Upsala J Med Sci 92: 301–314, 1987

Early and Late Discharge after Hospital Birth. Health of Mother and Infant in the Postpartum Period

Ulla Waldenström, Claes Sundelin and Gunilla Lindmark

Department of Obestetrics and Gynaecology and Department of Paediatrics, University Hospital, University of Uppsala, Uppsala, Sweden

ABSTRACT

Early discharge, defined as hospital leave 24-48 hours after birth, was introduced at Falun Hospital in 1984. 164 women interested in participating in an evaluative study of the program were randomly allocated in late pregnancy to an Experimental group (EG) offered early discharge, and a Control group (CG) offered the regular postpartum care in hospital. After medical and other withdrawals 24 h after the birth, 50 women remained in EG and 54 in CG.

Infant morbidity and number of prescribed medicaments during the first 6 months after the birth were lower in EG than in CG, but the difference was not statistically significant. EG mothers made fewer visits to the Child Health Centre nurse than did CG mothers ($p<0.05$). No significant difference in puerperal complications was demonstrated, but the intake of sedatives by EG mothers was smaller than that of CG mothers during the first puerperal week ($p<0.01$).

INTRODUCTION

The length of stay in hospital after normal birth varies from one country to another, depending on economic factors, attitudes to childbirth and traditions in obstetric care. Over the last 25 years there has been a trend in western countries towards shorter hospital stay. Special programs have been introduced for early discharge, often combined with medical supervision of mother and infant by home visits.

Shortage of hospital beds and the high cost of hospitalization were the reasons behind the first early discharge programs, introduced in New Orleans, in 1943 (6), Texas, 1956 (11), Bradford, 1959 (15) and New York, 1962 (7). These are

still important arguments for programs of early discharge but the psychological motives for family-oriented care and home birth alternatives have grown in importance during recent years (3, 5, 10, 14, 22).

When an early discharge program was introduced as a research project in Falun, Sweden in 1984 the motive was to offer the new family an opportunity to start together earlier after birth in a more natural setting, thus promoting optimal parent-infant contact.

The intention of the present paper is to analyse the medical outcome of the program. The hypothesis of the study is that there is no difference in medical outcome for mothers and infants discharged early vis-à-vis late in a selected group fulfilling low-risk criteria.

Because of the limited number of subjects in this study the risks connected with very rare neonatal complications could not be described. To elucidate this important issue, however, a review of the literature and a summary of a preparatory study of infant morbidity involving a larger number of subjects, is presented.

Infant and maternal morbidity and mortality - a review

The medical outcome of 15 different studies is presented in Table 1. The follow-up period usually ranged from 1 to 2 weeks, but in some studies it was not clearly indicated. The readmission rate for mothers was 0.9% (mean) and for infants, 1.7%. Reasons given for maternal readmission were endometritis, mastitis, late bleeding, infected episiotomy wound, cystitis, cervicitis, hypertension, and thrombophlebitis. The main reason for infant readmission was hyperbilirubinaemia. Other diagnoses were irritation, fever, poor feeding, superficial skin infection, cyanosis, bradycardia, meningitis and congenital malformations.

No maternal morbidity was reported, but four studies reported infant mortality ranging from 0.08% to 0.4%. Of the 11 infant deaths reported, 10 were diagnosed as follows: major congenital heart defect, 5; bronchpneumonia, 2; tentorial tear, 1; perforated caecum with peritonitis, 1; and left adrenal haemorrhage, 1. These deaths were not proved to be related to the time of hospital discharge.

All studies concluded that early discharge was safe for the

mother. Some investigators drew attention to certain risks for the baby, but considered them avoidable with a system of domiciliary visiting.

