

**Early Hospital Discharge and First Week Follow-Up Visits for
Newborns—Pregnancy Risk Assessment Monitoring System, 2000**

Amy Lansky (1), Wanda Barfield (1), Kristen Marchi (2), Susan Egerter (2), Alison Galbraith (3), Paula Braveman (2)

- (1) Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Reproductive Health.
- (2) Department of Family and Community Medicine, University of California, San Francisco.
- (3) Robert Wood Johnson Clinical Scholars Program, University of Washington, Seattle.

Background

In the past decade, pressures to reduce hospital stays and contain costs have raised concerns that the needs of newborns are frequently not met. Among healthy singleton vaginal deliveries in California in the first half of the 1990s, the rate of hospital stays for newborns of 1 night or less was as high as 85%;¹ high rates of short stays were noted nationally at this time as well.²⁻⁵ In 1992, the American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) defined early discharge as a post-delivery stay of less than 48 hours for vaginal deliveries and less than 96 hours for cesarean sections.⁶ In 1995, the AAP recommended that newborns receive follow-up care in the office or home within 48 hours of a short stay, based on a range of clinical concerns, including the need to promote breastfeeding and to permit timely detection of severe jaundice and other conditions that might not manifest themselves during the first 1-2 days of life.⁷ Studies at single institutions around this time suggested that one-third to two-thirds of early-discharged newborns were not receiving the recommended follow-up visits,^{8,9} but population-based data were unavailable.

In response to widespread professional and public concerns about the safety of early discharge, in 1995-1997 43 states mandated that third-party insurers cover postnatal stays of at least 48 hours following vaginal delivery and 96 hours following cesarean section.¹⁰ In addition, about half of all states enacted legislation mandating the coverage of clinic or home follow-up visits for stays of less than 48 hours for vaginal deliveries or 96 hours for cesarean deliveries, in accordance with the 1995 AAP guidelines.¹² In 1996, the federal government passed the *Newborns' and Mothers' Health Protection Act (NMHPA)*, which mandated that health plans (including self-insured plans exempt from

state legislation under the Employee Retirement Income Security Act of 1974 [ERISA]) could not restrict benefits for hospital stays for the mother or newborn to less than 48 hours after vaginal delivery or less than 96 hours after cesarean delivery. The legislation allowed for an exception if the attending provider, in consultation with the mother, decided to discharge earlier.¹³ The federal legislation did not include provisions for follow-up services.

Both the widespread practice of early discharge of newborns and enactment of subsequent federal and state legislation occurred without strong evidence on either the safety of early discharge or the desirability of any particular length of stay.¹⁴⁻¹⁸ Several studies published since the federal legislation have found associations between early discharge and increased newborn morbidity,¹⁹⁻²⁵ while others have not.²⁶⁻²⁸ Many of these studies, as well as earlier ones, had methodologic limitations, including limited statistical power, lack of information on post-discharge services, and focus on a limited range of outcomes.^{25, 29-32} Findings on health promotion outcomes such as breastfeeding and immunization have been particularly inconclusive.^{14, 25, 30, 33-35}

Despite recognition that the effects of length of stay on newborn outcomes are likely to be influenced by the care received after discharge,^{36, 37} few studies of early discharge have included information on post-discharge care, and findings on the independent effects of post-discharge follow-up services are limited.^{31, 37} Receipt of routine follow-up, such as home or office visits, among early-discharged newborns has been found in some studies to be associated with decreases in newborn readmissions and urgent-care visits in comparison with early discharge without follow-up services.^{26, 38, 39}

Again, however, these studies have been limited by small samples, limited statistical power, lack of generalizability, and nonrandomized design.

Objectives

The study reported here was designed to address the lack of evidence about current utilization of postnatal services but not to assess the impact of the NMPHA legislation. We address questions highlighted by the Preliminary Report of the Secretary's Advisory Committee on Infant Mortality (SACIM) as meriting further research: "What postnatal/postpartum services (including hospital, outpatient, and home-based services) actually are being received by newborns and mothers in the United States? Are there particular groups who are not receiving the recommended postnatal/postpartum services?"¹⁰

This paper has the following main objectives:

1. To examine the extent to which newborns are discharged early and receive recommended follow-up services after early discharge.
2. To describe the characteristics of newborns who are discharged early but do not receive recommended follow-up care.
3. To examine how breastfeeding at 2 months and receipt of well-baby checkups vary by three classifications of postnatal care: later discharge, early discharge with early follow-up, and early discharge without early follow-up.

