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Early Nursery Discharge during COVID-19 and Readmissions for Hyperbilirubinemia

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Abstract:

Background and Objective: *Early discharge from the Newborn Nursery has been associated with an increased risk for readmission, especially for hyperbilirubinemia. During COVID-19, early discharge policies were enacted at our hospital, allowing prospective data collection to evaluate if early discharge resulted in increased readmission for hyperbilirubinemia.*

Methods: *Prospective observational data was abstracted from the electronic medical record in a New York State hospital with 2400 deliveries/year. Only babies >36 weeks gestation, born by NSVD, and admitted to the general Nursery were included. Data was analyzed for early discharge at ≤36 and ≤48 hours.*

Results: *During the COVID-19 study period (January 2020–June 2021), 1714 babies met inclusion criteria. Five hundred seventy-eight (34%) of patients were discharged ≤36 hours and 1225 (71%) ≤48 hours. For newborns discharged ≤36 hours, there were 5 RA (0.9%), which was significantly less than 28 (2.5%) discharged >36 hours [OR 0.35(0.13, 0.90) (p=0.03)]. Twenty newborns (1.6%) discharged ≤48 hours were readmitted compared to 13 (2.3%) discharged >48 hours [OR 0.61(0.31, 1.23) (p=0.17)].*

Conclusion: *Early discharge was not associated with increased readmissions for hyperbilirubinemia with early discharges at ≤36 and 48 hours*.

Background:

During the COVID-19 outbreak, many hospitals adopted policies that recommended shorter hospital stays for mothers and babies. In New York State, several hospital systems have implemented this strategy to limit exposure to COVID-19 infection and alleviate the visiting limitations on spouses and families. Within our Hospital System (Mount Sinai Health System), this policy was instituted and terminated several times during 2020 and 2021 as the pandemic waxed and waned. This provided the opportunity to analyze the effect of shortened length of stay (LOS) on readmission (RA) for hyperbilirubinemia in a setting where patient demographics and hospital practices in newborn care remained the same.

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Historically, shortened LOS for newborns has been associated with an increased risk for readmission for hyperbilirubinemia and was considered by some to be a risk factor for developing hyperbilirubinemia (1–7). Data was prospectively collected and analyzed during the years 2020 and 2021 as the early discharge policy waxed and waned, reflecting the pandemic's severity, to determine whether the shortened hospital stay during the pandemic would result in increased readmissions for hyperbilirubinemia.

Design/Methods:

Prospective observational data was collected in a regional, Baby-Friendly hospital in New York State with ~2,400 deliveries/year. Data was abstracted from the electronic medical record (Allscripts) from January 1, 2020 through June 30, 2021. All newborns >36 weeks gestation born by normal spontaneous vaginal delivery admitted to the General Newborn Service were included in the analysis. Babies born by Caesarean section, admissions to the NICU, and babies who were treated with phototherapy during the initial nursery admission were excluded. As the COVID-19 infection rate waxed and waned during this period, an early discharge policy was instituted at Mount Sinai South Nassau during spikes in infection rates and relaxed during lower infection rates. An early discharge policy was encouraged during the two peak periods of the pandemic in our area. These dates ran from April 15, 2020 to June 30, 2020 and from January 1, 2021 to March 31, 2021. During COVID-19, all other nursery policies, including universal bilirubin screening prior to discharge, breastfeeding support services, and scheduling of follow-up visits, remained unchanged.

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The American Academy of Pediatrics defines early discharge for newborns as LOS ≤48 hours (8). The definition of early discharge in other studies has varied (9–13), so data was analyzed for discharges for different LOS (≤24, ≤36, and ≤48 hours). LOS was calculated as the time from birth to the time the baby was given to the parents by the nurse to leave the hospital. Readmissions for

hyperbilirubinemia included newborns discharged from our General Nursery who met the requirements for phototherapy as defined by the AAP guidelines for the management of hyperbilirubinemia (9). All newborns at our hospital have bilirubin screening before discharge (transcutaneous and/or serum bilirubin).

