Objective: To investigate nursery practices regarding outpatient recognition of neonatal jaundice.

Design: Descriptive survey.

Participants: Random sample of nursery head nurses and pediatricians from national lists.

Setting: Nurseries with more than 100 births per year and pediatricians responsible for newborn discharges.

Results: Head nurses from 204 nurseries and 200 pediatricians were surveyed, with 62% of head nurses and 55% of pediatricians responding. Almost half of the head nurses (45%) reported lack of a written neonatal jaundice protocol. Twenty-seven percent of head nurses and pediatricians reported that no system is in place to track jaundiced newborns after discharge. Forty percent of head nurses and 26% of pediatricians reported from higher-risk nurseries, defined as nurseries where more than 25% of mothers did not have a high school diploma or more than 50% of infants were born to single-parent families. These nurseries were no more likely to have a protocol for jaundice management or to use a system to track newborns after discharge. Discharge of most newborns before 36 hours of age was common (70% of head nurses, 62% of pediatricians) and some respondents discharged most newborns before 24 hours of age (16% of head nurses, 12% of pediatricians). For newborns discharged before 24 hours of age, more than half of the nurseries surveyed scheduled follow-up within 2 to 3 days (53% of head nurses, 62% of pediatricians). The likelihood of such follow-up did not differ by type of health care insurance, level of maternal education, percentage of single-parent families, predominance of minority patients, or higher risk as defined above.

Conclusions: In our sample, many nurseries lack parent education, neonatal jaundice protocols, and neonatal jaundice tracking systems. Newborns discharged before 48 hours of age are often not scheduled to be seen by a health care provider within 2 to 3 days, despite American Academy of Pediatrics guidelines recommending such follow-up.

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Healthy newborns are discharged at increasingly earlier postnatal ages. This practice raises the concern that detection of symptoms of serious illness may either be missed or delayed. While numerous studies have addressed the safety of early discharge of full-term newborns, many of these studies are limited by methodological problems such as variable definition of early discharge, small sample size, and lack of appropriate control groups. Hyperbilirubinemia requiring phototherapy is the most common reason for readmission of neonates. Shorter nursery stays are associated with increased readmission rates for jaundice. Following the rise in early newborn discharges, reports of bilirubin encephalopathy in full-term infants with glycogen-6-phosphatase dehydrogenase deficiency, as well as in otherwise healthy full-term breast-fed infants, have appeared in the literature. This problem heightens concern about the need for timely and accurate recognition of jaundice in those infants who are discharged early.

With a shortened period of perinatal hospital observation, pediatricians must rely on outpatient means to detect jaundice. This study assesses pediatrician and nursery discharge practices regarding the recognition of outpatient jaundice. We hypothesized that those nurseries serving...
MATERIALS AND METHODS

In this descriptive survey, head nurses from 204 nurseries (4 from each of the 50 states and the District of Columbia) and 200 pediatricians (30 from each of the 4 geographic regions of the United States) were randomly selected from national lists. Nurseries were sampled from the 1994 American Hospital Association guide and pediatricians were sampled from a list of practicing pediatricians supplied (at no cost) by Ross Laboratories, Philadelphia, Pa. Hospitals with fewer than 100 births per year and pediatricians who did not discharge newborns were excluded. Initial surveys were mailed during April and May 1995 and a second mailing was sent to nonresponders.

Data collected from nursery surveys included number of full-term newborn discharges per month, method and content of parental instruction regarding jaundice, hospital protocols for the management of jaundice, indications for blood typing of healthy newborns, confidence in the ability of parents to recognize significant jaundice, systems in place to track jaundiced newborns after discharge, and timing of follow-up. Demographic data collected to describe the patients served by each hospital included level of education, race/ethnicity, insurance, percentage of single parents, and frequency of early discharge. Pediatricians received a parallel survey. Participants were asked to select a quartile response to describe the timing of newborn follow-up, demographic data, and frequency of early discharge.