Table 1: Reported readmission of mothers and infants in 15 studies of early discharge after hospital birth

	Subjects	Discharge	Morbidity				Mortality			
	No.	Hours	Mother		Infant		Mother		Infant	
			no.	%	no.	%	no.	%	no.	%
Nabors & Herndon, 1956	6 608	-	107	1.6	-	-	0	0	0	0
Theobald, 1959	741	24-48	3	0.4	4	0.5	0	0	0	0
Theobald, 1962	3 000	24-48	9	0.3	13	0.4	0	0	1	0.03
Hellman et al., 1962	1 941	<72	32	1.6	20	1.0	0	0	1	0.05
Pinker & Frazer, 1964	259	>48	4	1.5	2	0.8	0	0	1	0.4
Arthurton & Bamford, 1967	9 718	<72	-	-	85	0.9	-	-	8	0.08
Craig & Muirhead, 1967	5 000	<60	-	0,3	-	-	0	0	-	-
Mehl et al., 1976	130	>3	2	1.5	0	0	0	0	0	0
Yanover et al., 1976	385	12-72	0	0	15	3.9	0	0	0	0
Neuenschwander et al., 1981	79	>2	0	0	3	3.8	0	0	0	0
Avery et al., 1982	154	12-24	3	1.9	9	5.8	-	-	-	-
Klöck et al., 1982	120	>2	2	1.7	0	0	0	0	0	0
Dudenhausen & Stauber 1983	401	>2	2	0.5	12	3.0	0	0	0	0
Thurston & Dundas, 1985	267	<48	2	0.7	3	1	0	0	0	0
Jansson, 1985	925	24-48	3	0.3	9	1	0	0	0	0

Preparatory study of infant morbidity

Infant morbidity during the first neonatal week, defined as admission to the neonatal unit, was studied retrospectively in 2 347 infants born at Falun Hospital in 1982 (20). Twenty-three of the infants admitted to the neonatal unit met the following early discharge criteria, set up especially for the study: gestational age >37 weeks, single birth, vaginal delivery, head presentation, birth weight ≥2 500 g, Apgar score ≥7 at 5 min, and no infant or maternal morbidity during the first 24 h after the birth. Thirteen of the 23 infants were admitted for jaundice and 10 for the following reasons: sepsis suspecta, 1; respiratory difficulties, 4; ABO immunization, 2; heart disease, 1; jitteriness, 1; and feeding problems, 1. The infant with a heart disease died after an operation in the

first week.

The group of 23 (1%) infants was considered as the medical problem with discharge from hospital 24-48 h post partum. In 22 of the 23, the first symptoms would probably have been discovered in time by the parents or by the domiciliary midwife. The remaining infant suffered a sudden attack of cyanosis, and it was impossible by the retrospective analysis of the hospital records to decide if hospitalization had been a determining factor for the outcome. The infant recovered after 10 min of ventilation with oxygen, and then received sepsis treatment. The final diagnosis was uncertain: infection or aspiration. Thus, 1 infant out of 2 347 (0.04%) may have been exposed to a life threatening danger if discharged early. When evaluating the medical risk of early infant discharge, this figure must be compared with the potential risk of a longer postnatal stay in hospital, such as the risk of infection.

MATERIAL AND METHODS

All pregnant women visiting the antenatal clinics at Falun and Borlänge, and giving birth at Falun Hospital between March 15, 1984 and June 30, 1985 were available for the study (1,604 women). Ten weeks before term they were invited to participate in an early discharge study, implying that they would be willing to leave hospital 24-48 h after birth, in combination with domiciliary visits during the following days, if they were allocated to the Experimental group (EG). On the other hand they stood a 50/50 chance of being allocated to a Control group (CG), offered traditional hospital care.

164 (10.2%) agreed to participate in the early discharge study under those conditions. A detailed questionnaire on social and demographic circumstances was sent to this group and to a 25% random sample of the non-participants in order to characterize the study population in relation to non-participants. These data were analysed and presented in another paper (18). Of the 164 women, 85 were randomly allocated to the planned EG and 79 to the planned CG. In order to minimize the influence of possible reactions of disappointment in CG women, they were informed about the outcome of the randomization within 1-2 weeks after their decision, about 8 weeks before the delivery. Parental reactions to the different alternatives of care are described more fully elsewhere (19).

