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Transfers to hospital in planned home birth in four Nordic countries – a prospective cohort study

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Key words
Planned home birth, transfer to hospital, indications for transfers, potentially urgent transfer, midwifery

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Conflict of interest
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Abstract

Introduction. Women planning a home birth are transferred to hospital in case of complications or elevated risk for adverse outcomes. The aim of the present study was to describe the indications for transfer to hospital in planned home births, and the proportion of cases in which this occurs. *Material and methods.* Women in Norway, Sweden, Denmark and Iceland who had opted for, and were accepted for, home birth at the onset of labor, were included in the study. Data from 3068 women, 572 nulliparas and 2446 multiparas, were analyzed for proportion of transfers during labor and within 72 h after birth, indications for transfer, how long before or after birth the transfer started, time from birth to start of transfer, duration and mode of transfer, and whether the transfer was classified as potentially urgent. Analyses were stratified for nulliparity and multiparity. *Results.* One-third (186/572) of the nulliparas were transferred to hospital, 137 (24.0%) during labor and 49 (8.6%) after the birth. Of the multiparas, 195/2446 (8.0%) were transferred, 118 (4.8%) during labor and 77 (3.2%) after birth. The most common indication for transfers during labor was slow progress. In transfers after birth, postpartum hemorrhage, tears and neonatal respiratory problems were the most common indications. A total of 116 of the 3068 women had transfers classified as potentially urgent. *Conclusions.* One-third of all nulliparous and 8.0% of multiparous women were transferred during labor or within 72 h of the birth. The proportion of potentially urgent transfers was 3.8%.

Introduction

In Western countries, up to one-third of women planning to give birth at home are transferred to hospital during labor or after the birth (1). Compared with low-risk women planning to give birth in a hospital, there is evidence that low-risk women planning to give birth at

Key Message

Transfers to hospital during labor or within 72 h after birth occurred in one-third of nulliparous women and 8.0% of multiparous women. Most transfers were nonurgent; the overall proportion of potentially urgent transfers was 3.8%.

home have fewer interventions in labor, including cesarean sections, assisted vaginal deliveries, oxytocin augmentation and epidural analgesia (2–6).

The total population of Norway, Sweden, Denmark and Iceland is 20.5 million, with a combined annual birth rate of 220 000 births. Women receive free care and treatment during pregnancy.

The majority of births are in obstetric units, with a smaller proportion in midwife-led units and at home. Between 1 and 2% of all births are planned at home in Denmark (7), 2.2% in Iceland (8), 0.7/1000 in Sweden (9) and 1.5/1000 in Norway (6). In Norway, Sweden and Iceland, women have to find a midwife willing to assist the birth and only low-risk women are accepted for home birth. In Denmark, women have the right to be attended by a midwife at home, even when they have been advised to give birth in an obstetric unit. In Norway, Sweden, Iceland and some Danish regions, the woman will usually be attended by a midwife she has met during pregnancy, and who provided antenatal care. In other Danish regions, she may be attended by a midwife from the nearest hospital, without any particular experience or interest in home births, and the woman and midwife have never met before onset of labor. Denmark, Norway and Iceland, but not Sweden, have national guidelines on how to manage planned home births (7).

Maternal and neonatal outcomes are registered in national birth registries in all Nordic countries. However, planned home births are not systematically registered according to the principle of intention-to-treat, and hospital transfers in such cases and the reasons for them are not described.

Many previous studies on transfers to hospital in planned home births have not reported on indications for transfers, proportion of potentially urgent transfers or used stratified analyses by nulliparity and multiparity (1). Hence, the findings in this study will be useful for midwives, obstetricians and others providing antenatal care, and for women considering home births. Caregivers should be able to give evidence-based information about the probability of transfers during and after a planned home birth, and why they might be necessary.

This study aims to describe how often women and neonates were transferred from home to hospital during labor or after birth; the indications for transfer; how long before or after birth the transfer started; mode and duration of transfer; and the proportion of transfers classified as potentially urgent.

