

AOGS MAIN RESEARCH ARTICLE

Postpartum infections: occurrence, healthcare contacts and association with breastfeeding

PEDER AHNFELDT-MOLLERUP¹, LINE KIRKEBY PETERSEN², JAKOB KRAGSTRUP¹, RENÉ DEPONT CHRISTENSEN¹ & BENTE SØRENSEN³

¹Research Unit of General Practice, Institute of Public Health, University of Southern Denmark, ²Lægerne Vedelsgade 1 Clinic, Vejle, and ³Department of Gynecology and Obstetrics, Horsens Hospital, Horsens, Denmark

Key words

Breastfeeding, cesarean section, mastitis, postdischarge, postpartum infection, puerperium, vaginal delivery

Correspondence

Peder Ahnfeldt-Møllerup, Research Unit of General Practice, University of Southern Denmark, J.B. Winsløvs Vej 9A, 1, DK-5000 Odense C, Denmark. E-mail: pahnfeldt-mollerup@health.sdu.dk

Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

Please cite this article as: Ahnfeldt-Møllerup P, Petersen LK, Kragstrup J, Christensen RD, Sørensen B. Postpartum infections: occurrence, healthcare contacts and association with breastfeeding. *Acta Obstet Gynecol Scand* 2012;91:1440–1444.

Received: 23 September 2011

Accepted: 1 September 2012

DOI: 10.1111/aogs.12008

Introduction

The incidence of postpartum infection has been estimated to be 1–4% after vaginal delivery and 10–20% after cesarean section, depending on definition (1,2). Existing reports are usually based solely on hospital medical records. In the few studies where infections were diagnosed in a general practice setting, a relatively high incidence of infections was found (1,3). In many countries, including Denmark, the trend is now that women are discharged early after delivery and it may, therefore, be expected that an increased number of postpartum infections will be diagnosed and treated by the general practitioner (GP) and/or remain unreported within the

Abstract

Objective. To investigate the following: (i) the occurrence of postpartum infections; (ii) the frequency of contact with either a general practitioner or a hospital due to postpartum infections; and (iii) the association of postpartum infections with continuation of breastfeeding. **Design.** Cross-sectional study. **Setting.** Department of Gynecology and Obstetrics Horsens Hospital, Horsens, Denmark. **Population.** A total of 1871 women who gave birth at a regional hospital in Denmark over a one-year period (2007–2008). **Methods.** Data were collected by a questionnaire given to the women and combined with data from general practitioner and hospital records. **Main outcome measures.** The distribution of different infections, as well as the overall occurrence of any infection, was evaluated according to mode of delivery and breastfeeding status (stopped/continued). **Results.** Within four weeks after delivery, 24% of all women had experienced one or more self-reported episode of infection. Breast infections (12%) were most frequent, followed by wound (3%), airway (3%), vaginal (3%) and urinary tract infections (3%), endometritis (2%) and “other infections” (2%). Of the women with an infection, 66% (265 of 395) contacted their general practitioner, while 9% (37 of 395) had contact with a hospital. A significantly larger proportion of women with a postpartum infection stopped breastfeeding (21%) within the first four weeks after delivery compared with women without infection (12%; $p < 0.001$). **Conclusions.** Postpartum infections were common, and the occurrence is likely to be underestimated if based on hospital medical records only. Infection was associated with higher rates of discontinuation of breastfeeding.

Abbreviations: GP, general practitioner.

healthcare system. Postpartum infection is an infection that occurs following childbirth. The diagnostic criteria require that the woman has a temperature over 38.6°C during the

Key Message

Postpartum infection is more common than has often been indicated. Up to one in four women will experience some infectious problem in the postpartum period, mostly mild problems, but this can be a significant factor for the discontinuation of breastfeeding.

first 24 h after delivery or over 38°C on any two of the first 10 postpartum days after day one. However, postpartum infection can occur up to six weeks following delivery, and mastitis is reported to occur most frequently during the first four weeks after delivery (3,4). In this study, we examined infections acquired during the first four weeks following delivery.

Breastfeeding has several advantages for mother and infant and is recommended for a minimum of six months (5,6). Previous studies have explored reasons for the discontinuation of breastfeeding and focused on problems with technique, painful nipples, insufficient milk production, or milk alone not satisfying the infant (7,8). Limited data exist linking infections to problems with breastfeeding (4,9), but clinical experience indicates that infection in lactating mothers could be a reason for discontinuation of breastfeeding.

