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Hormonal contraceptive use in first and second interpregnancy intervals of Norwegian-born women

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Preface

This project began with a wish to write about something meaningful to me and my peers. As I get older, contraception is often a topic of conversation among me and my friends. Many struggle to find a method that is right for them, balancing side effects and other health issues. As I entered my mid-twenties, contraception in relation to pregnancy became increasingly relevant, as several of my friends began family planning. With this in mind, I reached out to a seasoned supervisor, who I knew had many years of research on contraceptives under his belt. With his expert help and tireless guidance this project came about.

I would like to thank a fellow student of mine, Helene Agejeva Jenssen, for fruitful discussions on the subject of contraception and for keeping my spirits up when writing was difficult. Lastly, I would like to extend my gratitude to my supervisor, Finn Egil Skjeldestad, for being my lighthouse in this project, guiding me through the dark.

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Abstract

Background and objective

Short interpregnancy intervals (IPIs) are associated with low birthweight and preterm births, while long IPIs may increase the risk of pre-eclampsia and small for gestational age (SGA). IPIs among Norwegian women are not described in the literature. The aim of this study is to investigate interpregnancy intervals and use of hormonal contraception between first and second births, as well as second and third births of women in Norway.

Methods

This cohort study used data from the Norwegian Prescription Database (NorPD), the Medical Birth Registry of Norway (MBRN) and Statistics Norway. The study population comprised 216 512 out of 903 704 deliveries in the MBRN between 2004-2018, and consisted of the first, second and third deliveries of Norwegian-born women with a spontaneous conception. Exposure group A represented the IPI of women with only two deliveries, while the first IPI of women with three deliveries was represented by group B1 and the second IPI by group B2. Statistical analysis was performed in SPSS version 27 with Chi-square test and T-test at significance level $p<0.005$.

Results

The average IPI length for study group A, B1 and B2 was 29.7, 23.7 and 32.6 months, respectively. Hormonal contraceptive use varied from 42.0% for group A, 30.2% for group B1, to 38.3% for group B2. Overall, 23.5% used POP, 8.5% used COC, and 3.9% used LNG-IUD between pregnancies. Use of vaginal ring, the patch and implant was low (0.5-1.2 %). The mean time from delivery to first contraceptive method for each exposure group was 7.9, 8.4 and 10.8 months. For older age groups, contraceptive use declines and IPIs are shorter. Proportions of no contraceptive use was high among all women with shorter IPIs.

Conclusion

Norwegian-born women had interpregnancy intervals just below two years to two years and eight months. Less than half of women used a hormonal contraceptive method between pregnancies. POP use was the most used method postpartum. The first hormonal contraceptive method is on average initiated 8-11 months postpartum. Older mothers had a lower hormonal contraceptive use and shorter IPIs compared to younger parturients.

Abbreviations

IPI – interpregnancy interval

SGA – small infant size for gestational age

CHC – combined hormonal contraception

COC – combined oral contraception

POC – progesterone only contraception

POP – progesterone only pill

DMPA – Depo-medroxyprogesterone acetate injection

LNG-IUD – Levonorgestrel-releasing intrauterine device

WHO – World Health Organisation

NorPD – Norwegian prescription database

MBRN – Medical birth registry of Norway

TSD – Tjeneste for Sensitive Data

Background

Optimal interpregnancy intervals (IPIs) are favourable for both mother and child (1, 2). The World Health Organisation (WHO) (2005) states that "after a live birth, the recommended interval before attempting the next pregnancy is at least 24 months in order to reduce the risk of adverse maternal, perinatal and infant outcomes" (3). Short IPIs are particularly associated with low birthweight and preterm births, whereas IPIs of five years or more are proven to additionally increase risk of small infant size for gestational age and pre-eclampsia (3, 4). Although the official recommendation from the WHO defines the optimal IPI to be 2 years, other researchers advise an 18 month-interval as medically safe and to better reflect the real data (5).