Material and methods

This was an almost fully prospective cohort study using data collected from planned home births in Norway, Denmark, Sweden and Iceland between 2008 and 2013. All midwives attending home births were asked to recruit their clients to the study. The women were given information about the study during pregnancy or labor, and signed a consent form agreeing to participate. All women who had opted for, and were accepted to, home birth at the onset of labor were eligible for inclusion.

Data were collected from 1 January 2008 to 31 December 2012 in Norway, 1 January 2009 to 31 December 2013 in Sweden, 1 March 2010 to 15 May 2013 in Denmark, and 1 January 2010 to 31 December 2013 in Iceland. For all births in Sweden and Iceland and some in Denmark, the data were entered into a web-based form and transferred into a data file. In Norway and for 70% of the Danish births, data were entered into a form and sent by post or e-mailed to the national study coordinator, who entered the data into a data file. The midwife who attended the birth filled in the form and submitted it 1 week after birth. In some cases, the midwives forgot to fill the forms and did so when they remembered, or perhaps were reminded. Therefore, parts of the data were collected retrospectively and, especially in Denmark, planned home births were not reported.

The following variables were registered: maternal age, civil status (married/cohabitant or single), country of residence, body mass index, smoking habits, parity, previous cesarean section, gestational age, estimated amount of blood loss, fetal presentation, mode of birth, birthweight, Apgar scores, any treatment given to the mother or baby, maternal death, stillbirths, neonatal deaths within the first 7 days of life, whether the woman and/or baby were transferred to hospital, time between the start of transfer and the birth or between the birth and the start of transfer, mode of transfer, duration of transfer and whether the transfer was classified as potentially urgent or nonurgent. Transfers were defined as potentially urgent if the indication for transfer was recorded as suspected or manifest fetal distress, antepartum hemorrhage, slow progress or detection of breech position in the second stage of labor, postpartum hemorrhage, low Apgar score, respiratory problems or other potentially urgent situations, at the discretion of the assisting midwife.

To ensure that women who met the inclusion criteria were recruited to the study, the coordinators contacted home birth midwives regularly by e-mail and telephone. Members of the study group were also invited to meetings arranged by home birth midwives, and informed about the study.

The databases were merged, and obviously erroneous values were deleted and registered as missing. We performed the following analyses: numbers, proportions, means, medians, standard deviations, ranges, differences in proportions and 95% confidence intervals. Analyses were stratified for parity (nulliparity, multiparity and unknown). The IBM SPSS Statistics for Windows version

21.0. data program (IBM Corp., Armonk, NY, USA) was used for the analyses.

The study was approved separately in each of the participating countries, by the Regional Committee for Medical and Health Research Ethics (REC North) (200704605-5) in Norway, by the Regional Committee at Karolinska Institutet (2009/147-31) in Sweden, by The Capital Region Committee on Health Research Ethics (H-3-2014-FSP71) in Denmark, and by The National Bioethics Committee (No. 11-031) in Iceland.

Results

We collected data from 3068 planned home births, 482 from Norway, 445 from Sweden, 1843 from Denmark and 298 from Iceland (see Supplementary material, Table S1). During the same period, the Medical Birth Registry of Norway registered 488 planned home births. The Medical Birth Registry of Sweden does not register planned home births, but according to the Association for Home Births, an association for midwives and parents, there were about 460 planned home births between 2009 and 2013 (Cina Madison, personal communication, January 2015). In Denmark, it is estimated that there were between 2000 and 2400 planned home births during the study period. The actual number is uncertain as the number of home births in 2011 was assessed to be 841 according to a publication from The Danish Health and Medicines Authority (10) and 550 according to The State Serum Institute (11). Furthermore, it was noted that due to poor data quality, too few home births have been registered (11). In Iceland, it is estimated that there were approximately 360 planned home births during the data collection period (12). These estimates suggest that we have data from more than 90% of the planned home births in Norway and Sweden and 80% in Iceland. The proportion from Denmark is 90% at best, but probably less.

A total of 2446 women (81.4%) were multiparous, 2922 (97.5%) were married or cohabitants, 204 (6.6%) were smokers and 138 (4.5%) had had a previous cesarean section. Table 1 shows the characteristics of the study population.

