Association between duration of neonatal hospital stay and morbidity in the first month of life

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Summary

The morbidity of 506 healthy full-term newborns was studied in the first month of life in relation to the time they stayed in the hospital. The average time for the newborns who were born by vaginal delivery was 73.3±11.7 hours, while for those who were born by cesarean section it was 135+31.5 hours. Thirty-seven newborns presented health problems during the neonatal period (7.3%) and only 2% needed hospital readmission. The commonest problem in the newborns we studied was jaundice which appeared from the fourth to sixth day of life. During the second fortnight the commonest problems were infections of the respiratory tract. From the results of our study it is obvious that only a small percentage of readmissions could have been avoided if the original stay in hospital had been prolonged.

Key words: Early discharge; Newborns; Morbidity; Neonatal period.

Introduction

Over the past decade there has been a tendency for healthy newborns to be discharged from the Maternity Clinic of hospitals much faster than in the past. From 1987-88 the average stay in hospital was 4 to 5 days, however from 1993-94 this period was reduced to 2-3 days [1, 2]. Equally the period of hospital stay for the mothers of newborns by cesarean section fell from 7.8 days in 1970 to 4 days in 1992 [3]. Today in many cases newborns are discharged from the maternity clinic within 24-72 hours of birth [4-8]. This has caused many researchers to question the significance of this reduction in the time of hospital stay for newborns in relation to the possibility of increased danger of delays in the diagnosis of serious problems in newborns. The purpose of this study was to focus on this problem in our country.

Material and Methods

The study included 600 infants who were born in the Maternity Clinic of the University of Crete from 1994 to 1995. Of these, 96 could not be located after discharge and had to be excluded from the study leaving a remaining 506 newborns (84.33%). All the newborns in this study were born after a normal pregnancy, with a birth-weight of >2500 g and during their stay in hospital showed no signs of illness. Newborn twins and other multiple births were excluded from the study. From the 506 newborns 410 (81%) were born vaginal delivery and 96 (19%) by cesarean section. Four hundred and fourteen of the mothers (81.8%) were prima partum or having their second baby and 92 (18.2%) were having their third baby onwards. Of the families 292 (57.7%) were residents in the town of Heraklion, Crete while the remaining 214 (42.3%) were from villages in the Heraklion area.

After discharge from the maternity clinic the newborns had weekly check-ups until the end of their first month. Of the newborns included in this study, 24 (4.7%) did not appear for their weekly check-ups, thus the doctor in-charge contacted the family by phone every week. All the details of findings as a result of these phone check-ups were recorded on special record sheets and on a specialized computer program.

Statistical analysis included the Mantel-Haensel x^2 test, estimating odds ratios (OR), and averages and standard deviations according to the Student's Test [9].

Results

The average hospital stay ranged from 85.1±29.9 hours which is approximately 3.5 days, with the shortest stay being 30 hours (1.5 days) and the longest 288 hours (12 days). The latter occurred in the case of a mother with problems resulting from a cesarean section delivery. The average of stay in hospital depended on the type of delivery. Vaginal deliveries required shorter stays than deliveries by cesarean section. In the former the average stay was 73.3±11.7 hours (3 days approximately), while the latter was 135.4±31.5 hours (6 days approximately). This difference was statistically significant ($t=132.433$, $p<0.0001$). Analysis of the duration of stay between prima-partum and multi-partum mothers showed no statistically significant difference ($p>0.05$).

The difference in the duration of stay between mothers from the town of Heraklion (86.0±32.0 hours) and those from other villages (83.8±26.2 hours) was not considered statistically significant ($p>0.05$). Factors concerning newborns presenting health problems after discharge from the hospital included the duration of the stay in hospital, the maternal partum and the area of residence of the family. Details are shown in Table 1.

It was observed that newborns by vaginal delivery 32 (7.8%) presented health problems while of those who

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were delivered by cesarean section and had a longer stay in hospital 5 (5.2%). The difference was not statistically significant (Mantel-Haenszel x^2=1.28, p=0.257). Depending on the maternal partum, health problems occurred in patients who had fewer than two births in 25 cases of newborns (6.0%) and in patients with more than three births in 12 cases (13%). The difference was statistically significant (Mantel-Haenszel: x^2=5.89, p=0.015, OR=0.39, RR=0.46, CL=95% 0.25-0.91).

Finally, the permanent residence of families of 22 newborns (7.5%) was Heraklion, while 15 newborns (7%) were from village families. This difference was not statistically significant (p>0.05). The day on which health problems appeared was examined in relation to the duration of hospital stay, the maternal partum and the area of family residence. The results were as follows: the day when the health problem appeared was closer to the time of birth in newborns who stayed 73.3±11.7 hours in the maternity clinic as compared with those who stayed 135.4±31.5 hours. The difference was statistically significant (t=3.079, p<0.001). Also the difference in relation to the area of family residence (t=4.552, p<0.001) was statistically significant while it was not when considering maternal partum (x^2=1.882, p>0.05). The appearance of health problems was also examined in relation to diagnosis (Table 2).

There were no cases of death in the neonatal period of any newborn in this study. It was observed that the average time for health problems to appear in all systems, except the respiratory, was shorter. The differences were statistically significant and were in order: jaundice, respiratory (t=4.970 and p<0.001), gastrointestinal, respiratory (t=2.70 and p<0.001). All problems except those of the respiratory system appeared within the first 15 days of life. Table 3 shows analytically the problems in these newborns. Readmission to hospital was necessary in ten cases (Table 4); one newborn had jaundice, eight had bronchitis and one had diarrhea. In the same table the frequency of problems and readmissions in relation to the total newborns in the study can be seen. Health problems appeared in 7.3% of the newborns studied and readmission in 2.0% of these.