Studies suggest that the optimal IPI varies for different subgroups or according to the woman's situation (2, 5, 6). Research on interpregnancy intervals and birth outcomes has largely been based on study populations from low- to middle-income countries, where a higher proportion of women are anaemic and malnourished before and throughout their pregnancies (7). This contributes to high rates of both maternal and perinatal morbidity and mortality. In high-income countries, such as Norway, most mothers are healthy and there are national programs for antenatal and prenatal care (7). Therefore, interpregnancy intervals shorter than 18 months might not pose a risk for well-nourished women under 35 years or for their infants (2, 7, 8).

The key to control for individual interpregnancy intervals is postpartum contraception. According to Norwegian guidelines, the first postpartum visit is offered 6 weeks after delivery. It is intended for discussing topics related to the woman's wellbeing, including contraception and future pregnancies (9). Otherwise, there are no specifications of when to start contraceptive use after birth in national Norwegian guidelines (10). Research recommends bringing up the subject in antepartum visits closer to the estimated date of birth (11).

Research from the United States suggests a lag between the time women resume intercourse and the time they start using contraception after delivery (12). Ovulation often begins before 6 weeks postpartum and many women resume having sex before this time (13). In non-breastfeeding women, ovulation may commence from 4 weeks postpartum and it is therefore recommended to resume contraceptive use 3 weeks after delivery (12, 14). For lactating women, it varies depending on the extent of breastfeeding. Ovulation begins 6 weeks after

supplemental feeding is introduced, but for women who fully breastfeed it is said that contraception should be used from 6 months postpartum (7).

Most contraceptive methods can be used after pregnancy (7). The exception is contraceptives containing oestrogen, which should not be used until 3-6 weeks postpartum due to risk of venous thromboembolism (7, 13). Research after 2005 does not show that combined hormonal contraception (CHC) has any significant impact on the quantity or quality of breastmilk, nor on the infant's growth (7, 13). Progestogen-only contraception (POC) does not seem to impact breastmilk or the child's health, either (7). There are no restrictions on POC when administered as pills or implants after giving birth, regardless of breastfeeding. However, WHO recommends waiting 6 weeks after delivery before using injectables such as depo-medroxyprogesterone acetate (DMPA), out of concern about the effects on breastfeeding and the infant (7).

According to the United Nations, oral contraceptives and condoms are the most commonly used contraceptive methods among women in developed countries (15, 16). Regarding the matter of women's use of contraception in interpregnancy intervals, the literature in Norway is rather sparse. The aim of this study is to investigate interpregnancy intervals and use of hormonal contraception between first and second births, as well as second and third births.

Materials and methods

This cohort study used data from the Norwegian Prescription Database (NorPD), the Medical Birth Registry of Norway (MBRN) and Statistics Norway. The NorPD stores information on prescriptions and patients. The registry creates a pseudonymous ID for patients and prescribers, which can be used to follow the patient's prescriptions. This gave us access to information on prescriptions dispensed at pharmacies by women across the country. We defined time to first contraceptive method as number of months from delivery to first contraceptive prescription, and categorized it into 4 groups (0-5 months, 6-11 mo., 12-17 mo., 18-147 mo.). We examined the prevalence of women using hormonal contraception in the interpregnancy interval by identifying the first contraceptive method, first categorized as "any method" or "no method". We then analysed for method choice among those using "any method", categorized into 7 groups (combined oral contraceptives (COC), progesterone-only pill (POP), depo-medroxyprogesterone acetate injection, implant, patch, vaginal ring and levonorgestrel-releasing intrauterine device (LNG-IUD)).

The MBRN registers new-borns after gestational week 12. Each child of a multiple gestations-pregnancy is recorded separately. The registry also contains information on the new-born's gestational age, the mother's age at delivery, the method of conception in the case of assisted conception, the year and month of delivery, parity, and the mother's marital status. An IPI is defined as the time from date of delivery until the last menstrual date of a subsequent pregnancy (17). When date for last menstruation was missing, an estimated date was calculated from the ultrasound determined delivery date and actual delivery date, and/or gestational age at delivery and/or birth weight percentiles. We categorized IPI (0-5, 6-11, 12-17, 18-35, 36-59, and 60-179 months) and maternal age (13-19, 20-24, 25-29, 30-34, 35-39 and 40-54 years) into six groups, and marital status into five groups (married, cohabitant, single, divorced/widowed or unknown).