The aims of the present study were to investigate the following factors: (i) the occurrence of postpartum infections; (ii) the frequency of contact with either a GP or a hospital due to postpartum infections; and (iii) the association of postpartum infections with continuation of breastfeeding.

Material and methods

This cross-sectional study attempted to include all women giving birth at the Department of Obstetrics and Gynecology, Horsens Regional Hospital, Horsens, Denmark between 1 May 2007 and 30 April 2008. The data were collected from the women directly using a postal questionnaire, from general practices by direct or postal contact with GPs and from hospital medical records. Information was obtained regarding any infection experienced by the women during the first four weeks after the delivery. In Denmark it is mandatory for a woman to deliver with the assistance of a qualified health professional (a midwife or a medical doctor), and more than 99% of women deliver in hospital. Health services, including delivery, are free of charge to the patient. There is also free access for all women to be examined and treated by a GP or in the hospital. The GPs act as gatekeepers with regard to referral for inpatient or outpatient treatment.

Four weeks after delivery a questionnaire was sent to all women who had given birth to a live child. If the women did not reply within four to five weeks, a second questionnaire was sent. The women were asked questions regarding obstetric history, the pregnancy and delivery and their health in the postpartum period (defined as four weeks postpartum). In the questionnaire the women were asked if they had experienced an infection during the first four weeks after delivery and, if they had, to indicate whether the infection was in the breasts, a wound, urinary tract, vagina, respiratory tract, uterus or other areas or to reply "do not know." There was space in the questionnaire for free text, where the women could provide additional comments. They were asked

whether they had been in contact with their GP or the hospital due to the infection. Data concerning infections were collected from their GPs (by phone or at a visit to the surgery) and from the records at the Department of Obstetrics, where information on whether the women had a vaginal delivery or a cesarean section was also obtained. Information regarding the diagnosis was thus validated as far as possible. All infections during the observation period were categorized by type.

When the women stated an infection in the questionnaire, we used this to define the women who had experienced an infection and assign the type of infection. If they had been in contact with a medical doctor (GP or at the hospital) the diagnosis from the medical record was used instead. From the records we used the clinical diagnosis, because often only limited diagnostic information was stated and few bacterial cultures were available. A wound infection in a woman having had a cesarean section was regarded as present if the infection was located at the incision site, whereas a wound infection reported by a woman who had delivered vaginally was regarded as present if the infection was located in or around the birth canal or in the episiotomy. The women were further asked whether they had been breastfeeding and whether they had stopped permanently at any time during the first four weeks after the delivery. The women who stopped breastfeeding, or who never started, were asked to state the reason.

The Regional Medical Ethical Committee determined that no approval was needed for this study. However, prior to collection of data from GPs written consent was obtained from the participating women.

Statistical analysis

Associations between breastfeeding status and infection types as well as any infection were explored using simple and multiple logistic regression analyses. Multiple regression analyses included the clinical covariates of age, parity, body mass index, duration of labor, civil status and mode of delivery as possible confounders. Only complete data sets were used. Statistical calculations were performed using STATA 11 for Windows (StataCorp LP, College Station, Texas, USA).

Results

Of the 1871 women who were sent the questionnaire, 1623 (87%) returned it. Five women were excluded from the analyses due to incomplete answers and one because she returned two questionnaires with conflicting replies, giving a total of 1616 (87%) responses. Of these, 1331 women (82%) delivered vaginally and 285 women (18%) by cesarean section (10% elective and 8% emergency).

By week four after the delivery 395 women (24%) had reported one or more infections, of whom 259 (66%) had the diagnosis confirmed by a medical doctor and 37 (9%)

Table 1. Number of infections in the first four weeks postpartum, by type and mode of delivery (vaginal, elective or emergency cesarean section).

Type of infection	Vaginal birth <i>n</i> = 1331		Planned cesarean section <i>n</i> = 156		Emergency cesarean section <i>n</i> = 129		Total <i>n</i> = 1616	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Endometritis	21	2	3	2	6	5	30	2
Vaginitis	34	3	6	4	2	2	42	3
Breast infection	170	13	17	11	10	8	197	12
Urinary tract infection	32	2	6	4	3	2	41	3
Airway infection	38	3	5	3	2	2	45	3
Wound infection	27	2	15	10	9	7	51	3
Other infection	29	2	2	1	2	2	33	2

Table 2. Crude and adjusted odds ratios for discontinuation of breastfeeding during the first four weeks of delivery, by type of infection and by any infection.