For this study, we defined early discharge as discharge before 36 hours of age and very early discharge as discharge before 24 hours of age. To analyze data among respondents serving higher-risk populations, we defined individual nurseries or pediatricians as high risk if the population they served met either of the following criteria: more than 25% of mothers have no high school diploma or more than 50% of newborns are discharged to single-parent families.

Data were analyzed using the chi-square test. Ranked data were analyzed using the Kruskall-Wallis rank sum test. Multiple logistic regression models were tested to examine potential confounding effects. Statistical significance was set at P < .05.

RESULTS

The response rate was 62% (126/204) from head nurses and 55% (109/200) from pediatricians. The geographic distribution of pediatricians who did not respond did not differ from responders. Fewer nurseries in the Northeast region responded. Discharges of healthy full-term newborns averaged 78 per month (median 50, range 7-420) in these nurseries and pediatricians discharged an average of 17 newborns per month (median 12, range 3-87). The majority of nurseries (58%) served rural communities while almost half (48%) of pediatricians served suburban areas. Only 6% of the hospitals were university based.

Medical care for the majority of newborns was covered by Medicaid in 41% of nurseries. Most pediatricians (52%) reported no majority insurer. Thirty-seven nurseries (31%) and 9 pediatricians (8%) stated that at least half of their newborns were discharged to single-parent families. More than one fourth of nurseries (30%) and pediatricians (26%) reported more than 25% of the mothers had not attained a high school diploma. Overall, 40% of nurseries and 26% of pediatricians met the high-risk definition (P < .03). The high-risk nurseries were more likely to serve rural (P < .04), minority (African American, P < .004; Hispanic, P < .02), and Medicaid patients (Wilcoxon P < .001). Similarly, the high-risk pediatricians were more likely to serve African American (P < .002) and Medicaid patients (Wilcoxon P < .001).

Forty-three nurseries (34%) and 30 pediatricians (28%) performed blood typing on all newborns. About half of the remaining respondents obtained a blood type when the mother was blood group O (48% of nurseries, 56% of pediatricians), and very early discharge was rarely reported as an indication for blood typing (5% of nurseries, 1% of pediatricians). Ninety-four percent of nurseries and 82% of pediatricians perform blood typing when the mother is Rh negative. We were unable to define any demographic or practice differences between the 18% of pediatricians not obtaining blood types on infants of Rh-negative mothers and other pediatricians. Specifically, they did not differ by number of newborn discharges per month, age, type of community, majority insurer, parental instruction, use of a protocol to manage jaundice, use of any system to track infants after discharge, frequency of early discharge, or follow-up within 2 to 3 days.

Fifty-five percent of the nurseries reported that a written protocol was used for the hospital management of neonatal jaundice. Most head nurses (87%) and pediatricians (85%) reported that nurses provided verbal instructions regarding newborn jaundice to most patients. Fifty-four nurses (47%) and 75 pediatricians (70%) reported that pediatricians provided verbal instructions to most patients. Sixty-seven percent of head nurses and 74% of pediatricians outlined the content of their standard verbal instructions regarding jaundice. Nurses were more likely than pediatricians to discuss signs or symptoms of jaundice, including yellow sclera (60% vs 29%, P < .001), yellow trunk (72 vs 48, P < .003), lethargy (28 vs 3%, P < .001), feeding problems (29% vs 12%, P < .01), and need for fluids (13% vs 0%, P < .003). Blanching the skin to assess jaundice was occasionally discussed (12% vs 7%, P < .29). Sixty-six percent of nurses and 69% of pediatricians (P < .69) discussed when to see a provider. Nurses were more likely to recommend seeing a provider for yellow eyes (35% vs 18%, P < .03). Nurses and pediatricians were equally likely to recommend seeing a provider if the trunk is yellow (36% vs 47%, P < .19), if the newborn is lethargic (12% vs 6%, P < .25), or if the infant has feeding problems (15% vs 10%, P < .35). Seventy-six nurses (60%) and 31 pediatricians (32%) provided written instructions about jaundice to most patients.
When asked, “How confident are you in the ability of a parent to recognize significant jaundice?,” 27% of head nurses replied “highly confident,” 64% “somewhat confident,” and 8% “not confident.” Similarly, among pediatricians, 27% replied “highly confident,” 62% “somewhat confident,” and 11% “not confident.” In response to the question, “Please describe what system, if any, is in place to track or identify jaundiced infants after discharge,” 29 nurseries (27%) and 23 physicians stated that no system existed. Most respondents used home or office visits and letters or telephone calls.