Statistics Norway provided information on maternal country of birth. The NorPD administrated the data merge between the different national health registries by creating a pseudonymous number from the personal 11-digit personal identification number. The data were stored and analysed at the TSD (Tjeneste for Sensitive Data) facilities, owned by the University of Oslo, operated and developed by the TSD service group.

The study population consists of women in Norway who gave birth to their first, second and, for some, third child between 01.01.2004 and 31.12.2018. We had a follow-up time of at least 12 months, until the end of 2019 for those who gave birth by the end of 2018. A total of 903 704 deliveries were recorded in the MBRN in this period. We excluded women with only one delivery from 2004-2018 (n=264 052) and women with a first delivery of less than 22 gestational weeks (n=4149). Deliveries with multiple gestations were only counted as one delivery, meaning that registration of the second twin, the second and third triplet, etc. was excluded (n=7480). We also excluded cases with invalid IDs (n=5255) and double registrations (n=6). Additionally, women with one or more deliveries prior to 2004 (n=105 123) were excluded. This leaves us with an eligible study population of 282 212 deliveries, accounting only for first, second and third delivery. Data on gestational age was missing from 28 of the first deliveries and 31 of the second deliveries, these were also excluded.

Of the remaining deliveries, we identified Norwegian-born women with a spontaneous conception and excluded those who conceived through assisted reproductive technologies. The final study population comprised a total of 216 512 deliveries. We created three exposure

groups. Group A included women with only two deliveries, group B1 comprised women with three deliveries representing the 1st to 2nd delivery, whereas group B2 represented the 2nd to 3rd delivery for B1 women.

Statistical analysis

Analysis was performed in SPSS version 27 by Chi-Square test and T-test at significance level $p<0.005$.

Formal aspects

The legal aspects of utilization of registry data were performed in accordance with national and European legislation (General Data Protection Regulation), The Regional Committee for Medical and Health Research Ethics North (Institutional Review Board number; IRB00001874 REK North, case no. 9997), The Norwegian Centre for Research Data (project no. 808142), the National Institute of Public Health (project no. PDB 2778), and Statistics Norway (case no. 21/0336).

Results

Study group A comprised of 131 124 women, whereas study group B1 and B2 comprised 42 694 women. The mean age for study group A, B1 and B2 were 27.5, 25.7 and 28.5 years, respectively. Exposure group B1 had a significantly higher proportion of births in age group 20-24 years compared to the other exposure groups (Table 1). Likewise, exposure group B2 had mainly a higher proportion of births in age group 30-34 years (Table 1). For all three exposure groups the highest number of births was in age group 25-29 years.

A third of the total cohort was married at delivery, while almost two thirds were cohabiting (Table 1). When comparing groups A and B1, we see that women with three deliveries were more often married at the first delivery than women who had two deliveries, only. For all three groups, very few women were single and almost none were divorced/widowed or recorded as unknown (Table 1).

The average IPI length for study group A, B1 and B2 was 29.7, 23.7 and 32.6 months, respectively. Exposure group A had a significantly longer mean IPI, mainly in the 18-35- and

36-59-month categories (Table 2). On the other hand, group B1 had a higher proportion of IPIs between 6-11 and 12-17 months (Table 2). Women in group B2 had the longest mean IPI of the cohort, mainly from a quite high proportion of IPIs in the 36-59-month category. For all three study groups, the highest proportion of IPIs were in the 18-35-month category. Very few IPIs were 0-5 months long (Table 2).

Less than half of the women in our cohort used any type of hormonal contraception between pregnancies. The numbers varied from 42.0% for group A, 30.2% for group B1, to 38.3% for group B2 (Table 2). The progesterone-only pill dominated as the first contraceptive method, at 23.5% for the whole cohort. 8.5% of the total cohort used COC, while 3.9% used LNG-IUD. Lastly, vaginal ring, the patch and implant were barely used (Table 2).