After a paediatric examination of the infant and an obstetrical assessment of the mother 24 h after the delivery, 26% and 32% of the mother-infant couples in EG and CG respectively had to be excluded for not fulfilling the following medical early discharge criteria, formulated after the exploratory study of infant morbidity during the first neonatal week (20): pregnancy and birth free from significant complications, vaginal delivery, single birth, gestational age >37 weeks, birth weight ≥3 000 g, Apgar score ≥7 at 5 min and no significant infant or maternal morbidity during the first 24 h. Infants excluded are shown in Table 2. At the 24 h examination the paediatricians did not regard the following complications in either EG or CG as contra-indicating early discharge: birth weight 2 600-3 000 g (4/5), heart murmur (2/0), subluxation of hip (1/1), palsy of arm (1/0), fractured clavicle (0/2) and slight jaundice (1/1).

Maternal exclusions are shown in Table 3.

Table 2. Infants excluded from the planned Experimental (EG) and Control group (CG) for medical reasons, assessed 24 hours after birth

Complications	Number of infants	
	EG (n=85)	CG (n=79)
Gestational age ≤37 wk	4	2
Birth weight <3 000 g (>37 wk)	4	1
Respiratory difficulties	1	3
Jitteriness	2	2
Jaundice	2	1
Hypothermia	1	1
Sepsis suspecta	1	
Apgar score ≤ 7 at 5 min		1
Hypoglycaemia		1
Nausea and oral cyanosis		1
Shift of plaster		1
Anaemia		1
No complications	70	64

Table 3. Mothers excluded from the planned Experimental (EG) and Control group (CG) for medical reasons, assessed 24 hours after delivery

Complications	No. of women	
	EG (n=85)	CG (n=79)
Caesarean section	7	4
Excessive blood loss (>1000 ml)	2	4
Hypertension	1	
Pre-eclampsia		1
Thrombophlebitis		1
Rubella suspecta		1
Visual field constrictions	1	
Non-obstetrical complications		1
No complications	74	67

In the planned EG another 15% of the mothers withdrew from the follow-up study for the following non-obstetrical reasons: maternal fatigue, 4; husband not at home, 3; siblings or husband ill, 2; sudden death in family, 1; diagnosed inherited metabolic disorder in the infant, 1; and other reasons, 2. The potential bias in this group of withdrawals was given closer study, but their health outcome 6 months after the birth did not differ statistically from the final EG.

The Experimental group consisted ultimately of 50 families and the Control group of 54. A comparison of the groups, based on data collected from questionnaires 8 weeks before term and from hospital records, showed no statistically significant differences in any of the variables studied concerning parity, age, education, occupation, financial situation, housing conditions, distance to hospital, social contacts, number of hobbies, parental division of labour at home, participation in antenatal classes, anxiety about the birth and earlier experience of hospital care. There was no difference between the groups regarding number of complications during pregnancy or outcome of the delivery.

Some of the characteristics were as follows: mean ages were

28 and 27 years for EG and CG, respectively, and the proportions of primiparae were 20% and 30%. Forty-four per cent of the women in both groups had not continued their education beyond seconday school, while 28% in EG vis-a-vis 19% in CG had gone on university. Sixty per cent of EG women and 57% in CG were gainfully employed.

Definitions

Early discharge was defined as discharge 24-48 h after birth combined with domiciliary visits by a midwife 3-4 times during the first week at home. A home visit was also made 4 weeks before term. On the 5th day after the birth, parents returned to hospital for a paediatric examination of the infant.

Late discharge included all varieties except early discharge, that is, traditional hospital care as it was practised when the study started. The average length of stay in hospital was at that time 6 days after the delivery. Women allocated to CG were not prevented from earlier or even later discharge, but no home visits were offered.