Type of infection	Crude			Adjusted		
	<i>p</i> -Value	Odds ratio	95% CI	<i>p</i> -Value	Odds ratio	95% CI
Endometritis	0.110	2.02	0.85–4.79	0.154	1.93	0.78–4.78
Vaginitis	0.824	1.10	0.46–2.66	0.537	0.71	0.24–2.09
Breast infection	<0.001	2.08	1.43–3.00	0.001	1.97	1.31–2.97
Urinary tract infection	0.005	2.68	1.34–5.33	0.010	2.84	1.28–6.30
Airway infection	0.171	0.44	0.13–1.43	0.214	0.46	0.14–1.56
Wound infection	0.004	2.53	1.34–4.77	<0.001	3.94	1.88–8.26
Other infection	0.647	1.25	0.47–3.31	0.809	0.86	0.25–2.98
Any infection	<0.001	1.99	1.46–2.70	<0.001	1.88	1.34–2.63

Abbreviation: 95% CI, 95% confidence interval.

at a hospital. One infection was recorded for 354 women, while 38 had two episodes and three women had three or more infections. In all, there were 439 diagnoses of infection. Breast infections (12%) were most frequent (Table 1).

Of the women who had infections, 259 (66%) women had been in contact with their GP and 37 (9%) with a hospital. All women seen in a hospital had also had contact with a GP. Of the patients who had contacted a GP, 223 (57%) women had one and 36 (9%) women had two or more infections. Of the women referred to hospital, 27 women had one and 10 had two or three infections. Almost all women with suspected endometritis and urinary tract infections were in contact with their GP and received antibiotics, but only just over half of those with breast or airway infections. Vaginal infections were often treated with non-prescription topical fungicides. Half of the women with endometritis were referred to specialist care at the hospital, whereas women with any other infection were mainly treated by their GP. In all, 269 of the women with infections were treated with antibiotics (68%).

In all, 1543 (95%) women initiated breastfeeding, 58 (4%) women did not attempt this, and for 15 (1%) the information was missing. During the observation period 213

(14%) women stopped breastfeeding. A significantly larger proportion of women with a postpartum infection stopped breastfeeding (21%) compared with women without infection (12%; $p < 0.001$). This was most marked in women with breast, urinary tract or wound infections. Wound infections were associated with discontinuation of breastfeeding among both women who had a cesarean delivery and women who delivered vaginally. Crude and adjusted odds ratios are shown in Table 2.

Reasons for discontinuation of breastfeeding are listed in Table 3 and categorized into four groups by order of frequency, i.e. the production of milk, conditions related to the breast, the lactating mother herself or the infant. Many women had more than one reason for stopping the breastfeeding. Insufficient milk production, breast infection or nipple problems were the most prevalent explanations.

Discussion

This study demonstrated that infections occur frequently during the first four weeks after delivery and it indicates that the incidence will be underestimated when based on

Table 3. Reasons for not breastfeeding (not initiated/stopped) during the first four weeks after delivery.

Reason	Did not initiate (n)	Stopped (n)
Situations related to milk production		
Failure to establish lactation	3	6
Not enough milk/ceased milk production	6	56
Infant got used to bottle	1	3
Not enough milk for twins	0	3
Breast milk alone did not satisfy the infant	0	8
The infant did not gain in weight or lost weight	11	24
Conditions related to the breast		
Breast infections	3	24
Pain in breasts or cracked nipples	0	34
Inverted nipples	1	1
Previous breast reduction	6	2
Previous breast implant	0	1
Piercing in breasts/nipples	1	0
Maternal situation		
Mother did not want to breastfeed	4	5
Mother felt uncomfortable breastfeeding	0	4
Mother did not have energy or strength to continue to breastfeed	1	6
Mother had bad experience breastfeeding a previous infant	8	2
Mother never received the help to establish breastfeeding	1	10
Mother had to leave infant for a time	1	4
Mother had a medical condition contraindicating breastfeeding	3	10
Conditions related to the infant		
Infant born preterm	1	2
Cleft palate	3	0
High levels of phenylalanine (phenylketonuria)	1	0
Tongue-tie	0	1
Infant with heart condition	0	1
Unspecified	0	6
Total	55	213

hospital medical records only. The most common infection was related to the breasts. Two-thirds of those who experienced a perceived infection contacted their GP and only 9% were referred to a hospital, which indicates that most of these infections were mild. In many instances specific treatment, such as with antibiotics, was not required. Women with infections did, however, discontinue their breastfeeding significantly more frequently than women without such problems, which points to a need for specific support when infectious complications are detected during this time. The strengths of this study were a high response rate (87%) and a large number of women studied during a whole year. The data were collected not only from the women themselves, but were also verified at the primary and secondary healthcare levels as well as could be done.

