

Regionalization of perinatal care in Wisconsin: A changing health care environment

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Abstract

Wisconsin has recently experienced a rapid increase in the number of neonatal intensive care units (NICUs), from 6 in the 1970s to 18 in 2003. Over the last year, the Wisconsin Association for Perinatal Care (WAPC) convened meetings in response to threats to regionalized care and worsening of perinatal outcomes, noted especially in some racial/ethnic groups. WAPC defined actions to address quality improvement, including adoption of designations for levels of care published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, definition of perinatal outcomes sensitive to quality of care, collection and analysis of outcome data, and continued statewide discussions about the status of regionalized care and outcomes. WAPC invites others to join in cooperative efforts to address quality of care and responsible utilization of resources.

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Background

In 1977 the Committee on Perinatal Health, composed of representatives from the American Academy of Family Physicians, American Academy of Pediatrics (AAP), American College of Obstetricians and Gynecologists (ACOG), American Medical Association, and the March of Dimes, published *Toward Improving the Outcome of Pregnancy*.¹

The Committee described the concept of regionalized perinatal care: "Regionalization implies the development, within a geographic area, of a coordinated, cooperative system of maternal and perinatal health care in which, by mutual agreements between hospitals and physicians and based upon population needs, the degree of complexity of maternal and perinatal care each hospital is capable of providing is identified so as to accomplish the following objectives: quality care to all pregnant women and newborns, maximal utilization of highly trained perinatal personnel and intensive care facilities, and assurance of reasonable cost effectiveness." The document identified 3 levels of perinatal care.

By the late 1970s to early 1980s regionalization was recognized as the future direction of perinatal care. Regional perinatal centers were established, and they developed formal relationships with smaller community hospitals. Arrangements

were made to transfer high-risk women antenatally, or newborn infants if they required a higher level of care. The published literature of the time demonstrated the benefits of regionalization, both domestically and internationally.

Perinatal Care in Wisconsin

The Wisconsin Association for Perinatal Care (WAPC) published *Toward Improving the Outcome of Pregnancy in Wisconsin* in 1983.² This document identified minimum capabilities for hospitals at the primary, secondary, and tertiary levels. A committee in each region was to implement planning, coordination and communication; consumer and professional education; continuity of care in managing the continuum of perinatal services; perinatal data collection; and development of hospital-based perinatal services.

In 1991 WAPC published *Directions in Perinatal Care*, which addressed public information and education, access to care, patient care guidelines, criteria for classification of hospitals, community health, and professional education and communication.³

Since publication of the first edition of *Toward Improving the Outcome of Pregnancy* there has been a rapid increase in the number of neonatal intensive care units (NICUs), in Wisconsin and nationally. In the 1970s Wisconsin had 6 perinatal centers; by 2003 that num-

ber had tripled. Twenty-five years ago there were approximately 300 neonatologists in the United States. Today there are over 3000.

Howell et al published the results of a 15-year retrospective analysis of secondary data from US metropolitan statistical areas in 2002.⁴ During the study period, 1980-1995, the number of hospitals with NICUs increased by 99%, the number of neonatal intensive care beds increased by 138%, and the number of neonatologists increased by 268%. In contrast, the increase in needed bed days was only 84%. The authors concluded that local policymakers should examine the factors that facilitate the proliferation of services, especially development of small NICUs. They added that policies to encourage cooperative efforts by hospitals should be developed, and that eliminating small NICUs would not restrict the NICU bed supply in most metropolitan statistical areas.

Neonatal Mortality— Does NICU Size Make a Difference?

A number of studies address the issue of neonatal mortality related to the size and staffing of the NICU. These studies demonstrate that increased volume is associated with improved outcomes, similar to those described in other areas of medicine, such as pediatric cardiology and adult surgical subspecialties.