Methods

Study sample

We analyzed data from the Pregnancy Risk Assessment Monitoring System (PRAMS), a state- and population-based surveillance system of maternal behaviors and experiences before, during, and shortly after pregnancy.⁴⁰ Currently, 31 states and New York City participate in PRAMS, which collects data using a standardized methodology.⁴¹ Every month in each state, birth certificates are used to select a stratified sample of 100 to 300 new mothers to whom a questionnaire is mailed 2 to 6 months after delivery. Nonresponders receive up to two additional mailings, and mothers are contacted by telephone for an interview if a questionnaire is not returned. Survey data are linked with birth certificate information, and selected items from the birth certificate are included in the PRAMS analysis dataset. PRAMS was approved by the institutional review board (IRB) of the CDC and by state IRBs as required locally.

The focus of this report is on state-specific data, capitalizing on the strength and uniqueness of PRAMS in providing state-based prevalence estimates. The descriptive analyses we present are based on data collected from surveyed mothers about their infants from the 19 states that participated in PRAMS during 2000 and achieved response rates of 70% or higher: Alabama, Alaska, Arkansas, Colorado, Florida, Hawaii, Illinois, Louisiana, Maine, Nebraska, New Mexico, New York (excluding New York City), North Carolina, Ohio, Oklahoma, South Carolina, Utah, Washington, and West Virginia. Data were weighted to represent the demographic characteristics of women with live births during 2000 in each state; weights were calculated to adjust for the survey design, noncoverage, and nonresponse.

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Because the AAP guidelines on early discharge and follow-up focus on healthy, term newborns, we restricted the samples in each state to singleton infants with birth weight ≥ 2500 g and gestational age ≥ 37 weeks. We also excluded infants whose lengths of stay were more than 3 days after vaginal delivery or more than 5 days after cesarean delivery, as infants with longer stays are likely to be kept in the hospital for problems or complications. We also excluded infants with nonhospital births, those who had died, and those not living with the sampled mother at the time of the survey. Applying these criteria, the proportion of newborns excluded from the sample ranged from 19% in Nebraska and Washington to 73% in South Carolina; the relatively high proportion of exclusions reflects oversampling of low-birth-weight births in most PRAMS states. Final sample sizes for this study ranged from 450 in South Carolina to 1,966 in Hawaii.

Variables

Measures of postnatal health services

- *Timing of discharge from the delivery hospital (length of hospital stay).* Using information from the PRAMS question on length of stay (possible responses of less than 24 hours, 24 – 48 hours, and 3, 4, 5, or 6 days or more), we approximated the definition of "early discharge" included in AAP guidelines by defining it as a length of stay of less than 24 hours or 24 - 48 hours after vaginal birth and up to and including 4 days after cesarean birth.
- *Early post-discharge follow-up visit.* The AAP guidelines recommend that infants receive home or office follow-up within 48 hours of early discharge, but timing of post-discharge follow-up could not be specified this precisely using PRAMS data.

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Based on responses to the PRAMS question, “Was your baby seen by a doctor, nurse, or other health care provider in the first week after he or she left the hospital?” we classified infants seen during the first week after discharge as having had early follow-up visit. We recognize that this method of categorization was likely to have led to overestimation of the proportion of infants who received recommended early follow-up (i.e., within 48 hours) after early discharge and underestimation of the proportion who did not. Those who reported a follow-up visit were asked if the baby was seen at home or at a health care facility (specified as a doctor’s office, clinic, or other health care facility).

- *Postnatal care group.* Using information on the timing of discharge and the early follow-up visit, we created three postnatal care groups: infants who were not discharged early ("Later Discharge"), those discharged early with early follow-up ("Early Follow-up"), and those discharged early without early follow-up ("No Early Follow-up").