Length of hospital stay

After delivery, women in EG spent an average of 1.5 nights in hospital, while women in CG stayed 4.1 nights.

Data collection

The infant follow-up extended over 6 months and maternal follow-up 6 weeks. Data were collected from hospital and Child Health Centre (CHC) records and from questionnaires to the parents 6 weeks after birth.

A paediatrician examined the infant 5 days after birth, in both EG and CG. EG women returned to the same hospital unit for the 5-day examination. Some CG infants had their second examination earlier, 14 on day 4 , 5 on day 3 and 3 on day 2, because they left hospital before the 5th day.

Information about consumption of sedatives and analgesics during the first puerperal week was collected in two ways. Women in EG gave information about their drug consumption after discharge in the 6-week questionnaire. Drug intake during hospital stay was collected from case records.

Statistical methods: The statistical methods used were Chi-square test and Student's t-test.

A more detailed description of the methods used in the whole study is published elsewhere (21).

RESULTS

Infants

There was no major difference in infant morbidity found at the examination 5 days after birth, vs. in maternal reports 6 weeks after the birth. Case records from the CHC reported more complications in CG when the whole period from hospital discharge to 6 months was observed (Table 4). More medicaments were prescribed to Control subjects than to Experimental subjects during the first 6 months (Table 5). None of those differences was statistically significant, however.

Table 5. Medicaments prescribed to infants from birth to 6 months (15 infants in the Experimental group and 21 in the Control group)

Medicine	Number of infants	
	EG (n=49)	CG (n=53)
Antifoam	9	11
Antichollinergic	3	5
Antibiotic, systematic	2	4
Antibiotic, topical	2	2
Nose drops	1	1
ß-adrenergic		1
Antihistamine	1	1
Antimycotic	1	3
Hydrocortisone, topical	1	2
Sedative		3

Of those 15% who withdrew from the planned EG for non-medical reasons, 60% of the infants had no complications during the first 6 months and 30% had medicaments prescribed.

Two infants were referred to the neonatal unit during the first week, one from each group. One EG infant was brought to

Table 4. Morbidity and mortality at 5 days, from birth to 6 weeks, and from hospital discharge to 6 months after birth among infants discharged from hospital early (EG) and late (CG). Some infants had more than one complication.

Health problems	Number of infants					
	5 days		6 weeks		6 months	
	Pediatric exam.		Maternal report		CHC records	
	EG	CG	EG	CG	EG	CG
	50	54	50	54	49	53
Slight jaundice	1	3	1			
Feeding problems	1					
Heart murmur	(2)	1	1		1	1
Conjunctivitis		1			2	2
Fractured clavicle		2				
Palsy of arm	(1)					
Subluxation of hip	(1)	1				
Respiratory and feeding problems		1				
Respiratory infections			3	5	11	14
Colic			5	1	9	12
Dermatological problems				2	4	3
Trash				1	1	3
Gastrointestinal problems				1	4	4
Sudden infant death						1
No problems (No.)	45	45	40	44	26	22
No problems (%)	90	83	80	82	53	42

The figures in parentheses denote complications observed 24 hours after birth, but not regarded as contra-indicating early discharge.

the hospital when 3 days old because of feeding problems and was sent home again 2 days later. One CG infant was sent from the postnatal to the neonatal unit when 3 days old because of respiratory and feeding problems, but was returned to the postnatal unit after one day's observation. At 4 months of age another CG infant was referred to hospital for care for 2 days with a diagnosis of obstructive bronchitis and virosis.

There was one case of sudden infant death in the CG, at the age of 2½ months.

No case of jaundice needing treatment occurred in either group. In the EG, 3 infants were tested for bilirubin in serum, and 6 in the CG.