Total transfers

Table 2 contains detailed numbers of transfers, together with their indications, mode and duration. Of the 3068 women, 402 (13.1%) were transferred to hospital during labor or within 72 h of giving birth, including 32.7% of all nulliparous and 8.0% of all multiparous women (difference 24.7%; 95% CI 20.7–28.9). Data about parity were missing for 50 women, of whom 21 (42.0%) were transferred.

The transfer rates differed across the countries, and were 9.4, 12.1, 13.1 and 24.8% in Sweden, Denmark, Norway and Iceland, respectively. Transfer rates for nulliparous women were 25.7% (Sweden), 28.5% (Denmark), 34.4% (Norway) and 57.4% (Iceland). In multiparous women, transfer rates were 6.2% (Sweden), 7.2% (Denmark), 8.2% (Norway) and 15.2% (Iceland). Supplementary material, Table S2, gives information about transfer rates in each country.

Transfers during labor

Most transfers occurred during labor, before the birth of the baby. A total of 271 women (8.8%) were transferred to hospital before birth. In nulliparas and multiparas, transfer rates during labor were 24.0 and 4.8%, respectively (difference 19.2%; 95% CI 15.7–22.9). The rate was 42.0% for women whose parity was not recorded.

The median time interval from the start of the transport to the birth of the baby was 3 h 34 min (range 20 min to 24 h). In nulliparas, the median time interval was 4 h 30 min and in multiparas, 2 h 45 min. The most common reason for transfer was slow progress, both in nulliparous and multiparous women. (Table 2).

Transfers after the birth

In total, 131 (4.3%) women and/or neonates were transferred after the birth. The transfer rates in nulliparas and multiparas were 8.6 and 3.2% (difference 5.4%; 95% CI 3.1–8.1). The most common maternal indications for transfer were postpartum hemorrhage and tearing that needed to be repaired by an obstetrician. The most common neonatal indication was respiratory problems/low Apgar score. Median time interval from the birth to the start of the transfer was 1 h 45 min (range 8 min to 48 h). In 36 women (27.5%), the transfer started within 1 h after the birth, and in 52 women (39.7%), between 1 and 6 h after the birth (Table 2).

Potentially urgent transfers

In total, 116 transfers (28.9% of all transfers and 3.8% of all deliveries) were classified as potentially urgent, of which 55 occurred before and 61 after the birth of the baby. Forty-eight (8.7%) nulliparous and 61 (2.5%) multiparous women had a potentially urgent transfer (difference 6.2%; 95% CI 3.9–8.9). The most common indications for potentially urgent transfers were suspected fetal distress, postpartum hemorrhage and respiratory problems/low Apgar score (Table 2).

In 83 of the 116 transfers (71.6%) for potentially urgent reasons, no medical treatment was needed on

Table 1. Characteristics of the 3068 women who planned and were approved for home birth.