The mean time from delivery to first contraceptive method for each exposure group was 7.9, 8.4 and 10.8 months. Time to first contraception was most similar for group A and B1. Exposure group A has the highest contraceptive initiation within the first 5 months postpartum of all groups (Table 2). There is a definitive increase in time to contraception for group B2 in all categories over 5 months (Table 2). On average, women with three deliveries wait about 3 months more to initiate contraception after their second delivery compared to after their first. Among women using hormonal contraception, more than half in each group initiated a method within the first 0-5 months after delivery (Table 2).

The mean IPI is inversely associated with age (Table 3). The younger age groups have longer mean IPIs, while older age groups have shorter IPIs. For instance, teen mothers in exposure group A, B1 and B2 have a mean IPI of 46.4 (SE 0.43), 34.2 (SE 0.44), and 40.7 (SE 1.77) months, whereas mothers 30-34 years old have a mean IPI of 26.3 (SE 0.08), 19.0 (SE 0.13) and 30.2 (SE 0.15) months (Table 3). The results were significant, except for ages 35-39 and 40-54 in group B1 and ages 40-54 in group B2.

Overall, contraceptive use declines with increasing age for the whole cohort. 58.3% of teenagers (13-19 years) have a first prescription for hormonal contraception between births. On the other end, the same is true for only 13.5% of 40-54-year olds (Table 4). In fact, the proportion of women initiating contraceptive use declined with roughly 7-10% for each age group (Table 4). When determining method choices for the age groups, a few differences are revealed. In general, the use of all methods decreases with increasing age. COC is the only method that increases in use in the oldest age group (Table 4). The youngest age group has a

higher use of COC than of POP (+1.5%). All other age groups use POP most. LNG-IUD also decreases in use with age, albeit only slightly for the three youngest age groups (Table 4).

The proportions of women with no contraceptive use were high among those with shorter IPIs. From 0-5 month-intervals to 12-17 months, non-use declines from 90.2% to 70.2% (Table 5).

Discussion

This study examined the relationships between interpregnancy interval and hormonal contraception. The mean IPIs of our cohort ranged from just under two years to two years and eight months. The first IPI of women with three deliveries was on average 6 months shorter than the first IPI of women who only had two deliveries. Proportions of women with no contraceptive use were high among those with shorter IPIs. Less than half of women used a hormonal contraceptive method between pregnancies. The most used method was POP, followed by COC and LNG-IUD. Contraceptive use declined with increasing age. The first hormonal contraceptive method is on average initiated 8-11 months postpartum.

The mean IPIs of our exposure groups ranged from 23.7 months to 32.6 months. A US-study reported the mean overall IPI as 23.8 months in 1999 (18). Another US-study from Missouri on *Pregnancy spacing among women delaying initiation of childbearing* during 1987-1997 reported a mean IPI between the first and second pregnancy to be 29.9 (SE 23.6) months (6). This is similar to the mean IPIs of women with only two deliveries in our study (29.7 months).

Our findings demonstrated that the first IPI of women with three deliveries is on average six months shorter than that of women with two deliveries. The second IPI of women with three deliveries is about 9 months longer than the first IPI, which is in line with an Australian study that also reported the first IPI to be shorter than the second (2). One can speculate that women with three deliveries wish to have more than 2 children, and that they plan to have the pregnancies closely spaced. This is supported by the fact that the lowest contraceptive use is seen in the first IPI of women with three deliveries, compared to women with two deliveries (-12%). In addition, women with three deliveries initiate childbearing at an earlier age compared to women with two deliveries, only.

In general, we have found that older women have shorter IPIs regardless of parity status. This is in line with the study from Missouri where IPIs declined as maternal age at first pregnancy increased (P<0.0001) (6). It has also been documented in other studies on the subject (6, 19, 20). As older women have fewer fertile years left to have their desired number of children, they are in a sense biologically pushed to have shorter IPIs and do not initiate hormonal contraception as often as younger parturients.

