

Maternal Postpartum Health Care Utilization and the Effect of Minnesota Early Discharge Legislation

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Purpose: To describe maternal postdischarge follow-up and health care utilization in the context of Minnesota's early discharge legislation, which mandates coverage for a home visit for a mother and baby who voluntarily leave the hospital early.

Methods: Claims data from a large managed care organization were used to identify 22,944 women giving birth from January 1995 through February 1999. Study variables included home or clinic visits within 1 week of discharge (early follow-up), readmissions within 1 month of discharge, and urgent care or emergency department visits within 2 months of discharge.

Results: After enactment of Minnesota's legislation, the percentage of mothers with short stays decreased from 52% to 16% for vaginal births and from 87% to 63% for cesarean births ($P = .001$). Overall, 33% of mothers with vaginal births and 40% with cesarean births had early home or clinic follow-up ($P = .001$). Mothers who stayed 0 or 1 hospital days after vaginal births were more likely to have early follow-up than those with longer stays (37% vs 32%, $P = .01$). However, mothers who stayed 2 or 3 days after cesarean birth were no more likely to have early follow-up than mothers who stayed 4 or more days (39% vs 42%, $P = .08$). Rates of early follow-up were significantly higher after enactment of Minnesota's legislation, regardless of length of stay.

Conclusions: Implementation of Minnesota's early discharge legislation corresponded with significantly increased lengths of stay and an increase in the percentage of mothers who received early follow-up visits. However the majority of mothers with short stays continued to lack early follow-up. (J Am Board Fam Pract 2005;18:307–11.)

Childbirth is the most frequent reason for hospital admission.¹ The length of stay after childbirth decreased steadily from 1970 to 1995. Initially the shorter stays were in response to attempts to "de-medicalize" childbirth. However, hospital stays became even shorter when insurers began limiting their postpartum coverage in an attempt to contain costs.¹ Concerns raised about the safety of early discharge led to recommendations from medical societies and ultimately to legislation. The federal Newborns' and Mothers' Health Protection Act, enacted in September 1996, requires health insurance plans to provide coverage for minimum hos-

pital stays of 48 hours for new mothers and their babies after normal vaginal deliveries and of 96 hours after cesarean births. Although the federal legislation does not include any postdischarge care requirements for women who choose to be discharged early, state laws regarding postdischarge care vary considerably.² Minnesota legislation enacted in March 1996 requires coverage for at least one home visit by a registered nurse for a mother and baby who voluntarily leave the hospital before completing the minimum mandated stay and specifies that the visit must occur within 4 days of the date of discharge. The American College of Obstetrics and Gynecology³ and the Secretary of Health and Human Services Advisory Committee on Infant Mortality have different recommendations for postpartum follow-up.¹ However, the current medical literature provides little scientific evidence to guide discharge planning for most apparently well mothers.⁴

The Advisory Committee report recommends research to examine the following questions. What

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postpartum services (including hospital, outpatient, and home-based services) mothers in the United States are actually receiving? What have been the effects of maternity length of stay legislation?¹ We previously used claims data from a large managed care organization in Minnesota to report on the postnatal services, including home health nurse visits, received by the infants in that organization and how they were affected by the state's early discharge legislation.⁵ In this report, we use the same claims data to report on the postpartum services received by those infants' mothers. We also examine whether the use of postpartum services influence the women's subsequent use of health care.

Methods

HealthPartners is a managed care organization that provides health care services and coverage in Minnesota to more than 650,000 members, 30% of whom receive care in staff model clinics and 70% at contracted clinics. The study population was identified using HealthPartners claims data and consisted of mothers giving birth from January 1995 through February 1999. A mother was excluded if she gave birth to a premature infant, had a multiple gestation, was not discharged on the same day as her infant, was not continuously enrolled in HealthPartners for 3 months after discharge, or had a postpartum length of stay greater than 25 days. We also excluded 3 additional mothers who according to the claims data had a cesarean birth and a length of stay of zero or one. A total of 22,944 mothers met the inclusion criteria. The study was approved by the HealthPartners Institutional Review Board.

Length of stay was defined as the date of discharge minus the date of delivery. For example, a mother discharged the day after delivery had a length of stay of 1. Although the Minnesota and federal early discharge legislation refer to length of stay in hours, data on actual time of birth and discharge were not available. Because lengths of stay of 0 and 1 are clearly less than 48 hours and lengths of stay of ≤ 3 days are clearly less than 96 hours, these were considered to be *short hospital stays*, as defined by the legislation, for mothers with vaginal and cesarean births, respectively.