	Total study population (n = 3068)		Nulliparas (n = 572)		Multiparas (n = 2446)		Parity missing (n = 50)	
Country, *n* (%)								
Norway	482	15.7	90	15.7	391	16.0	1	2.0
Sweden	445	14.5	74	12.9	370	15.1	1	2.0
Denmark	1843	60.1	340	59.4	1455	59.5	48	96.0
Iceland	298	9.7	68	11.9	230	9.4	0	–
Missing	0	–	0	–	0	–	0	–
Age (years), *n* (%)								
<20	10	0.3	6	1.0	4	0.2	0	–
20–24	201	6.6	87	15.2	110	4.5	4	8.0
25–29	767	25.0	230	40.2	520	21.2	17	34.0
30–34	1199	39.1	185	32.3	995	40.7	19	38.0
35–39	736	24.0	53	9.3	677	27.7	6	12.0
≥40	138	4.4	10	1.7	127	5.2	1	2.0
Missing	17	0.6	1	0.2	13	0.5	3	6.0
BMI (kg/m^2)[a], *n* (%)								
<18.5	103	3.4	25	4.4	75	3.0	3	6.0
18.5–24.9	1994	65.0	371	64.9	1589	65.0	34	68.0
25–29.9	535	17.4	91	15.9	438	17.9	6	12.0
≥30	199	6.5	24	4.1	173	7.1	2	4.0
Missing	237	7.7	61	10.7	171	7.0	5	10.0
Mean BMI (kg/m^2), SD (range) Missing	23.4	3.8 (15.2–43.4)	22.9	3.4 (16.2–38.1)	23.6	3.9 (15.2–43.4)	22.3	3.8 (17.1–37.3)
Civil status, *n*. (%)								
Married/cohabitant	2992	97.5	556	97.2	2388	97.6	48	96.0
Single	48	1.6	12	2.1	36	1.5	0	–
Missing	28	0.9	4	0.7	22	0.9	2	4.0
Smokers, *n* (%)								
No	2805	91.4	518	90.6	2244	91.7	43	86.0
Yes	204	6.7	38	6.6	163	6.7	3	6.0
Missing	59	1.9	16	2.8	39	1.6	4	8.0
Previous CS, *n* (%)								
No	2923	95.3	–	–	2301	94.1	50	100
Yes	144	4.7	–	–	144	5.9	0	–
Missing	1	0.0	–	–	1	0.0	0	–
Gestational age (weeks), *n* (%)								
<37	8	0.3	3	0.5	5	0.2	0	–
37–42	2956	96.3	541	94.6	2371	96.9	44	88.0
>42	22	0.7	8	1.4	14	0.6	0	–
Missing	82	2.7	20	3.5	56	2.3	6	12.0
Fetal presentation, *n* (%)								
Occipito-anterior	2887	94.1	516	90.2	2330	95.3	41	82.0
Abnormal cephalic[b]	126	4.1	38	6.6	81	3.3	7	14.0
Breech	7	0.2	2	0.3	5	0.2	0	–
Missing	48	1.6	16	1.9	30	1.2	2	4.0
Birthweight (g), mean (SD) (range)	3687	459 (2070–6380)	3552	438 (2210–5520)	3718	457 (2070–6380)	3672	505 (2940–5200)
Missing, *n* (%)	85	2.8	23	4.0	78	3.2	4	8.0

[a]Prepregnancy weight or weight measured at first consultation <12-week gestational age.
[b]Includes occipito-posterior presentations, face and brow presentations and unspecified abnormal cephalic presentations.
BMI, body mass index; CS, cesarean section.

Table 2. Transfers to hospital during labor and within 72 h after the birth.

