exciting to think about how the care we provide for these newborns is rapidly evolving through many improvement processes to better meet the needs of Rhode Island’s smallest and most vulnerable patients.

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Disclosure of Financial Interests

The author and spouse/significant other have no financial interests to disclose.

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