Maternal characteristics

Several variables were examined in association with early discharge and follow-up. Here we describe the measurement of three (income, insurance status, and maternal race/ethnicity).

- *Income.* Information on income is ascertained differently by different states. We measured income as a percent of the federal poverty level (FPL) in two different ways, depending on the state; in each case, 1999 federal poverty limits were used, because surveys asked about the time period before the baby’s birth. For the three

states in which the respondent was asked an open-ended question about her family income, income was calculated as a percent of the federal poverty level (FPL) according to published charts of the federal poverty cutoffs by family size. Income was not included in the Alabama survey. In the remaining states, the respondent was asked to select her income from a series of categories. We recalculated income as a percent of FPL as follows: (1) we calculated a midpoint for each category; because the highest categories were open ended (e.g., "\$40,000 or more"), the midpoints for these upper income categories were determined using Census 2000 income estimates for each state. (2) After adjusting for family size, we grouped incomes in three categories-- 0 - 100% FPL, 101 - 200% FPL, and 201% FPL or higher. Income was not studied for West Virginia, which used income categories that were too limited for the calculations.

- *Insurance status* was defined by responses to the question "How was your delivery paid for?" Respondents could check one or more of the following: Medicaid, personal income, private insurance (health insurance or HMO), or other, with some states including additional options for local coverage programs (e.g., Indian Health Service, military coverage). To classify each respondent in a single insurance category, we recoded this information hierarchically in four categories--Medicaid, private insurance/HMO, other payer, and uninsured (i.e., personal income only). In some states, small cell sizes (<30) limited analyses to Medicaid and private insurance/HMO.
- *Maternal race and ethnicity.* Race was categorized as White, Black, and other. Small sample sizes precluded more detailed analyses by racial category; in some

states, comparisons were limited to White and Black only, or White and other only. Similarly, several states had too few women who identified as Hispanic or who completed the questionnaire in Spanish to consider these variables in the analyses.

Postnatal outcomes

We examined differences in a) breastfeeding at 2 months and b) well-baby checkups by postnatal care group:

- *Breastfeeding at 2 months* was defined as the proportion of all infants whose mothers had breastfed for at least 2 months (infants considered not breastfeeding at 2 months included those whose mothers had either never initiated breastfeeding or had initiated breastfeeding but discontinued before 2 months).
- *Receipt of at least one well-baby checkup* was defined as one or more well-baby visits by the time of the survey. The survey did not distinguish whether a follow-up visit in the week after discharge was to be included or excluded in the number of well-baby visits the mother reported.

Statistical analyses

Data for each state were analyzed separately, and all analyses were performed using SUDAAN software⁴² to account for the sampling design. We first calculated the overall prevalence in each state of (a) early discharge, (b) follow-up within 1 week for infants discharged early, and (c) office-based follow-up among infants with early follow-up. We also noted for each state whether it had passed legislation related to length of hospital stay and early follow-up after early discharge (Table 1). To examine whether

particular subsets of newborns were less likely to receive recommended postpartum care, we estimated prevalence and corresponding unadjusted odds ratios (making comparisons with reference groups considered *a priori* to be at greatest advantage or least vulnerable) for early discharge and for lack of early follow-up after early discharge by selected maternal characteristics (Tables 2a-2s). Sample sizes in many states were too small to conduct meaningful multivariate analyses, and thus this report is limited to unadjusted odds ratios. We also calculated the prevalence in each state of (a) breastfeeding at 2 months and (b) receipt of at least one well-baby checkup by the time the survey was completed, by postnatal care group (Table 3).

Results

Early discharge, early follow-up, and office visit as early follow-up, by state

The prevalence during 2000 of early discharge, of early follow-up after early discharge, and of office-based visits for those with early follow-up is shown for each of the 19 PRAMS states in Table 1, along with summary information on length-of-stay legislation.

- In the three states that did not enact relevant length-of-stay legislation (Hawaii, New Mexico, and Utah), the prevalence of early discharge ranged from 87.1% to 93.1%. Although at least three-quarters of early-discharged infants received early follow-up in Hawaii and New Mexico, only about half of these infants in Utah received early follow-up. Thus, Utah had one of the highest rates of early discharge coupled with the lowest rate of early follow-up.