	Total study population (n = 3068)		Nulliparas (n = 572)		Multiparas (n = 2446)		Parity missing (n = 50)	
All transfers (during labor and after birth), n (%)	402/3068	13.1	186/572	32.5	195/2446	8.0	21/50	42.0
Transfers during labor, n (%)	271/3068	8.8	137/572	24.0	118/2446	4.8	16/50	32.0
Indications								
Slow progress of labor	143/271	52.8	83/137	60.6	50/118	42.4	10/16	62.4
Need for medical pain relief	33/271	12.2	10/137	7.3	19/118	16.1	4/16	25.0
Suspected/manifest fetal distress	33/271	12.2	16/137	11.7	16/118	13.6	1/16	6.3
Midwife not available/not able to reach the woman's home in time	5/271	1.8	3/137	2.2	2/118	1.7	0/16	
Woman changed her mind (during labor)	3/271	1.1	1/137	0.7	2/118	1.7	0/16	
Abnormal cephalic/breech presentation	6/271	2.2	3/137	2.2	3/118	2.5	0/16	
Other reasons[a]	28/271	10.3	12/137	8.7	16/118	13.6	0/16	
Indication missing	20/271	7.4	9/137	6.6	10/118	8.4	1/16	6.3
Time from transport started to birth, in women transferred during labor								
≤1 h	24/271	8.9	9/137	6.6	11/118	9.3	4/16	25.0
>1–3 h	77/271	28.4	35/137	25.5	40/118	33.9	2/16	12.5
>3–6 h	58/271	21.4	30/137	21.9	26/118	22.0	2/16	12.5
>6 h	63/271	23.2	42/137	30.7	16/118	13.6	5/16	31.3
Missing	49/271	18.1	21/137	15.3	25/118	21.2	3/16	18.7
Median time in min (range)	212	(20–1440)	270	(20–1440)	165	(20–1080)	190	(43–720)
Transfers after the birth, n (%)	131/3068	4.3	49/572	8.6	77/2446	3.2	5/50	10.0
Maternal indications	(n = 96[d])		(n = 37[d])		(n = 55[d])		(n = 4)	
Postpartum hemorrhage	36/96	37.5	13/37	35.2	23/55	41.8	0/4	
Retained placenta	17/96	17.7	5/37	13.5	12/55	21.8	0/4	
Tear to be sutured/assessed by consultant	34/96	35.4	16/37	43.2	15/55	27.3	3/4	75.0
Other indications[b]	5/96	5.2	2/37	5.4	2/55	3.6	1/4	25.0
Indication missing	4/96	4.2	1/37	2.7	3/55	5.5	0/4	
Neonatal indications, n (%)	(n = 38[d])		(n = 14[d])		(n = 23[d])		(n = 1)	
Respiratory problems/low Apgar score	23/38	60.5	9/14	64.3	12/23	52.2	1/1	100
Malformation	2/38	5.3	0/14		2/23	8.7	0/1	
Suspected infection	1/38	2.6	0/14		1/23	4.3	0/1	
Jaundice	3/38	7.9	1/14	7.1	2/23	13.0	0/1	
Other indications[c]	8/38	21.0	4/14	28.6	4/23	17.4	0/1	
Indication missing	1/38	2.6	0/14		1/23	4.3	0/1	
Time from birth to start of transfer to hospital in women and infants transferred after the birth, n (%)								
≤1 h	36/131	27.5	12/49	24.5	24/77	31.2	0/5	
>1–6 h	52/131	39.7	20/49	40.8	28/77	36.4	4/5	80.0
>6–24 h	2/131	1.5	1/49	2.0	1/77	1.3	0/5	
>24–72 h	4/131	3.1	1/49	2.0	3/77	3.9	0/5	
Missing	37/131	28.2	15/49	30.6	21/77	27.2	1/5	20.0
Median time in min (range)	105	(8–2880)	115	(8–2880)	80	(10–2880)	162	(120–240)
Urgency of transfer								
Non-urgent transfer	256/402	63.7	127/186	68.3	116/195	59.5	13/21	61.9
Potentially urgent transfer[d]	116/402	28.9	48/186	25.8	61/195	31.3	7/21	33.3
Missing	30/402	7.5	11/186	5.9	18/195	9.2	1/21	4.8
Vehicle used for transport, in nonurgent transfers, n (%)								
Private car	126/256	49.2	70/127	55.1	52/116	44.8	4/13	30.8
Taxi	14/256	5.5	4/127	3.2	9/116	7.8	1/13	7.7
Ambulance car	99/256	38.6	52/127	40.9	39/116	33.6	8/13	61.5

Table 2. Continued

	Total study population (n = 3068)		Nulliparas (n = 572)		Multiparas (n = 2446)		Parity missing (n = 50)	
Ambulance helicopter	1/256	0.4	0/127	–	1/116	0.9	0/13	–
Other	1/256	0.4	1/127	0.8	0/116	–	0/13	–
Missing	15/256	5.9	0/127	–	15/116	12.9	0/13	–
Duration transport, in nonurgent transfers, *n* (%)								
≤ 30 min	175/256	68.4	93/127	73.2	72/116	62.1	10/13	76.9
31–60 min	29/256	11.3	14/127	11.0	15/116	12.9	0/13	–
> 60 min	2/256	0.8	2/127	1.6	0/1116	–	0/13	–
Missing	50/256	19.5	18/127	14.2	29/116	25.0	3/13	23.1
Median time in min (range)	20	(3–95)	15	(3–95)	20	(3–60)	20	(10–30)
Vehicle used for transport, in potentially urgent transfers, *n* (%)								
Private car	18/116	15.5	10/48	20.8	8/61	13.1	7/7	100
Taxi	3/116	2.6	2/48	4.2	1/61	1.6	0/7	–
Ambulance car	91/116	78.4	35/48	79.2	49/61	80.3	0/7	–
Ambulance helicopter	1/116	0.9	0/48	–	1/61	1.6	0/7	–
Missing	3/116	2.6	1/48	2.1	2/61	3.3	0/7	–
Duration transport, in potentially urgent transfers, *n* (%)								
≤30 min	99/116	85.3	41/48	85.4	51/61	83.6	7/7	100
31–60 min	4/116	3.4	1/48	10.5	3/61	4.9	0/7	–
>60 min	0/116	–	0/19	–	0/61	–	0/7	–
Missing	13/116	11.2	6/48	12.5	7/61	11.5	0/7	–
Median time in min (range)	15	(5–45)	15	(5–45)	15	(5–45)	15	(10–30)