Respondents discharging more than half of their newborns before 36 hours of age were considered to practice frequent early discharge. Using this definition, 88 nurseries (70%) and 66 pediatricians (62%) describe frequent early discharge of their newborns. A minority of nurseries (16%) and pediatricians (12%) reported discharging more than half of their healthy newborns before 24 hours of age (very early discharge). The Table describes procedures of nurseries and pediatricians practicing frequent early discharge compared with routine discharge. Pediatricians practicing frequent early discharge were more likely to report use of any system to track infants after discharge than those practicing routine discharge (72% vs 53%, \( P < .02 \)). However, almost half of nurseries and pediatricians reported that a minority of infants discharged early were scheduled to be seen by any health professional within 2 to 3 days. The likelihood of follow-up within 2 to 3 days of discharge was not affected by type of community (urban, suburban, or rural), size of nursery, predominant type of payment for medical care, racial/ethnic composition of the patient population, level of education, or percentage of single-parent families. No differences between the groups were found in the frequency of using a protocol to manage jaundice nor in provision of verbal or printed instructions to parents.

We compared procedures by nurseries and pediatricians serving a higher-risk population (as previously defined) with the remaining respondents. These respondents did not differ in the practice of frequent early discharge (70% of nurseries, 63% vs 54% of pediatricians; \( P < .38 \)). This lack of relationship between risk category and frequency of early discharge persisted when potential demographic confounders, including community type, ethnicity, and insurer, were considered in multiple logistic regression models. They were no more likely to use a protocol for the management of jaundice or to have a system for the follow-up of jaundiced infants after discharge. Nurses at higher-risk nurseries were less likely to provide verbal instructions to parents (\( P < .03 \)). There was no difference in frequency of verbal instructions by pediatricians or the provision of printed materials by nurses or pediatricians between the risk groups.

In this study, we examined the ways nurseries and pediatricians arrange follow-up after early discharge and prepare families to detect jaundice. To our knowledge, this issue has not previously been studied. We found that some nurseries do not routinely provide verbal instructions to parents and that many nurseries also do not provide written instructions for parents. A minority of nurseries have a protocol for the management of jaundice, and systems for tracking and detecting jaundice after discharge are also uncommon. Surprisingly, nurseries discharging a majority of newborns early were no more likely to provide education or follow-up to detect jaundice after discharge. Because few respondents were highly confident that parents could recognize significant jaundice, one must be concerned that newborns requiring treatment may escape detection. This concern is increased by our finding that many newborns who are discharged early are not seen for follow-up in 2 to 3 days, as is recommended by the American Academy of Pediatrics.\(^8,9\) In one study, 33% of newborns discharged early were not scheduled for early follow-up, even after educational interventions in the study hospital.\(^10\)

Further study is needed to determine optimal timing and mechanisms for the follow-up of newborns, particularly those who are discharged early. However, the reports of kernicterus in the literature suggest that current practices are not adequate to prevent this devastating consequence of hyperbilirubinemia. Although federal legislation passed in September 1996 mandates insurers to cover 48 hours of hospitalization after birth, the need for education and timely follow-up will continue to be of concern, as some mothers and physicians will still elect for early discharge. In addition, many infants requiring medical intervention will present after the third day of life.