The primary outcome was readmission in the first two weeks of life for treatment of hyperbilirubinemia. This project met the conditions for IRB exemption under 45 CFR 46.101(b)(4) and was approved by the IRB protocol review committee.

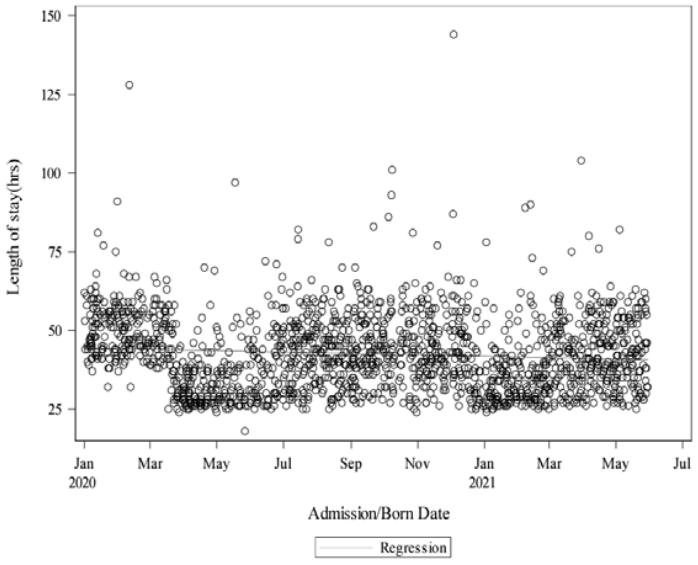
Statistical analysis:

Continuous variables are presented as mean (SD), and categorical variables are presented as proportions. Student's t-test or Wilcoxon rank-sum test was used to compare continuous variables, and the chi-squared or Fisher exact test was used for categorical variables. Univariate analysis of outcome RA was performed by logistic regression for variable LOS ≤36 hours and LOS ≤48 hours separately in both 2017–2019 and 2020–2021 datasets. All statistical analyses were performed at the 0.05 significance level using SAS version 9.4 (SAS Institute, Cary, North Carolina, USA).

Results:

An early discharge policy was encouraged during the two peak periods of the pandemic in our area. These dates ran from April 15, 2020 to June 30, 2020 and from January 1, 2021 to March 31, 2021. Fifty-seven percent of early discharge occurred during the 165 days. This represented 30% of the 548 days during the study period (January 1, 2020–June 30, 2021) (Figure 1). While most babies discharged during these months were early discharges, many remained in the hospital for ≥ 36 hours. Similarly, there were many early discharges during other months even when early discharge was not the policy (Figure 1).

Figure 1. Distribution of discharges during COVID-19 study period (January 2020–June 2021)



During the COVID-19 Study Period (Cov-19), 1,714 newborns were admitted to the General Nursery Service who met the criteria for entry into the study (Table 1). During COVID-19, LOS ≤24 hours were infrequent (6 newborns, 0.4%) (Table 1), so meaningful analysis could not be performed. These patients were excluded as a distinct early discharge group but were included in the analysis for ≤36 and ≤48 hours. There were 578 (34%) babies discharged at ≤36 hours and 1136 (66%) discharged at >36 hours. When using ≤48 hours as the criteria for early discharge, there were 1225 (71%) babies discharged at ≤48 hours and 489 (29%) babies discharged at > 48 hours.

Table 1. Distribution of Newborns Considered for Early Discharge COVID (January 2020–June 2021)

Criteria for ED	Early Discharge Number (%)	Late Discharge Number (%)
≤24	6 (0.4%)	1708 (99.6%)
≤36	578 (34%)	1136 (66%)
≤48	1225 (71%)	489 (29%)

During COVID-19, LOS for the early-discharge patients was significantly shorter than the late-discharge patients for the 36-hour and 48-hour criteria (Table 2). During COVID-19, there was a lower ratio of males to females in the ≤36 hours (p=0.02) group, which was not present in the ≤48 hours group (Table 3). Gestational ages were similar for the 36-hour groups but were greater for the ≤48-hour group when compared to the >48-hour group (p=0.01) (Table 3). During COVID, quarterly breastfeeding initiation and exclusive breastfeeding rates ranged from 92.3–98.6% and 43.1–50.6%, respectively, and did not differ between the groups (Table 4).