Limitations were the self-reporting questionnaire design and the observation that one-third of the women did not see a medical doctor for at least clinical confirmation of a possible infection. This is to be expected, however, when the problems are mild and thus often self-limiting or will resolve with use of easily accessible over-the-counter medications. Postpartum infections in general and their subtypes are thus not definable with certainty. This will have contributed to the 24% incidence, which may to some extent be a possible overestimation of postpartum infectious morbidity, although this depends upon the type of infection. Only half the women who reported an infection in the vagina or airways consulted a doctor, whereas almost all the women with endometritis did so. If only the two-thirds of cases verified by a doctor are considered, then the occurrence of postpartum infection was 16% (259 of 1616). A further limitation was that GPs often let a clinical diagnosis suffice and few diagnostic tests were performed. Antibiotic treatment was largely given empirically. More accurate diagnosis and appropriate treatment would have ensued had bacterial cultures and diagnostic tests been used to a greater degree. A causal relation between many of the infections and discontinuation of breastfeeding could also not be established. Women stated that they stopped breastfeeding during the first four weeks after delivery due to the breast problems, especially cracked nipples, pain or too little milk production, but also because of infections in their breasts. Women with breast infections experience discomfort and pain and are likely to have a poor latch-on technique and stop breastfeeding prematurely. The women's own notes, which some of them entered into the questionnaire, ranged from substantial to very brief. Where "breast infection" was written, it was not clear whether the reason for stopping breastfeeding was due to fear of infecting the child, the use of antibiotics, breast pain or cracked nipples. A significant proportion of women with wound infections and urinary tract infections also stopped breastfeeding. The reasons for this require study. Within the limitations of the data, adjustment for possible confounders was still possible, showing that associations and background factors between infections and discontinuation of breastfeeding were similar.

The incidence and types of postpartum infections resemble what has been found in previous studies (1–3); so do the reasons for stopping breastfeeding during the first months after delivery (7,8). An association between discontinuation of breastfeeding and postpartum infection has, however, not been shown before. As women with infection of any sort seemed to discontinue breastfeeding significantly more often, the study indicates that health professionals should pay special attention to lactating mothers with infections, not least because the current advice that women receive is to continue breastfeeding through an episode of infection (10).

Funding

Funding was received from the Region of Southern Denmark and Central Denmark Region.

References

1. Leth RA, Møller JK, Thomsen RW, Ulbjerg N, Nørgaard M. Risk of selected postpartum infections after cesarean section compared with vaginal birth: a five-year cohort study of 32,468 women. *Acta Obstet Gynecol Scand.* 2009;88: 976–83.
2. French L. Prevention and treatment of postpartum endometritis. *Curr Womens Health Rep.* 2003;3:274–9.
3. Yokoe DS, Christiansen CL, Johnson R, Sands KE, Livingston J, Shtatland ES, et al. Epidemiology of and surveillance for postpartum infections. *Emerg Infect Dis.* 2001;7: 837–41.
4. Sundhedsstyrelsen. Amning – en håndbog for sundhedspersonale. (Breastfeeding – a manual for health personnel). Second edn. Vol. 1. Copenhagen: Sundhedsstyrelsen (Danish National Board of Health), 2009.
5. WHO. The optimal duration of exclusive breastfeeding. Report of an expert consultation. Geneva, (document WHO/NHD/01.09, WHO/FCH/CAH/01.24) March 2001.
6. Li R, Fein SB, Chen J, Grummer-Strawn LM. Why mothers stop breastfeeding: mothers' self-reported reasons for stopping during the first year. *Pediatr.* 2008;122 Suppl 2:S69–76.
7. Amir LH, Forster DA, Lumley J, McLachlan H. A descriptive study of mastitis in Australian breastfeeding women: incidence and determinants. *BMC Public Health.* 2007;7:62.
8. Gerd AT, Bergman S, Dahlgren J, Roswall J, Alm B. Factors associated with discontinuation of breastfeeding before 1 month of age. *Acta Paediatr.* 2012;101:55–60.
9. Vogel A, Hutchison BL, Mitchell EA. Mastitis in the first year postpartum. *Birth.* 1999;26:218–25.
10. Michie C, Lockie F, Lynn W. The challenge of mastitis. *Arch Dis Childhood.* 2003;88:818–21.