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## **5. Length of Stay and Outcome: Obstetrics**

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Discussions of length of stay (LOS) in the obstetrical literature have centered around two different patient groups: patients with normal deliveries and patients with low birth weight infants. The discussion here will focus on U.S. studies of these problems. Although there has been some work done in Great Britain on normal deliveries (1,160,172), the long tradition of home births makes their experience very different from that of the United States and of only slight relevance. Some work has also been reported from developing countries (162, 164), including a randomized clinical trial (RCT) from India (16). Major differences in maternal risk factors, prevalence of infectious diseases, and infant mortality rates between the United States and these areas make it impossible to generalize from this work to U.S. populations. As already discussed in other chapters, this case study does not deal with places of care outside the acute care hospital. Thus, a discussion of birth settings outside the hospital is beyond the scope of the present analysis. A review of the literature on the safety of different birth locations has recently been published (88).

Following World War II, rising birth rates rapidly led to shortages of maternity beds in U.S. hospitals, where the vast majority of birth takes place. This situation forced obstetrical departments to reduce lengths of stay for postpartum patients. One study appeared in 1962 that described this phenomenon. Hellman and Kohl (77) describe a study that compared outcomes among all patients discharged within 72 hours of a normal delivery with a random sample of all other maternity patients. They found no difference in the incidence of complications among either mothers or infants discharged early, as measured by subsequent development of illness in the infants when seen as outpatients, by readmission rates, and by mortality rates. More of the short-stay mothers were dissatisfied (7.7 percent) with their LOS than were those mothers who stayed longer (1.8 percent). The authors concluded that while they did not document any risks to early discharge, the risk of neonatal jaundice developing

at home within the first week of life was significant and warranted home visits by a nurse during that time. The operation of such a program has also been reported (40).

This study has all of the problems of studies failing to employ random allocation procedures to select control groups. There is a clear potential bias in this study for the control group to be significantly sicker than the experimental group. The finding that on some measures the experimental group did slightly better than the control group is therefore not surprising. One does not know whether they did better simply because they were healthier or because they were discharged earlier. In fact, one may wonder about the possibility of early discharge having actually harmed the experimental group, since none of the differences in outcome was statistically significant. If there was a significant bias and the study group was healthier, perhaps early discharge canceled this advantage.

There is a single RCT involving early discharge of patients following normal deliveries. Yanover and colleagues (184) reported it in 1976 from San Francisco. This study compared discharge planned for 12 to 24 hours following delivery with discharge at 48 to 72 hours in a highly selected group of patients. Eligible patients were required to have had at most one other child; the mother was required to be between 19 to 35 years of age and of low medical risk; and the father was required to attend prenatal classes and to be living with the mother within 20 miles of the hospital. These criteria resulted in the elimination of 76 percent of the 362 mothers initially screened for participation in the study. The remaining 88 patients were randomly assigned to study and control groups. Study patients were discharged at 12 or 24 hours, providing the mother and infant met certain criteria designed to identify fitness for early discharge. These included the absence of fever, the presence of normal blood pressure, and the absence of excessive vaginal bleeding in the mother. The criteria also included a birth weight between 6 and 9 pounds, normal vital signs, absence of

feeding difficulty, and an Apgar score of eight or greater at 1 minute for the baby. Following discharge, the study group received home visits from a specially trained perinatal nurse practitioner. Failure to meet discharge criteria prevented 23 of 44 study patients from going home within the targeted period of 24 hours after delivery. The average LOS was considerably lower in the study group (1.8 v. 3.4 days), and none of the control patients went home within the first 24 hours.

The patients were followed for 6 weeks after discharge. No statistically significant differences were measured in rates of complications among infants or mothers, although the rate of morbidity among infants in the study group was less than among those in the control group (9 v. 20 percent). None of the mothers was readmitted during the 6-week followup period. The authors concluded that their program was safe and stated that they hoped that it would promote better bonding between mother and infant, although they did not attempt to measure this phenomenon. They also estimated that the costs of the program were about the same as the savings that resulted from early discharge.

This study documented that, for a highly selected group of patients, the combination of early discharge, prenatal education, and a program of home care produced results comparable to more traditional care. Once again, small sample sizes prevent one from drawing any solid conclusions about the effect of the program on infrequently occurring events such as neonatal mortality. The study almost demonstrated a statistically significant benefit of the program in reducing neonatal morbidity. The 95-percent confidence interval for the difference in morbidity rates for the infants in the study and control groups ranges from 26

percent in favor of the study group to 3 percent in favor of the control group. From a clinical viewpoint, one must believe that the program of home followup care included in this study was heavily responsible for this result, with some contribution from the decreased exposure of the infant to the hospital environment by early discharge. It is not at all clear that the same results could be achieved by a program that involved only early discharge and did not also provide home care. From an economic viewpoint, therefore, this study does not offer great hope of saving large amounts of resources by drastically reducing LOS for the millions of patients discharged annually with normal deliveries. Moreover, this study does not provide evidence that such a policy would be safe.