Table 2. Mean Hours for LOS

	2020–2021 COVID
≤36 Hours Mean (SD)	30.3 (3.4)
>36 Hours Mean (SD)	48.7 (10.0)
≤ 48 Hours Mean (SD)	36.6 (6.8)
> 48 Hours Mean (SD)	57.2 (9.4)

During COVID-19, there were 33 readmissions for hyperbilirubinemia (Table 5). The overall readmission rate (RAR) was 1.9%. There were five readmissions (0.9% RAR) in the ≤36 hours group and 28 readmissions (2.5% RAR) in the >36 hours

Table 3. Patient Characteristics During COVID-19 Study Period

	Total	≤36 Hours	>36 Hours	p-value	≤48 Hours	>48 Hours	p-value
Number	1714	578	1136		1225	489	
Male Number (%)	866 (50.5)	267 (46.2)	599 (52.7)		605 (49.3)	261 (53.4)	
Female Number (%)	848 (0.5)	311 (53.8)	537 (47.3)	0.02	620 (50.3)	228 (46.3)	0.13
Gestational Age	38.8 (1.2)	38.9 (1.2)	38.8 (1.2)	0.23	38.8 (1.2)	38.7 (1.2)	0.01

group. The number of readmissions was significantly lower [OR 0.35(0.13,0.90) (p=0.03)] in the ≤36-hour early discharge group compared to those discharged >36 hours. Using ≤48 hours as the criteria for early discharge, there were 20 readmissions (1.6% RAR) in the ≤48 hours group and 13 readmissions (2.7% RAR) in the >48 hours group (Table 5**)**. There was no significant difference between these groups [OR 0.61 (0.30,1.23) (p=0.17)].

Table 4. Breastfeeding Rates (%)

	COVID (2020-2021)	
	2020	2021
Exclusive breastmilk feeding while in hospital	49%	56%
Formula supplement while in hospital	44%	38%
Breastfeeding initiation rate	93%	94%

Discussion

Previous studies have demonstrated that shortened newborn LOS may be associated with an increase in readmission, mainly for treatment for hyperbilirubinemia (1–7). The definition of a short newborn LOS has varied widely in the literature. At present, many studies and the AAP Guideline for Nursery Discharge define early discharge as ≤48 hours of age (8) while other studies define early discharge as ≤36 hours (10-11) and some as early as ≤24 hours (12–13). The present study attempted to analyze all three time periods, but the lack of significant numbers of patients ≤24 hours made evaluation of that group impossible. Discharges at ≤36 and ≤48 hours were not associated with increased readmissions for hyperbilirubinemia, as found in previous studies. During the pandemic study period, the LOS for the ≤36 hours early discharge group was significantly shorter, and the RAR was significantly lower than those discharged at >36 hours.

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Table 5. Readmissions for Hyperbilirubinemia

	Total	≤36 Hours	>36 Hours	≤48 Hours	>48 Hours
Newborns	1714	578	1136	1225	489
Readmissions	33	5	28	20	13
Readmission Rate	1.9%	0.9%	2.5%	1.6%	2.7%
Unadjusted OR (95% CI) p		0.35 (0.13, 0.90) 0.03		0.61 (0.30, 1.23) 0.17	

Previous studies of early discharge were typically retrospective, and many of the analyses were conducted 15–20 years ago. At the time of those reports, numerous interventions, such as universal screening for hyperbilirubinemia (14–15), improved lactation support (16), and establishment of strong follow-up systems (17–18) following nursery discharge, may not have been in place, and their implementation as standard care in nurseries may now play a role in the rate of readmission for hyperbilirubinemia. The opportunity provided by the change in our hospital nursery discharge policy during COVID-19 allowed the prospective evaluation of shortened LOS in which all other nursery protocols remained the same. Similarly, during this period, patient demographics, hospital personnel providing care, hospitalists, and community pediatricians caring for the patients remained unchanged. Since there were no changes in these variables, they are unlikely to affect the RAR. One significant variable implicated in hyperbilirubinemia, breastfeeding, also remained unchanged. As a Baby-Friendly hospital, breastfeeding is encouraged and strongly supported. Breast milk introduction and exclusive breastfeeding remained stable during the pandemic, and a change in breastfeeding rates would not explain why the rate of readmissions for hyperbilirubinemia remained unchanged or decreased. One possible explanation for the lower rate of the RAR in the COVID-19 ≤ 36-hour group could be the lower number of males in that cohort. Male gender has been identified as a risk factor for the development of hyperbilirubinemia (4, 9).