### Table

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Nursery Head Nurses</th>
<th>Pediatricians</th>
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<tbody>
<tr>
<td>Any system for follow-up</td>
<td>Frequent Early Discharge: 52/75 (69) Routine Early Discharge: 23/28 (82)</td>
<td>Frequent Early Discharge: 44/54 (82)† Routine Discharge: 16/30 (53)†</td>
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<td>&gt;50% of parents receive verbal instructions about jaundice by nurse</td>
<td>Frequent Early Discharge: 80/88 (91) Routine Early Discharge: 26/35 (79)</td>
<td>Frequent Early Discharge: 52/61 (85) Routine Discharge: 33/39 (85)</td>
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<tr>
<td>&gt;50% of parents receive verbal instructions about jaundice by physician</td>
<td>Frequent Early Discharge: 35/81 (43) Routine Early Discharge: 18/30 (60)</td>
<td>Frequent Early Discharge: 48/65 (74) Routine Discharge: 25/46 (63)</td>
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<tr>
<td>&gt;50% of parents receive printed materials about jaundice</td>
<td>Frequent Early Discharge: 52/87 (60) Routine Early Discharge: 22/34 (65)</td>
<td>Frequent Early Discharge: 19/54 (35) Routine Discharge: 12/41 (29)</td>
</tr>
<tr>
<td>&gt;50% of newborns are scheduled for follow-up within 2-3 days</td>
<td>Frequent Early Discharge: 23/44 (53) Routine Early Discharge: 12/20 (60)</td>
<td>Frequent Early Discharge: 14/34 (41) Routine Discharge: 13/23 (57)</td>
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*All data are given as number per sample size (percentage). Frequent early discharge indicates more than 50% of newborns discharged before 36 hours of age; routine discharge, more than 50% of newborns discharged after 36 hours of age.*

†\( P < .02 \).
We were surprised to find that blood typing of infants born to Rh-negative mothers was not reported to be universal. Although this test may be ordered by the mother’s obstetrician or be carried out by protocol in many hospitals, we expected all pediatricians to select this as an indication for blood typing. Most respondents indicated that blood typing was obtained selectively, presumably as a means of reducing costs.

It is commonly observed that patients of lower socioeconomic status have lower compliance with scheduled appointments. We hypothesized that respondents serving a population at higher socioeconomic risk would be more likely to provide parental instruction, use a protocol to manage jaundice, and have a system to track infants after discharge. We also tested whether these infants would be more likely to be scheduled to be seen in accordance with the American Academy of Pediatrics follow-up guidelines. We found that these interventions were no more likely to be used in the high-risk groups. In fact, verbal instructions by nurses, the most commonly used intervention, was performed less often in the high-risk group.

There are several limitations in interpreting the results of this study. The majority of head nurses and pediatricians did respond to our survey; however, the characteristics and practice patterns of the nonresponders may differ from those who chose to complete the survey. Although this is a national survey, the sample size is small and the results are not generalizable to all of pediatric practice. However, it is interesting that the responses by nurses and pediatricians are very similar, despite demographic differences between the groups. For example, despite nurseries serving more rural, Medicaid patients, the responses from nurseries and pediatricians are very similar in frequency of early and very early discharge, indications to perform blood typing, verbal instructions about jaundice by nurses, use of a system to track newborns after discharge, and timing of newborn follow-up. Because this study relies on self-report of nursery procedures, actual procedures may differ from those reported. It is likely that pediatricians and nurses may report optimal or idealized procedures and follow-up. Bordley et al11 demonstrated this type of bias, finding that most pediatricians overestimated immunization rates in their own practices. In addition, we were only able to investigate the scheduling of follow-up visits. One would anticipate that the rate of completed follow-up home or office visits would be lower owing to missed appointments.

We conclude that nurseries and pediatricians commonly do not provide parent education about newborn jaundice or use neonatal jaundice protocols and neonatal jaundice tracking systems. Nurseries and pediatricians practicing frequent early discharge and those serving high-risk patient populations do not provide more interventions related to detection of jaundice after discharge. After discharge, many newborns are not seen for follow-up in accordance with the American Academy of Pediatrics guidelines. Further study is needed to determine which interventions are effective and when newborn follow-up should optimally occur.

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REFERENCES


Free Patient Record Forms Available
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