[a]Other indications: five not described; four elevated blood pressure; two fever; one irregular fetal heart rate; eight prelabor rupture of membranes; one low blood sugar; one mother unconscious; one exhausted mother; one suspected risk for uterine rupture; one suspected placental abruption; three vaginal bleedings.

[b]Other indications: two infections/maternal fever; one low blood pressure; one mother dizzy/unwell; one breastfeeding problems.

[c]Other indications: one umbilical cord rupture and bleeding, one for observation after clavicle fracture following shoulder dystocia, two low birthweight, one to be assessed by a pediatrician after vacuum extraction for fetal distress at home, one bleeding because of vasa previa, one meconium aspiration, one transferred 4 h after the birth because the parents felt unsafe.

[d]In three cases, both mother and infant were transferred, resulting in three more indications than transfers as the denominator is number of deliveries.

arrival at the hospital. Of the 55 women transferred before birth, nine had an instrumental delivery and eight had a cesarean section. In five cases, the operative delivery was performed within an hour of the transfer. Among the 61 women transferred after giving birth, three received a blood transfusion, three had a manual removal of the placenta and eight had both. One neonate needed a respirator and another nasal continuous positive airway pressure (CPAP) treatment. Indications for the potentially urgent transfers are in Supplementary material, Table S3.

Mode and duration of transfers

In the 332 transfers for nonurgent reasons, a private car was the most commonly used vehicle (49.2%), followed by an ambulance car (38.7%). In 14 cases (5.5%), a taxi was used for the transfer. In 68.4% of cases, the transfer was completed within 30 min. In two women (0.6%), it took more than 1 h. Information on duration of the transfer was missing in 22.9% of the women. The median duration of the nonurgent transfers was 20 min (range 3–95 min) (Table 2).

Of the 116 women or infants transferred for potentially urgent reasons, an ambulance car was used in 91 cases (78.4%), ambulance helicopter in one, and private car or taxi in 21 (15.5%). The median duration of potentially urgent transfers was 15 min (range 5–45 min) (Table 2).

Discussion

In this study, 32.7% of nulliparous and 8.0% of multiparous women were transferred to hospital during labor or after the birth. The most common reasons for transfer were slow labor progress, need for medical pain relief and suspected fetal distress. In total, 28.9% of transfers, 3.8% of all deliveries, were classified as potentially urgent.

A strength of this study is that it included the majority of planned home births in all four countries during the study period. One limitation is that our only data source was the attending midwives. Diagnoses and other information were not verified through patient files or other sources. Another limitation is that planned home births are not systematically registered, and so it was impossible to assess the exact number in the four countries. In Norway, Sweden and Iceland, there are few home births and few midwives attending them. We are quite sure that we know all midwives attending home births, and that we have collected data from practically all planned home births in these countries. Collecting data in Denmark was challenging as there are many home births and all midwives may attend home births. We did attempt to give all midwives information about the study several times during the data collection period. It is impossible to estimate the proportion missed, but missed home births occurred probably more often among planned home births organized from hospitals than in settings with more experienced and dedicated midwives. The missed home births probably had a higher rate of transfers as previous research has shown that a known midwife reduces the rate of transfers (9) and some large Danish hospital units organizing home births had transfer rates up to 60% in nulliparous women (Ole Olsen, personal communication, October 2015).