- Among the nine states that enacted length-of-stay legislation without early follow-up provisions (Alabama, Alaska, Arkansas, Colorado, Louisiana, Maine, Oklahoma, South Carolina, and West Virginia), the prevalence of early discharge ranged from 83.5% to 92.3%, and the prevalence of early follow-up ranged from 64.3% to 88.5%. In seven of the nine states, a quarter or more of early-discharged newborns received no early follow-up.
- In the seven states with legislation including follow-up provisions (Florida, Illinois, Nebraska, New York, North Carolina, Ohio, and Washington), rates of early discharge ranged from 84.8% to 93.4%, with rates of early follow-up ranging from 75.1% to 86.8%.
- Most early follow-up visits (more than 70% in every state, and over 90% in 11 states) took place in the office setting, even in the two states with legislation that specified the provision of home follow-up, New Mexico and New York.

Characteristics related to postnatal services

When we examined how the prevalence of (a) being discharged early and (b) receiving *no* follow-up visit within 1 week of early discharge varied by mothers' characteristics (Tables 2a – 2s), we found the following:

- When timing of discharge varied by the characteristics we studied, in general women in less advantaged/more vulnerable groups were *least likely* to be discharged early. In states where differences were observed, we consistently found that the prevalence of early discharge was significantly lower for infants of mothers who were teenagers, nonWhite, not married, not a high school graduate, living in poverty, living in

crowded housing, multiparous, covered by Medicaid for their deliveries, or had not received first-trimester prenatal care. When differences by mode of delivery were seen, infants with cesarean births were more likely to be discharged early.

- Patterns with respect to early follow-up after early discharge were less clear. In most states, few differences in receipt of early follow-up were seen by mothers' characteristics; when differences were observed, they were less consistent across states than those seen for timing of discharge. Significant differences by education were seen in six states; in five of them (Colorado, Florida, New Mexico, North Carolina, and Oklahoma), infants of women with less education were less likely to receive follow-up within 1 week of early discharge, with the opposite finding in West Virginia. Significant differences by income were seen in nine states; the prevalence of early follow-up among infants from lower-income families was lower in seven of those states (Alaska, Colorado, Florida, Hawaii, Illinois, Louisiana, and New York) and higher in Nebraska and South Carolina. Significant differences by delivery coverage were apparent in nine states; in four of those states (Alabama, Hawaii, Nebraska, and South Carolina), Medicaid coverage was associated with higher rates of early follow-up, with the opposite finding in the remaining five states (Alaska, Colorado, Florida, Illinois, and New Mexico).

Postnatal Outcomes

Breastfeeding at 2 months of age

- Dramatic differences were seen across the states in the prevalence of breastfeeding at 2 months (Table 3). In nine of the 19 states (Alabama,

Arkansas, Louisiana, Nebraska, North Carolina, Ohio, Oklahoma, South Carolina, and West Virginia), fewer than half of infants in each postnatal care group were being breastfed at 2 months, but in Hawaii the rates were 66%-71% and in Washington they ranged from 65% to 70%.

- Within each state, the prevalence of breastfeeding at 2 months were similar across the three postnatal care groups we considered.

Well-baby checkups

- Most infants had received at least one well-baby visit by the time of the survey; the percentages of infants with no well-baby checkups ranged from 0% to 6.4% across states and postnatal care groups. We again found no clear differences in receipt of well-baby checkups by postnatal care group.

Discussion

This study analyzed population-based data from PRAMS, a surveillance system with high response rates and minimal selection and response biases,⁴³ to examine the early postnatal health care received by healthy, term newborns in 19 states during 2000. PRAMS offers a unique source of information on timing of discharge and follow-up visits as well as other behavioral and demographic characteristics of mothers and infants. The standardized protocol also allows for comparisons across states.

