

## Patient Safety

# Editorial: Microsystems, Macrosystems, and Kernicterus

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**K**ernicterus is a devastating—although relatively uncommon—condition that occurs in newborns as a consequence of severe hyperbilirubinemia. Fortunately, kernicterus is preventable if abnormally high levels of bilirubin are detected and treated in time.

In recent years, accrediting and professional organizations have become increasingly aware of both the risk and consequence of undetected severe hyperbilirubinemia and have responded by issuing updated alerts to hospitals<sup>1</sup> and updated guidelines for health care professionals.<sup>2</sup>

Hyperbilirubinemia is most likely to manifest itself three to five days after birth, a window during which most newborns and their mothers are no longer under observation in the hospital. As a consequence, the updated alerts and guidelines call for an in-person follow-up with the newborn within the first few days following discharge from the hospital. This is a straightforward recommendation and on the surface appears quite feasible. The study by Susanne Salem-Schatz and her colleagues demonstrates that this seemingly straightforward and feasible recommendation, however, is not simple in execution.<sup>3</sup> The study's focus groups with physicians, nurses, and parents identified challenges that each group faces in following the recommendation. They all want to follow the recommendation, but the physicians and nurses experience difficulties in obtaining or communicating the information needed to effectively conduct follow-up visits and face system barriers to follow-up; the new parents struggle with the logistics of an office visit so soon after the birth. The authors have synthesized this focus group input into a helpful summary of the challenges and of the strategies that can be used to overcome them. The authors point out that it is the clinical microsystems of

care, and the macrosystems they comprise, that must be redesigned if the barriers are to be overcome.

The microsystems of care are those units of people—including the patient—and processes that deliver care at the front line, such as the pediatric unit, the physician's office, or nursing provided in the patient's home.<sup>4</sup> The macrosystems, such as the hospital, clinic, and home health organization, provide the microsystems with resources, support processes, and structure. Unfortunately, too often each microsystem within a macrosystem operates within its own silo.

An important function of the macrosystem is to help the microsystems integrate into an effective patient-centered care system. Because a patient's care may be delivered through more than one macrosystem, the macrosystems themselves must overcome the barriers of their own silos to provide patient-centered care.

Yet focusing on the microsystems and macrosystems of care brings us face-to-face with a principle of systems thinking: the goal is the output of the system as a whole rather than of each piece of the system (for example, each microsystem of a macrosystem). That means that the focus of microsystem redesign is not to maximize the function of the microsystem but rather to optimize the function of each microsystem to maximize the goal of the system as a whole. In patient-centered terms, the system goal is to eliminate kernicterus in newborns. This means that each microsystem and macrosystem process should be integrated in a way that maximizes the probability of eliminating kernicterus. As the focus group participants have made clear, this system maximization is not occurring now and will not occur in the future if each microsystem remains in its own silo.

Optimizing the function of a macrosystem requires a willingness to invest in changes to the traditional processes of each microsystem and to potentially compromise each process's and microsystem's efficiency to focus on the larger system's goal. This requires collaborative study and redesign of processes with an emphasis on handoffs and transitions among microsystems within the macrosystem, the proactive transmission of data and information among microsystems within the macrosystem, and a focus on the goal of elimination of kernicterus. The refrain should always be: How does or will this current or proposed process, within the current or proposed system, contribute to eliminating kernicterus? Both the goal and the system

context must drive the microsystem and macrosystem redesigns.

Kernicterus is devastating for the child and family. We now know how to prevent it, and this message is being disseminated widely by both professional and consumer organizations. We recognize that the changes needed are not necessarily simple or easy—but they are feasible. It is now our responsibility to act. **J**

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