Early follow-up was defined as any home or office-based services received by mothers within 1 week of discharge. All home visits were counted as

a home-based service for the mother, regardless of who was billed.

Measures of *subsequent health care utilization* included clinic visits (other than an early follow-up visit) and urgent care or emergency department visits within 2 months and hospital readmissions within 1 month of initial discharge.

Control variables included before and after enactment of the state legislation in March 1996, delivery mode (vaginal vs cesarean), maternal age (measured in years), and seasonality (a dichotomous variable, with winter births defined as those occurring from October through April).

Analysis Plan

Frequencies and χ^2 statistics were used to compare length of hospital stay, overall and by delivery mode, before and after enactment of the Minnesota length of stay legislation. Similar tests were performed to analyze differences in receipt of early follow-up by length of stay and by mode of delivery before and after the legislation. Using logistic regression, we examined differences in the proportions of mothers who had (1) an urgent care or emergency department visit within 2 months of discharge, and (2) were readmitted within 1 month of discharge. Predictor variables in these analyses included type of delivery (vaginal vs cesarean), length of stay, receipt of early follow-up (any vs none), and maternal age (in years), and variables were kept in the regression models if they were statistically significant at $\alpha = 0.05$. Analyses were performed using SAS 6.12.

Results

Characteristics of the Sample

Of the 22,944 mothers who met the inclusion criteria, 85% gave birth vaginally and 15% had cesarean births. Nearly one third (30%) gave birth before the enactment of Minnesota's maternity length of stay legislation in March 1996. Less than 2% had Medicaid or state health insurance for the poor; 98.7% were covered by HealthPartners. Maternal age ranged from 15 to 52 years, with a mean age of 30 years. As we have reported previously,⁵ after enactment of Minnesota's legislation, the percentage of newborns and mothers with short stays decreased from 52% to 16% for vaginal births and from 87% to 63% for cesarean births. ($P = .001$).

Early Postpartum Services

Overall, 33% of mothers in the study sample with vaginal births and 40% with cesarean births had early home or clinic follow-up visits ($P = .001$). As seen in Table 1, mothers with short stays after vaginal birth were more likely to have early follow-up than those with longer stays (37% vs 32%, $P = .01$). Mothers with short stays after cesarean birth were no more likely to have early follow-up than mothers with longer stays (39% vs 42%, $P = .08$). Comparing the periods before and after enactment of the Minnesota length of stay law, the prevalence of early follow-up visits increased significantly after enactment; this increase was seen in each length of stay and delivery group.

Subsequent Use of Health Services

Use of clinic visits from days 8 to 60 (excluding early clinic visits in the first week after discharge) seemed to depend primarily on mode of delivery. Among mothers with vaginal births, clinic visits seemed to cluster around the traditional 6-week postpartum visit, whether or not mothers had early follow-up. In the 2 months after discharge, 14% of mothers had no clinic visits; 50% had one clinic visit and 27% had 2 visits. Mothers who had cesarean births were more likely to have clinic visits at the time of both the traditional 2-week wound check and the 6-week postpartum visit, whether or not early follow-up occurred. Within 2 months of discharge, 11% had no clinic visits, 35% had one visit, and 30% had 2 visits. Regardless of delivery mode, mothers with shorter lengths of stay had significantly fewer clinic visits ($P = .001$).

Overall, 710 (3%) mothers had urgent care or emergency department visits within 2 months of discharge. Urgent care or emergency department

visits were more likely after cesarean births than after vaginal births (3.9% vs 3.0%, $P = .002$). Mothers with longer hospital stays were more likely to have urgent care or emergency department visits than mothers with short stays (adjusted OR, 1.08; 95% CI, 1.03 to 1.13). Compared with mothers without early follow-up, those seen in the first week were twice as likely to have urgent care or emergency department visits (adjusted OR, 2.19; 95% CI, 1.87 to 2.55).

Overall, 140 (0.6%) mothers were readmitted within 1 month of initial discharge. Mothers with cesarean births were more likely to be readmitted than mothers with vaginal births (0.9% vs 0.6%, $P = .016$). The most common principal diagnoses at readmission were puerperal infections (18.6% for mothers with vaginal births and 31.2% for those with cesarean births) and postpartum hemorrhage (4% in each delivery mode group). As shown in Table 2, the odds of readmission were slightly higher among mothers with longer lengths of stay (adjusted OR, 1.11; 95% CI, 1.01 to 1.22) and dramatically higher among mothers with early follow-up (adjusted OR, 3.71; 95% CI, 2.61 to 5.26), adjusting for other factors.

