Chapter 5. Future Research

In this section, we propose two prospective health service research opportunities. These proposals would help SSA evaluate the application process of VLBW disability criteria and determine the appropriateness of the criteria for identifying high-risk VLBW infants. In addition, we propose concepts to improve identification of risk factors and outcomes.

Evaluation of the Application Process of SSA VLBW Disability Criteria

This proposed research concept involves more complete reporting of regional applications of the VLBW disability criteria based on the entire VLBW population within regions. The proposed research would document baseline risk factor data on all VLBW infants born within participating regions, follow surviving VLBW infants for specified periods of time with respect to pre-specified, disabilities (1, 2, 3, 5, 10, 12 years of age), and document the proportion of VLBW who come to the attention of SSA, relative to the entire regional cohort of VLBW infants. This research proposal would accomplish several objectives:

- SSA could compare baseline characteristics of VLBW infants who do and do not come to the attention of SSA.
- SSA could assess the consistency of applying SSA VLBW Disability Criteria. This would, in turn, provide greater insight into reasons for successful programmatic implementation and impediments of applying the criteria. It would provide insight regarding the effectiveness of identifying high-risk VLBW infants.
- Provide an opportunity for SSA to standardize uniformity in assessing disabilities in this high-risk cohort at different ages.
- Identify barriers to referring infants to SSA.

Determine the Appropriateness of the New VLBW Disability Criteria Proposed by SSA Based on the Evidence of This Report.

This proposed research concept involves the evaluation of VLBW infants who do and do not meet the new disability criteria to ascertain the sensitivity, specificity, positive and negative predictive values of the new SSA disability criteria for VLBW infants. This second proposed research concept is a natural “next- step” linked to the first research concept proposed above. The combination of these two concepts affords the SSA the ability to know if the process and the criteria are achieving the objectives established by the SSA.

Proposal to Improve the Evidence of Predictors and Predictive Models

Improve Definitions of Predictors

The current literature provides evidence, which confirms that VLBW infants with or without various conditions are at increased risk for multiple long-term disabilities. Large and methodologically sound studies performed in a variety of settings have identified several risk factors (e.g. gestational age, CNS damage, ROP, BPD) that appear to have consistent and independent associations with subsequent abnormal neurodevelopmental outcome. The identified demographic and clinical factors are important, helpful, and necessary evidence, but current definitions of clinical risk factors have limitations. Each risk factor has a spectrum of severity. Three examples for possible definition refinement include 1) criteria for screening and diagnosis of cerebral WMD, 2) criteria for high-risk ROP, and 3) criteria for high-risk BPD. More specific definition of the predictors may better characterize an infant's risk for having a specific disability(ies).

In addition to refining predictor definitions, the development of a robust, well designed, and carefully validated predictive model, constructed with clinically significant factors available at the time of hospital discharge, could create a "profile" of a VLBW infant at risk for specific disabilities. Such a predictive model does not yet exist. A series of models could be developed and validated to incorporate new factors and information noted during the specified times of follow-up. The presence or absence of deficits on physical, neurological, and developmental examinations at subsequent follow-up appointments (e.g. at 6, 12, 24 months of corrected age) may significantly refine assessment of risk for sustained disabilities. Refinement of risk factors invites a systematic, collaborative effort to develop a series of predictive models using large regional cohorts of VLBW infants, followed by validation of the model in an independent group.

Identify New Predictors

Current predictors of disabilities in VLBW infants are markers of the underlying complications and morbidities. Multiple levels of risk factors exist, including demographic and clinical factors, as well as physiologic, biochemical, molecular, and genetic factors. Most of the factors beyond demographic and clinical data are not well described. Better understanding of pathogenesis and the "biochemical, molecular, and genetic" epidemiology of a disease process could provide a more comprehensive profile of the "condition(s)" that predispose to VLBW infants to certain disabilities. Current research is underway to refine our molecular and clinical understanding of the determinants of major morbidities (CNS damage, ROP, BPD) of extremely low gestational age neonates. These and other studies should refine our ability to improve criteria for infants at risk for adverse outcomes.

Feasibility of Future Research Proposals

These proposals are ambitious. The logistical issues of organizing, funding, and implementing these long-term collaborative endeavors present enormous, but achievable, challenges. The fact that large scale follow-up of VLBW infants over many years can be accomplished is reflected in the studies reviewed. Regions that have committed leadership and established neonatal programs for achieving the objectives noted above should be solicited in order to ensure the success of this endeavor.

The follow-up of VLBW infants is a major public health concern. Prospective neonatal health services research that facilitates linkage of significant risk factors with outcomes is essential to care providers in assessing care practices and to agencies providing health services. Research efforts to identify amenable determinants of premature birth, CNS damage, ROP, and BPD are in progress. Research promoting the identification and dissemination of "best care practices", as well as determinants of prematurity and its consequences should be encouraged and supported.

The VLBW child with long-term disabilities is a challenge to his/her family, teachers, physicians, and society. This challenge often stems from the complexities of the child's issues coupled with inadequate resources and support for effective assessment and intervention on a long-term basis. The standard techniques currently available to evaluate function are often not adequate to describe the extent and nature of impairment. Educational interventions will vary for children with different disabilities. Although specific educational programs exist for children with disabilities, they may not be widely accessible. The potential for a child with multiple handicaps to live independently and productively is often compromised if access to effective rehabilitation is not available or limited. For prematurely born children who sustain complications that result in neurodevelopmental and neurosensory disability, effective efforts must be made to identify these children and their specific issues/needs early in infancy. These children need recurrent reassessment of their abilities and/or disabilities over time in order to detect progression of disabilities and to provide appropriate early intervention or rehabilitation to maximize their capabilities and limit their disabilities.