In the questionnaire 6 weeks after birth, 46% of the EG mothers and 41 % in the CG reported that their babies had periods of crying that they interpreted as caused by "stomach ache". The problems lasted for 3 and 3½ weeks in EG and CG respectively. Six months after birth, 18% of the EG infants and 23% in CG had got medical treatment for colic pain. None of these differences were statistically significant.

Parents were routinely offered one domiciliary visit and three paediatric examinations at the CHC during the first 6 months. In addition they could visit the clinic nurse whenever they needed. As shown in Table 6, members of the two groups had equal numbers of home visits and paediatric examinations but more visits to the nurse were made by CG mothers.

Table 6. Number of visits to the Child Health Centre from birth to 6 months in Experimental (EG) and Control group (CG)

Kind of visit	EG (n=49)			CG (n=50)			
	Visits	Mean	SD	Visits	Mean	SD	
Home visits by CHC nurse	48	1.0		47	0.9		
Visits to CHC nurse	269	5.5	3.1	344	6.9	3.8	*
Visits to paediatrician	134	2.8	0.9	146	2.9	0.9	

* t=2.0; p<0.05

Mothers

Puerperal complications were few and no statistically significant difference was found between mothers in the two groups. There were no complications in the EG during the first

6 weeks post partum. One CG woman was referred to a psychiatric unit 7 days after delivery because of psychosis. One case of cervicitis and one of mastitis were diagnosed in the CG.

The consumption of sedatives (mainly Oxazepam) during the first puerperal week was smaller in the EG than in CG (Table 7). The total number of women using sedatives during the first puerperal week was 11 (22%) in EG and 16 (30%) in CG. The number of women using analgesics (mainly Paracetamol) during the first week was nearly the same in the two groups (Table 7).

Table 7. Use of sedatives and analgesics during the first puerperal week, before and after 48 hours post partum in Experimental (EG) and Control group (CG) (women in EG were all at home 48 hours after the birth)

Medicaments	Hours after birth	EG (n=49)	CG (n=54)
Sedatives	< 48	22%	20%
	> 48	2%	20% **
Analgesics	< 48	55%	52%
	> 48	39%	41%

** $X^2(1)=8.4$; $p<0.01$

DISCUSSION

The main objection to early discharge is the contention that the safety of the infant is jeopardized. The present study produced no evidence to support this opinion. On the other hand the sample size in the study was too small to warrant the conclusion that early discharge is just as safe as longer hospital stay - or vice versa.

The readmission rate of 2% for the infants during the first postnatal week tallied with the results of other investigations (Table 1), and with the results of the exploratory study (20).

The proportion of infants with complications during the first 6 months was somewhat higher in CG than in EG, and CG infants had more medicaments prescribed than did EG infants. These differences were not statistically significant, but may explain the greater number of visits to the CHC nurse in the CG than in the EG. Another explanation for this difference may be

greater self-confidence among EG than CG mothers, due to their taking a greater responsibility for the newborn. During the postpartum stay in hospital the CG mothers may have learnt to consult the nurses as soon as they had a problem and in this way they may have formed a pattern of solving problems with their newborn, based more on the reliance on professionals than on themselves.

The proportion of infants with complications during the first 6 months of life was surprisingly high in both groups (EG: 47% vs. CG: 58%). The fact that 18% of the EG infants and 23% in CG got medical treatment for colic pains is thought-provoking, considering that only low-risk infants were included in this study.

The frequent use of sleeping tablets by mothers in hospital can also be questioned, considering the passage of these drugs to the baby via the breastmilk. Thirty per cent of the CG women had taken one tablet or more during their hospital stay, despite the fact that all but one woman had an uncomplicated puerperium. The higher consumption by CG vis-a-vis EG mothers can be explained by the ease of access to and generous supply of sleeping pills in the postpartum units. Another explanation is that women in hospital feel in greater need of such drugs because of the unfamiliar and, for some women, disturbing surroundings.