Several limitations of this work should be noted. The implications of not receiving recommended early postnatal care may differ depending on why babies are not seen during the first week after early discharge; PRAMS includes information only on

whether follow-up care was received, with no information on clinicians' recommendations, parents' perceptions, or barriers to care. There may be some misclassification in well-baby care, as the follow-up visit may have been counted as a well-baby visit. In addition, the results presented here are based on unadjusted analyses, making it difficult to draw conclusive inferences about the relative importance of different characteristics related to early postnatal care. Finally, small numbers limited statistical power for some analyses in some states, as noted in the tables, and precluded state-specific multivariate analyses.

These limitations notwithstanding, the results presented here provide answers to important questions posed in the 2001 SACIM report to Congress. Four years after implementation of the *NMHPA*, early discharge was highly prevalent in the 19 PRAMS states we studied regardless of whether state length-of-stay legislation had been implemented. On the other hand, in every state, the majority of infants discharged early received an early follow-up visit. The highest percentages of infants without early follow-up after early discharge were seen in states without state legislation mandating coverage of such care. Even so, the extent to which state legislation played a role in the differences in early discharge and follow-up cannot be assessed in this study; such an assessment would require comparison data over time and an experimental study design.

In more than half of the 19 states, the likelihood of early discharge was greater for infants of mothers who had one or more of the following maternal characteristics: older age, white race, primiparity, married status, 16 or more years of schooling, income >200% of the federal poverty limit, receipt of early prenatal care, and coverage by private health insurance; early discharge was also more likely after cesarean delivery. In some

states, low maternal education and low income also were associated with lack of a follow-up visit within 1 week of early discharge. Although in more than half the 19 states infants covered by Medicaid were less likely to be discharged early, those who were discharged early were more likely to receive early follow-up in some states and less likely to receive such visits in other states. When we looked at breastfeeding at 2 months, variation across states was evident but differences by type of early postnatal services received were less clear. Most babies in the study had received well-baby checkups by the time of the survey.

An earlier study in California also examined early postnatal care using population-based data.⁴⁴ In findings based on 1999 data from the Maternal and Infant Health Assessment (MIHA; California's population-based postpartum survey, modeled on PRAMS), the reported prevalence for early discharge was 49.4%, much lower than the rates reported here. These differences may reflect truly lower rates of early discharge in California, but they are also likely to reflect the fact that length of stay was categorized in MIHA using nights of stay rather than hours or days; recalculating the percentage of early-discharge infants assuming that an additional half of those who stayed 2 nights had stays under 48 hours suggests that the actual prevalence might have been as high as 67% in California in 1999. We should note that the true prevalence of early follow-up after early discharge is most likely to have been overestimated using PRAMS data, because the 1-week time period for early follow-up visits measured in PRAMS is much longer than the recommended time (within 48 hours of discharge) included in professional guidelines and state laws. Recall of early follow-up using the broader definition is likely to be more accurate at 2 to 6 months postpartum, however. Based on MIHA data, the prevalence of

early follow-up after early discharge in California was 32.5% using the criterion of a visit within 48 hours of discharge and 56.2% using the 1-week criterion; the latter estimate falls in the lower range of estimates for the 19 PRAMS states.

The health effects of early discharge remain controversial. Recent reviews of the literature continue to find evidence is inadequate for making scientific recommendations regarding this practice.⁴⁵ Clinical guidelines emphasize that decisions about early discharge should be made on an individual basis, accounting for the health and social conditions of the mother and newborn and the guidelines continue to recommend a follow-up visit within 48 hours of early discharge.⁴⁶ Using the broader 1-week window for early follow-up, we found that most newborns discharged within about 2 days of delivery did receive follow-up visits. In several states, however, infants of Medicaid recipients and lower-income women were less likely to receive early follow-up after early discharge. In addition, the lack of provisions for early follow-up in the *NMHPA* and in most state early-discharge laws may have a disproportionately negative effect on the most vulnerable infants. On the other hand, infants of mothers in less-advantaged groups appear in many states to be less likely to be discharged early, suggesting that discharge decisions may have taken their increased vulnerability into account. Extra effort may be needed to ensure that infants of women with lower incomes or who are insured by Medicaid receive appropriate early postnatal care.

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