Goodman, et al reported the relation between the availability of neonatal intensive care and neonatal mortality.⁵ They examined the supply of neonatologists and NICU beds in 246 neonatal intensive care regions, using linked birth and death records from the 1995 US birth cohort to assess associations between the supply of both neonatologists and neonatal intensive care beds per capita (in quintiles), and the risk of death within

the first 27 days of life. Among 3,892,208 newborns with a birth weight of 500g or greater, the mortality rate was 3.4 per 1000 births. After adjustment for neonatal and maternal characteristics associated with an increased risk of neonatal death, the rate was lower in the regions with 4.3 neonatologists per 10,000 births than in those with 2.7 neonatologists per 10,000 births. Further increases in the number of neonatologists were not associated with greater reductions in the risk of death. There was no consistent relation between the number of neonatal intensive care beds in the region and neonatal mortality. They concluded that a minority of regions in the United States may have inadequate neonatal intensive care resources, whereas many others have more resources than are needed to prevent the death of high-risk newborns.

A study from California by Gould, Marks, and Chavez was designed to investigate the effects of NICU growth on level-specific distribution of births, acuity, and neonatal mortality.⁶ The number of hospitals in California with community NICUs increased from 17 in 1990 to 52 in 1997. In this study, 4,563,900 records of infants born from 1990 to 1997 were analyzed by levels of care. The authors examined shifts in birth location and acuity. Neonatal mortality for singleton very low birth weight (VLBW, <1500g) infants without congenital abnormalities was used to assess differences in level-specific survival. They concluded that the rapid growth of monitored community NICUs supported by a regionalized system of neonatal transport represents an evolving face of regionalization, and reducing VLBW births at primary care and intermediate NICU hospitals continues to be an important goal of regionalization.

In 1996 Phibbs et al published a

report on effects of patient volume and level of care at the hospital of birth on neonatal mortality.⁷ They found that both patient volume and level of NICU care at the hospital of birth had significant effects on mortality. Compared with hospitals without a NICU, infants born in a hospital with a level III NICU with an average daily census of at least 15 patients per day had significantly lower risk-adjusted neonatal mortality. Risk-adjusted neonatal mortality for infants born in smaller level III NICUs, and in level II+ and level II NICUs, regardless of size, was not significantly different from hospitals without a NICU, and was significantly higher than hospitals with large level III NICUs. They concluded that risk-adjusted neonatal mortality was significantly lower for births that occurred in hospitals with large (average census, >15 patients per day) level III NICUs. They also concluded that concentration of high-risk deliveries in urban areas in a smaller number of hospitals that could provide level III NICU care has the potential to decrease neonatal mortality without increasing costs.

Cifuentes et al evaluated the effect on NICU level and patient volume at the hospital of birth on neonatal mortality of infants with a birth weight of <2000g.⁸ Compared with birth in a hospital with a regional NICU, risk-adjusted mortality of infants with BW <2000g was higher when birth occurred in hospitals with no NICU, an intermediate NICU, or a small (average census <15) community NICU. Risk-adjusted mortality for infants who were born in hospitals with a large (average census \geq 15) community NICU was not statistically different compared with those with a regional NICU. They concluded that the results support the recommendation that hospitals with no NICU or intermediate NICUs transfer high-risk

mothers with estimated fetal weight of <2000g to a regional NICU. Birth at a hospital with a regional NICU is associated with a lower risk-adjusted mortality than birth at a hospital with no NICU, intermediate NICU of any size, or a small community NICU. Subsequent neonatal transfer to a regional NICU only marginally decreases the disadvantage of birth at these hospitals.

Maternal Care

There is very little published material to suggest that maternal morbidity or mortality vary from one level of care to another. Broader issues related to maternal care are to reduce the overall incidence of low birth-weight (LBW, <2500g) and VLBW, and to remove barriers that may prevent women from accessing an appropriate level of care based on risk.