LOS for uncomplicated deliveries in the United States has fallen steadily since 1968, even in the absence of pressure from the postwar baby boom. Table 12 shows how each region has declined in this measure. All but the South experienced declines greater than the decline in average LOS for all patients in their regions. Based on 1978 regional LOS patterns, if all regions were able to achieve the same 1.8 day average LOS for 24 percent of their patients with uncomplicated deliveries as this study did, then a total of about 848,000 postpartum hospital days could have been saved: 11 percent of the total spent. While this calculation clearly shows the great potential saving in this area, one must hesitate from generalizing too widely from a single study. One must be even more careful to avoid generalizing beyond the limits imposed by the study itself. This was a study of early discharge, education, and home followup care, where the costs of the second entirely canceled the savings from the first. Additional research is required before it can be con-

**Table 12.—Regional Trends in Length of Stay for Uncomplicated Delivery**

| Region                         | Length of stay (days) |      | Percent change |
|--------------------------------|-----------------------|------|----------------|
|                                | 1968                  | 1978 | 1968-78        |
| Northeast . . . . .            | 4.7                   | 3.9  | -17            |
| Northcentral . . . . .         | 4.4                   | 3.7  | -16            |
| South . . . . .                | 3.5                   | 3.1  | -11            |
| West . . . . .                 | 3.4                   | 2.5  | -26            |
| United States average. . . . . | 4.1                   | 3.3  | -20            |

SOURCE *Vital and Health Statistics*, series 13, No 84, DHHS publication No (PHS) 82.1725 (Washington, D. C. National Center for Health Statistics, 1982)

cluded that early discharge alone is safe and economical.

Low birth weight infants are generally defined as those born weighing 5 pounds or less at birth. Traditionally, in the United States, they have been kept in the hospital until they have attained a weight of 5 to 5½ pounds. This procedure was questioned in the late 1960's and early 1970's by three studies that allowed these infants to go home prior to the attainment of fixed target weights. Instead, they used criteria designed to assess the infant's ability to function satisfactorily at home. The first study (14) examined a group of 68 babies who went home with a mean discharge weight of 4½ pounds after an average LOS of 11 days. This group was compared to a sample of other low birth weight infants cared for at other hospitals in the same State. These infants were discharged at an average weight of 5⅓ pounds after an average LOS of 22 days. No significant illness occurred in the study group. The two other early studies (9,13) were uncontrolled. Both found a low incidence of problems following early discharge for a group of low birth weight babies. Bauer and Tinklepaugh (9) reported that 2 of 57 such infants did poorly after discharge, one recovering after a period of slow growth, the other succumbing to sepsis that apparently began 5 days after discharge. Berg and Salisbury (13) extended their previous series and reported no fatalities at 2 months after discharge in a group of 170 early discharges. However, they found that one infant developed pneumonia and one pair of twins experienced poor weight gain. Without randomly selected comparison groups, these data are difficult to interpret.

One RCT has been done in a U.S. population in this area. Dillard and Korones (42) reported a study in which low birth weight infants in Memphis were randomly assigned to study and control groups. In the study group, infants were required to attain a weight of 2,000 gm (4 pounds 6 ounces) prior to discharge; control infants were required to weigh the usual 2,268 gm (5 pounds). Other criteria were included to ensure that the

babies were healthy and gaining weight consistently before discharge. Of 548 infants randomly assigned, 51 died prior to discharge, and another 87 were excluded because their discharge weights were more than 100 gm over the target for their group. Average LOS was 19 days for the study group and 25 days for the controls. There was no difference in average daily weight gain as outpatients. At four weeks, 4 percent of the study group and 5 percent of the controls had been rehospitalized, while 0.5 percent of each group had died. A similar study from England (39) showed no readmission in three months for 20 early discharge low birth weight infants and 20 controls.

The study reported by Dillard and Korones (42) was a well-executed RCT. The principal problem in interpreting the results of the study is the familiar one of statistical power. The study had a very small chance of detecting any clinically important differences in mortality rate. Assuming the mortality rate in the control group to be 0.5 percent, as measured, the study had only a 14-percent chance of rejecting the null hypothesis of no difference even if the study group's mortality rate had actually been twice that. As with elective surgery, the sample size in this RCT was inadequate to measure important differences in mortality.

On the other hand, the study was not so bad with respect to readmission rates. The 95-percent confidence interval for the true difference between the study and control groups in hospital readmission rates ranged from 4.9 percent in favor of the study group to 3.6 percent in favor of the control group. If the true readmission rate for the study group had been twice that actually measured for the control, the sample sizes in this study would have given it a 58-percent chance of detecting this difference at the 5-percent level of significance. The study did show that this particular early discharge program did not result in large differences in either positive or negative events for the study group. Whether patients discharged early were exposed to a somewhat greater risk of dying or a slightly increased risk of readmission to hospital has not been proven.