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While hospital policies other than early discharge did not change, other changes might have occurred in physician, nursing, and parental behavior during the COVID-19 pandemic. Were follow-up visits not scheduled or occurring? Both prior to and during COVID, all discharges from our Nursery, whether early or late, have follow-up visits carefully planned and scheduled before discharge. There were no instances of practitioners reporting failures of newborns returning as scheduled. Similarly, the shortened hospital stays may have affected maternal lactation education; therefore, the length and exclusivity of breastfeeding might have decreased. Most readmissions occur during the first five days of life, so a shortening of breast feeding education or the number of days of breast feeding should have little effect on readmission rates. Another concern might be that all readmissions from our Nursery may not be at our institution. While this might be the case, it would occur at the same rate before and during COVID-19.

Readmission rates seen in the present study are consistent with those previously reported (19–21). The overall rate of 1.9% during COVID-19 is well within the reported range of 0.8–4%. Similarly, the range of rates seen in the early discharge and late discharge subgroups (0.8–2.4%) were also well within those previously reported.

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An interesting contrast to past studies was that the LOS in the present study was clearly defined. An exact LOS was determined by using the time of birth and discharge by the nursery nurse. How the LOS was determined in past studies was not clearly defined (1–8). In general, authors cite the time of discharge without establishing how that was determined. Since most studies were retrospective, the implication was that the discharge time was determined by when the discharge order was written, often hours before the baby left the hospital. Using the actual time that the baby left the hospital and was directly observed by a nurse who is constantly evaluating the newborn for visible jaundice would represent a longer LOS than using the time the discharge order was written. The present study measured the actual time the baby was in the hospital, while previous studies may have included a longer-than-reported LOS.

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This study reports the experience of a single hospital and may not be representative of programs and populations around the country. Intangible changes may have occurred during COVID. Were staff and parents more diligent, or did they care for their newborns differently during this stressful time? Were there issues concerning healthcare seen differently during COVID-19 that led to an imperceptible or unmeasured variable that may have affected results? In contrast, the system of care has been designed to identify newborns at risk for hyperbilirubinemia, and there is no indication that parents and providers were less diligent than in previous years, so cases of hyperbilirubinemia were missed.

In the present study, early discharge did not result in an increased risk of readmission for hyperbilirubinemia, and during the COVID-19 pandemic, the rate decreased for patients discharged ≤36 hours. Past concerns about the adverse effects of early discharge may not be as significant with present-day hospital practices, including pre-discharge universal bilirubin screening, discharge planning, early follow-up visits, and strengthened breastfeeding support (i.e., Baby Friendly). This study in a single hospital requires additional institutions where these changes have been implemented to evaluate the effects of early discharge on bilirubin readmissions. The ability to analyze the data prospectively, made possible by the policy change during COVID-19, gave us a unique opportunity to evaluate the effect of early discharge. Whether early discharge in 2022 presents the same risks seen in past years needs further evaluation and may be necessary in creating policies and guidelines that ensure the safe discharge of newborns.

"In the present study, early discharge did not result in an increased risk of readmission for hyperbilirubinemia, and during the COVID-19 pandemic, the rate decreased for patients discharged ≤ 36 hours. Past concerns about the adverse effects of early discharge may not be as significant with present-day hospital practices, including pre-discharge universal bilirubin screening, discharge planning, early follow-up visits, and strengthened breastfeeding support (i.e., Baby Friendly)."

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