There is literature, however, that supports determining the appropriate level of maternal care through risk identification and consultation early in pregnancy, and reassessment throughout the pregnancy. Interventions to improve infant outcomes may require transferring women to an appropriate level of care.⁹⁻¹¹ One of the goals of obstetrical care in *Healthy People 2010* is to increase the proportion of VLBW infants born at Level III hospitals or subspecialty perinatal centers; the target is set at 90%.¹² That document states “The proportion of VLBW infants who are delivered in the level III obstetric hospitals ... should be measured to monitor the continuing effectiveness of these systems and the appropriateness of the level of care delivered to high-risk pregnant women and infants.” The “systems” referred to are perinatal regionalization strategies and protocols.

Framing Future Directions

According to Johnson and Little, with the transformation of the health care system and the emer-

gence of managed care in the past decade, there has been a resurgence of public, professional, and governmental interest in quality measurement and accountability.¹³ Regional perinatal systems have been implemented in all states with varying levels of involvement by state health agencies and the public sector.

The Committee on Perinatal Health states that since 1993 financial and marketing pressures, as well as community demands, have encouraged some hospitals to raise their perinatal care service level designation. This is done primarily with regard to patient care activities, and without attention to regional coordination concerns. This tendency conflicts with the classic concept of regional organization, in which single level III or subspecialty care centers had the sole capability to provide complex patient care and usually, but not always, assumed regional responsibilities for transport, outreach education, research, and quality improvement for a specific population or geographic area. Sometimes differing levels of perinatal care services have developed within a single hospital—usually a basic or specialty obstetric service in conjunction with a subspecialty neonatal service. This imbalance or lack of coordination of services may be a product of a growing competitive health care market and prepaid health plans with overlapping geographic areas. Such competitive forces frequently have led to the unnecessary duplication of services within a single community or geographic region, with the potential fragmentation and decreased coordination of care resulting in increased patient morbidity and mortality, as well as increased cost.

Given the weight of the evidence, it must be emphasized that inpatient perinatal health care services should be organized within individual regions or service areas

so that there is a concentration of care for the most at-risk pregnant women and their fetuses in the highest level of perinatal health care centers. The determination of the appropriate level of care to be provided by a given hospital should be guided by prevailing local health care regulations, national professional organization guidelines, and identified regional perinatal health care service needs.

Regional organization of perinatal health care services requires that there be coordination of perinatal services, professional continuing education to develop and maintain competency, and the collection of data on outcomes to evaluate both the effectiveness of delivery of perinatal health care services and the safety and efficacy of new therapies and technologies. These functions usually are best achieved when responsibility is concentrated in a center with both perinatal and neonatal subspecialty services.

WAPC's Role

WAPC organized and sponsored a series of discussions from May 2003 through April 2004 that focused on an examination of the status of regionalization of perinatal care in Wisconsin, including the effects of changes in health care practices on regionalization. WAPC was instrumental in the establishment of regional boundaries, perinatal centers, and referral patterns in Wisconsin in the 1970s. Seven perinatal regions were defined at that time. These boundaries and referral patterns are now changing as new centers are established. Five of the seven regions have multiple perinatal units; only the north central and northwest regions are currently served by a single center. There are now 19 self-designated perinatal centers serving the state.

The meetings convened by WAPC were in response to threats to

regionalized care and worsening of perinatal outcomes, especially for some racial/ethnic groups.¹⁴⁻¹⁶ Members of WAPC questioned the effect on quality of care of the increasing number of NICUs in Wisconsin, with the attendant loss of coordination of care and more care delivered in smaller units.

A number of steps were defined to address the concerns identified; actions to address quality improvement, including adoption of designations for levels of care published by the AAP and the ACOG, definition of perinatal outcomes sensitive to quality of care, collection and analysis of outcome data, and continued statewide discussions about the status of regionalized care and outcomes.

Summary

Worsening perinatal outcomes are recognized as a statewide issue, which may be related to the breakdown of regionalization that has occurred with the development of more and smaller neonatal units. The problems identified here clearly fall within the realm of WAPC's mission and expertise; WAPC is a recognized leader in defining quality standards for perinatal care. WAPC alone, however, cannot effect the needed changes. Solutions for the issues of quality control and responsible utilization of resources will require the involvement of many other partners. The input and collaboration of others is welcomed as we move forward to address these issues.

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