Discussion

Given the lack of conclusive evidence to guide the early postpartum care provided to mothers,⁶ discrepancies in professional and legislative guidelines^{1,3} are not surprising. Although the federal length of stay legislation does not include requirements for follow-up care after early discharge, most states with length of stay legislation, including Minnesota, do specify that insurers cover early follow-up after short stays.⁷ Although the Minnesota

Table 1. Percentage of Mothers Receiving an Early Follow-up Visit Relative to the Minnesota Length of Stay Legislation*

Length of Stay	Vaginal Birth			Cesarean Birth		
	Entire Study Period	Before Legislation	After Legislation	Entire Study Period	Before Legislation	After Legislation
Short Stay	1902/5081 (37%)	1034/2922 (35%)	868/2159 [†] (40%)	934/2391 (39%)	248/864 (29%)	686/1527 [†] (45%)
Longer Stay	4609/14432 [§] (32%)	448/2713 (17%)	4161/11723 [†] (35%)	438/1036 (42%)	43/126 (34%)	395/910 [‡] (43%)

* An early follow-up visit was a home or clinic visit within 1 week of discharge; a short stay was 0 to 1 day after vaginal birth and 2 to 3 days after cesarean birth.

[†] $P < .001$, compared with proportion observed before legislation.

[‡] $P = .05$, compared with proportion observed before legislation.

[§] $P < .001$, compared with proportion of women with vaginal births and short stays.

Table 2. Associations of Postpartum Length of Stay and Early Follow-up with Selected Maternal Outcomes*

Predictor	One or More Urgent Care or Emergent Care Visits within 2 Months of Discharge Adjusted OR (95% CI)	One or More Readmissions within 1 Month of Discharge Adjusted OR (95% CI)
Length of stay in days	1.08 (1.03 to 1.13)	1.11 (1.01 to 1.22)
Early follow-up [†] (any vs none)	2.19 (1.87 to 2.55)	3.71 (2.61 to 5.26)

* Models included length of stay, early follow-up, and maternal age (data not shown).

[†] Early follow-up defined as a home or clinic visit within 1 week of discharge.

legislation mandates coverage of at least one home health nurse visit within 4 days of early discharge, we found that such home visits were received by only 12.4% of mother-infant pairs discharged early.⁵

Enactment of the law in Minnesota did correspond with an increase in early follow-up visits, although the increase was not limited to mothers with short hospital stays or to visits in the home setting. The prevalence of home visits increased for all mothers. Mothers with longer stays, for whom coverage was not mandated, were as likely to receive home visits as those discharged early.⁵ In this study, 33% of mothers with vaginal births and 40% of mothers with cesarean births had follow-up visits in the home or clinic setting within the first week of discharge, and the prevalence of follow-up in both settings was higher after the legislation was passed. Although we did find that mothers with vaginal births were more likely to have early follow-up if they were discharged early, the likelihood of early follow-up after cesarean birth did not vary by length of stay.

A previous study of a nationally representative sample of 9953 women found that 15% of respondents had not made a postpartum visit within 6 months after delivery in 1988.⁸ Our findings of 14% of mothers with vaginal births and 11% of mothers with cesarean births having no clinic visits during the 2 months after discharge (excluding visits in the first week after discharge) add to the meager knowledge of postpartum visit utilization.

Several research studies have focused on the relationship between selected maternal outcomes and length of postpartum hospital stay, with conflicting results.⁹⁻¹⁶ Most of these studies did not control for the receipt of postdischarge services. In this study, both length of stay and early follow-up were related to mothers' subsequent use of health services, with higher prevalences both of urgent care and emergency department visits and of readmissions seen among women with longer hospital

stays and among those who had home or clinic visits in the first week. In our study of the infants of these mothers, we found that infants who had early follow-up visits were more likely to have complete immunizations by age 3 months (adjusted OR, 1.09; 95% CI, 1.03 to 1.14).⁵

Our study has several limitations. It cannot determine whether the changes we noted were caused by the legislation rather than temporally associated with it. The generalizability of the results may be limited to mothers with insurance other than Medicaid. Claims data have inherent limitations, because it is designed for billing rather than research purposes.