To sum up, early discharge combined with domiciliary follow-up and a paediatric examination about one week after birth was found to be a safe alternative for mothers and infants fulfilling the selection criteria.

ACKNOWLEDGEMENT

This study was supported by grants from The Swedish Ministry of Health and Social Affairs, Commission for Social Research (Project no. F 83/18).

REFERENCES

1. Arthurton, M.W. & Bamford, F.N. Paediatric aspects of the early discharge of maternity patients. Brit Med J iii:517-520, 1976.

2. Avery, M.D., Fournier, L.C., Jones, P.L. & Sopovic, C.P. An early postpartum hospital discharge program. Implementation and evaluation. JOGN Nurs 7:233-235, 1982.

3. Britton, H.L. & Britton, J.R. Efficacy of early newborn discharge in middle-class population. Am J Dis Child 138: 1041-1046, 1984.

4. Craig, G.A. & Muirhead, J.M.B. Obstetric aspects of the early discharge of maternity patients. Brit Med J iii:520-522,1967.

5. Dudenhausen, J.W. & Stauber, M. Erfahrungen mit der sogenannten ambulanten Geburt in der Klinik. Arch Gynecol 235:617-623,1983.

6. Guerriero, W.F. A maternal welfare program for New Orleans. Am J Obstet Gynecol 46:312,1943.

7. Hellman, L.M., Kohl, S.G. & Palmer, J. Early hospital discharge in obstetrics. Lancet i:227-232,1962.

8. Jansson, P. Early postpartum discharge. Am J Nursing 5:547-550, 1985.

9. Klöck, F.K., Harms, E. & Sieberz, J. Erfahrungen mit der ambulanten Geburt. In: Hillemans HG, Steiner H, Richter D, eds. Die humane, familienorientierte und sichere Geburt. Stuttgart: Georg Thieme, 84-86,1982.

10. Mehl, L.E., Peterson, G.H., Sokolosky, W. & Whitt, M.C. Outcomes of early discharge after normal birth. Birth and the Fam J 3:101-107,1976.

11. Nabors, G.C. & Herndon, E.T. Home puerperal care following hospital delivery. Obstet Gynecol 7:211,1956.

12. Neuenschwander, F., Meier, M. & Witschi, M. Die ambulante Geburt: Erfahrungen und Organisation. Ther Umsch 38:981-984, 1981.

13. Pinker, G.D. & Fraser, A.C. Early discharge of maternity patients. Brit Med J 7:99-100,1964.

14. Scupholme, A. Postpartum early discharge: An inner city experience. J Nurs Mid 26:19-22,1981.

15. Theobald, G.W. Home on the second day: The Bradford experiment. Brit Med J ii:1364,1959.

16. Theobald, G.W. Weekly antenatal care and home on the second day. Lancet 4:735-737,1962.

17. Thurston, N.E. & Dundas, J.B. Evaluation of an early post partum discharge program. Can J Public Health 76:384-387, 1985.

18. Waldenström, U. & Lindmark, G. Early and late discharge after hospital birth. A comparative study of parental background characteristics. Scand J Soc Med. Accepted.

19. Waldenström, U. Early discharge with domiciliary visits and hospital care: parents' experiences of two modes of postpartum care. Scand J Caring Sci. Accepted.

20. Waldenström, U. & Lindmark, G. Is early discharge possible from a medical point of view. Läkartidningen 80:4286-4289, 1983 (Swe).

21. Waldenström, U., Lindmark, G. & Sundelin, C. Methodological problems of clinical trials in nursing illustrated by a study postpartum care. Scand J Caring Sci. In press.

22. Yanover, M.J, Jones, D.J. & Miller, M.D. Perinatal care of low-risk mothers and infants: Early discharge with home care. N Engl J Med 294:702-705,1976.

Address for reprints:
Ulla Waldenström
Department of Obstetrics and Gynaecology
University Hospital
S-751 85 Uppsala