Table 1. — *Health problems of newborns after discharge in relation to duration of hospital stay, maternal partum, and area of residence.*

	Health Problems Yes	No	Health Problem (%)	Days of illness Average±SD
In hospital 73.3±11.7 hours	32	378	7.8	17.8±11.1
In hospital 135.4±31.5 hours	5	91	5.2	27.0±20.0
Births ≤2	25	389	6.0	17.9±13.4
Births ≥3	12	80	13.0	21.4±10.9
Area of residence				
Heraklion	22	270	7.5	16.3±13.0
Other villages	15	199	7.0	23.1±11.2

Table 2. — *Health problems of newborns.*

	Health Problems No.	%	Days of illness Average±SD	Min	Max
Jaundice	6	16.2	8.75±4.19	6	15
Respiratory	22	59.5	25.19±13.23	6	30
Gastrointestinal	4	10.8	13.75±6.29	5	20
Others	5	13.5	12.17±5.12	7	20
Total	37	100.0	19.05±12.62	3	30

Table 3. — *Health problems of different systems of newborns.*

Jaundice No.	Respiratory	No.	Gastrointestinal	No.	Others	No.
6	rhinitis	10	stomatitis	1	fever	2
	otitis	3	regurgitation	–	dermatitis	1
	bronchitis	8	vomiting	2	rash	2
	aspiration	1	diarrhea	1		
Total 6		23		4		5

Table 4. — *Health problems of newborns in relation to readmission.*

Health Problem	No.	%	Readmission No.	%
Jaundice	6	1.2	1	0.2
Respiratory	22	4.3	8	1.6
Gastrointestinal	4	0.8	1	0.2
Others	5	1.0	–	0.0
Total number of neonates with problems	37	7.3	10	2.0

Discussion

The discharge of newborns from maternity clinics in ever-decreasing time has been the practice for some years now [1, 10]. However opinions vary. Those who support early discharge claim that it is safe and may be advantageous both medically and psychosocially. Opponents state that there may be risks in rapid discharge involving delay in detection of significant illness in newborns [11] as well as metabolical disease such as phenylketonouria whose diagnosis can only be made with accuracy after the third day of life [12].

The USA was first in reducing the time of hospital stay of newborns in maternity clinics from 12-24 hours after delivery. In the last few years this practice has been adopted in other countries such as England, Australia and Scandinavia, where up to a few years ago the duration of stay in maternity clinics was 6-10 days after delivery [5, 13-15].

In our study the number of newborns included was considered sufficient, as well as the manner and duration of observation of their health. We particularly investigated the early discharge of newborns from the maternity clinic in relation to morbidity up to the end of the first month of life. The findings were connected with duration of stay in hospital, maternal partum and area of permanent residence of the family. No newborn in our study died during the duration. It should be mentioned that morbidity in the newborn period is relatively low and unrelated to early discharge of newborns from a maternity clinic [16-19].

In a study carried out in Ontario, Canada of 920,554

newborns with a birthweight ≥2500 g after discharge from the maternity clinic the following observations were made: the shortest duration of stay in hospital for the newborns was related to an increase in the number of readmissions. This was for illnesses which do not present symptoms during the first three days of life, such as jaundice and dehydration particularly in breast fed newborns due to inadequate milk supply. In the same study two deaths from hypernatremic dehydration occurred [20]. From another study carried out among 29.934 infants, it was concluded that early discharge significantly increases the risk for readmission to hospital and the risk of readmission with hyperbilirubinemia [21].

In our study health problems in our newborns appeared closer to the time of birth, with jaundice within 4-6 days of life. Six of the newborns in the study required re-examination shortly after discharge from the maternity clinic due to maternal concern over a jaundice appearance of the skin. In five newborns the jaundice was considered within physiological limits, and only one case needed readmission to hospital for photo therapy. The most common health problem observed in newborns in our study was viral infection of the respiratory system. These are infections which are common in infancy [22]. Readmission was needed for eight newborns; vomiting, regurgitation and diarrhea were also noted. Newborns with problems of the gastrointestinal system except for one case of diarrhea did not require readmission to hospital.

A statistically significant relationship was observed between maternal partum and the appearance of health problems in the newborn. In multi-partum mothers the newborns presented health problems in a greater number of cases compared with the number of those born as first or second babies. This finding is not mentioned in previous literature. In particular a problem of the respiratory system appeared from the 15th-30th day of life. This is probably connected with an increased possibility of viral infection of the respiratory system from other members of the family [22]. Of newborns in our study 16.7% were jaundiced and needed re-examination after discharge. The number of newborns with respiratory infections was larger, while those with problems in other systems was smaller. The percentages of readmissions was similar to that mentioned in the literature. Pitterd and Gedder [6] mention a great percentage of readmissions after early discharge (3.05%) compared with those newborns with a longer stay (2.0%). The result of our study showed that only a small percentage of readmissions could be avoided by delaying discharge from the maternity clinic. Also early discharge did not seem to be directly connected with the health problems which appeared; the reduction in stay in the maternity clinic of newborns who were born by vaginal delivery did not show a significant increase in the frequency of health problems compared with those delivered by cesarean section.

In conclusion it would seen that the most frequent health problems in the first 15 days of life in newborns are jaundice and gastrointestinal distress and that early discharge from the maternity clinic did not seem to be directly connected with health problems which appeared during the neonatal period. Clearer explanations to patients of the possibility of jaundice and dehydration are vital before discharge. The parents should also be informed of the increased possibility of infections of the respiratory system expecially in large families.

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