Our findings are in line with previous studies from Norway and Sweden. In a Swedish study of home births between 1992 and 2005, 23.4% of nulliparous and 9.1% of multiparous women were transferred to hospital during labor or after the birth (9). In a Norwegian study with data from 1990 to 2007, 31.7% of the nulliparous and 6.3% multiparous women were transferred (6). An Icelandic study including home births from 2005 to 2009 found that 39.1% of nulliparous and 12.3% of multiparous women were transferred (8).

A study reporting outcomes from all planned home births in England with National Health Service midwives in 2008–2010 reported higher proportions of transfer, 45.4 and 12.0% for nulliparous and multiparous women, respectively (2). A Dutch study (13) reported transfers from home to hospital in 49.3% of nulliparous and 12.1% of multiparous women in 2000–2008.

We found a higher rate of transfers in Iceland than in the other Nordic countries. There were slightly more nulliparous women in the Icelandic cohort, but this does not explain the difference. Iceland's low population density, harsh terrain, unpredictable weather and risk of difficult transportation could be part of the reason, although this is also true for other parts of the region, especially Norway. Transfer rates in Iceland are, however, comparable to those in England and the Netherlands (2,13). There are probably also variations within different areas and practices within each country. A recent study from the Netherlands (14) found that the transfer rate varied from 10 to 63% between different midwifery practices, and that the variation could not be explained by medical factors or client characteristics alone. The authors state that factors related to the midwifery practice are strong contributors to the variation in transfer rates.

Transfers should not be regarded as an adverse outcome, and are not necessarily indicators of quality of care. High rates of transfer may be for nonmedical reasons such as traffic or weather conditions. It is difficult to assess what transfer rate provides the best outcomes of care. A very high transfer rate, however, may lead to unnecessary interventions and also lower patient satisfaction. A Dutch study investigating maternal sense of control found that women transferred from midwife-led care at home to obstetric-led care in hospital reported lower feelings of control during labor than those who were not transferred (15).

In this study, the most common reason for transfers was slow labor progress (52.8% of all transfers and 4.7% of the study population). Slow progress and failure to progress are not clearly defined and may vary between individual midwives and regions. This is slightly lower than the figure reported in a recent systematic review (1).

We found that the proportion of potentially urgent transfers was 3.8% (116/3068). Previous studies have reported figures from 0 to 5.4% (1,9,14,16). The definitions of an urgent transfer varied across these studies, making them difficult to compare.

Median transport time was 20 min for nonurgent and 15 min for potentially urgent transfers. We do not have data for how long it took to arrange the transfer, therefore we do not know the overall time from decision to arrival at the hospital. In transfers for nonurgent reasons, the time from decision to transfer likely does not influence the outcomes of care, but a long overall transfer time could lead to poorer outcomes in potentially urgent transfers. It is reasonable to estimate about 20 min to arrange the transfer (T. Wisborg, Director, Norwegian National Advisory Unit on Trauma, personal communication, March 2015). An English study assessing duration and urgency of transfers in 13 175 home births found median overall transport time for potentially urgent transfers to be 42 min (16). The overall transport time is dependent on the distance between the woman's home and the hospital. We did not collect data on distances from home to hospital. According to the home birth midwives, the majority of planned home births in the Nordic countries are in or around the bigger cities, with short distances to the nearest hospital. Our findings support this assumption.

Conclusion

One-third of nulliparous and 8.0% of multiparous women were transferred to hospital during labor or within 72 h of giving birth. Transport from home to hospital commonly took approximately 15–20 min. Most transfers (63.7%) were for nonurgent reasons. Women planning a home birth should receive information about the possibility of transfer and about its potential mode and duration.

As the official registration of planned home births is poor, we recommend that public authorities do this systematically. There should be a concise definition and documentation of planned home births, i.e. the woman had planned and was accepted for home birth, at the onset of labor. Transfers during labor and after the birth should be registered together with indication for transfer.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Table S1. Parity of the study population in each country.

Table S2. Transfer to hospital rates for each country.

Table S3. Indications for hospital transfer in 116 cases of potentially urgent transfers.