In summary, the Minnesota length of stay legislation in 1996 corresponded to significant changes in timing of postpartum discharge and in receipt of early follow-up visits. After enactment of the law, more mothers had follow-up within 1 week of discharge regardless of their length of stay. Mothers who had longer initial length of stay or received early visits were more likely to have urgent care or emergency department visits and readmissions. This pattern of findings is not consistent with strict adherence to professional and legislative guidelines, in that the majority of mothers with short stays continued to lack early follow-up. We lacked additional information about other characteristics (parity, breastfeeding status, underlying medical or social complications that may have influenced receipt of care) among the women in this study, making it difficult to definitely interpret these results. These results support the conclusion, however, that many clinicians have learned to work within the current legislative context—making appropriate decisions about hospital discharge and postdischarge follow-up care to ensure that mothers who should be monitored more closely during the postpartum period are also more likely to receive additional services.

This study helps provide answers to some of the questions raised by the Secretary of Health and Human Services Advisory Committee on Infant Mortality. The Committee's major recommendation is to focus now on the postnatal and postpartum services needed for the optimal health of newborns and mothers. The focus should shift from "early discharge" to "appropriate discharge."¹ Because family physicians are the only physicians who provide care for both mothers and their infants, we can contribute unique insights to this area of research.

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References

- Eaton AP. Early postpartum discharge: recommendations from a preliminary report to Congress. *Pediatrics* 2001;107:400–4.
- Thilo EH, Townsend SF, Merenstein GB. The history of policy and practice related to the perinatal hospital stay. *Clin Perinatol* 1998;25:257–70.
- Guidelines for perinatal care. 4th ed. Elk Grove Village (IL): American Academy of Pediatrics; Washington DC: American College of Obstetricians and Gynecologists; 1997.
- Braveman P, Egerter S, Pearl M, Marchi K, Miller C. Early discharge of newborns and mothers: a critical review of the literature. *Pediatrics* 1995;96:716–26.
- Madlon-Kay DJ, DeFor TA, Egerter S. Newborn length of stay, health care utilization, and the effect of Minnesota legislation. *Arch Pediatr Adolesc Med* 2003;157:579–83.
- Braveman P, Miller C, Egerter S, et al. Health service use among low-risk newborns after early discharge with and without nurse home visiting. *J Am Board Fam Pract* 1996;9:254–60.
- Egerter SA, Braveman PA, Marchi KS. Follow-up of newborns and their mothers after early hospital discharge. *Clin Perinatol* 1998;25:471–81.
- Lu MC, Prentice J. The postpartum visit: risk factors for nonuse and association with breast-feeding. *Am J Obstet Gynecol* 2002;187:1329–36.
- Gazmararian JA, Koplan JP, Cogswell ME, Bailey CM, Davis NA, Cutler CM. Maternity experiences in a managed care organization. *Health Aff (Millwood)* 1997;16:198–208.
- Grullon K, Grimes D. The safety of early postpartum discharge: a review and critique. *Obstet Gynecol* 1997;90:860–5.
- Klingner J, Solberg L, Knudson-Schumacher S, Carlson R, Huss K. How satisfied are mothers with 1-day hospital stays for routine delivery? *Eff Clin Pract* 1999;2:253–7.
- Liu S, Heaman M, Kramer MS, Demissie K, Wen SW, Marcous S. Length of hospital stay, obstetric conditions at childbirth, and maternal readmission: a population-based cohort study. *Am J Obstet Gynecol* 2002;187:681–7.
- Meikle SF, Lyons E, Hulac P, Orleans M. Rehospitalizations and outpatient contacts of mothers and neonates after hospital discharge after vaginal delivery. *Am J Obstet Gynecol* 1998;179:166–71.
- Mandl KD, Homer CJ, Harary O, Finkelstein JA. Effect of a reduced postpartum length of stay program on primary care services use by mothers and infants. *Pediatrics* 2000;106:937–41.
- Mandl KD, Brennan TA, Wise PH, Tronick EZ, Homer CJ. Maternal and infant health. Effects of moderate reductions in postpartum length of stay. *Arch Pediatr Adolesc Med* 1997;151:915–21.
- Mosen DM, Clark SL, Mundorff MB, Tracy DM, McKnight EC, Zollo MB. The medical and economic impact of the Newborns' and Mothers' Health Protection Act. *Obstet Gynecol* 2002;99:116–24.