The WHO recommends two years as the optimal interpregnancy interval (3). In our cohort, all women over 34 years have mean IPIs under 24 months (Table 3). Furthermore, women with three deliveries have first IPIs shorter than two years from the age of 25-29 years. Researchers often define a short IPIs as less than 18 months. 30% of our total cohort has an IPI under 18 months, this corresponds to the 36% of American women with IPIs shorter than 18 months (1).

In our cohort, 39% of the parturients used a hormonal contraceptive method in their IPI. This is lower than US-findings of 60-70% overall contraceptive use postpartum (1, 21-23). Two US studies found 37% hormonal method-use, which is similar to our results (21, 22). In line with our findings, the postpartum use of implants and LNG-IUDs was 4-7% in three US studies (1, 22, 23).

Norwegian national guidelines recommend breastfeeding in the child's first year of life, and states that fulltime breastfeeding in the first six months is favourable for the infant (24). In 2013, 81% of women were breastfeeding by 4 months postpartum, and 35% by 12 months (25). It is probable that this is the reason for the high proportion of women using POP in our study, as oestrogen-containing contraceptives is contraindicated while breastfeeding (7). Teenage mothers are the only group in our study to choose COC more often than POP as the first method after birth. This could be because young mothers breastfeed their infants less often and for a shorter time than older women (26).

In the general Norwegian population and other Nordic countries, the most used hormonal contraceptives are COC, followed by LNG-IUD (15, 27). As shown in this study, the postpartum population differs significantly from the general population regarding use of hormonal contraception.

Women in our cohort generally initiate contraceptive use 9 months postpartum. This is later than US women, who initiate hormonal contraception after 3-4 months on average (1).

A very high proportion of women with short IPIs do not use any hormonal contraception. 90% of those who give birth within 5 months do not use a hormonal method, the same is true for 80% of women who give birth within the first year postpartum (Table 5). This only applies to a small proportion of the cohort, as only 2% have IPIs under 6 months and 10% have IPIs under 12 months. We have also seen that over half of those using a contraceptive method between pregnancies initiate use within 5 months of delivery. We assume that women with shorter IPIs wish to space their pregnancies closely and therefore choose to not use any contraception after delivery.

One of the strengths of this study is that our findings are novel to postpartum contraceptive use. Other strengths include a large study population that is based on the general population. However, excluding women born abroad affects the generalisability of our results. Migrant women stood for 14 510 out of the total 52 979 living infants born in Norway in 2020. They also have more deliveries than Norwegian born women, with a fertility rate of 1.68 vs. 1.48 (28, 29). Thus, the findings from this study are generalisable to Norwegian-born women with two to three deliveries.

This study is registry-based. When using a prescription registry as basis for contraceptive use, one relies on the assumption that redeemed prescriptions are in fact used. This is not necessarily the case. Women may pick up contraceptives and not use them or use contraceptives left over from before their pregnancy. Other limitations this entails is lack of data on barrier and withdrawal methods, breastfeeding and lactational amenorrhea. Although this study doesn't include a variable on breastfeeding, progesterone-only contraception may indicate breastfeeding.

In recent years, maternal age is seen to increase as fertility rates decline in the Norwegian population (30). There is currently no reason to believe that this development will turn around. In light of our findings, it is likely that rates of shorter interpregnancy intervals will persist and even increase in the future. The topic of interpregnancy intervals and hormonal contraception will continue to be relevant and further research on the subject is needed.

Conclusion

Norwegian-born women with two deliveries waited on average two years and five months after their first delivery to become pregnant again. Those with three deliveries spaced their

first two pregnancies almost two years apart, and their last pregnancy two years and eight months after their second delivery. Less than half of the women used a hormonal method between pregnancies. Use of the POP was dominant, followed by COC and LNG-IUD. The first contraceptive method was on average initiated 9 months postpartum. Older mothers had a lower hormonal contraceptive use and shorter IPIs compared to younger parturients.

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Appendix

Tables

Table 1 Characteristics of the exposure groups (mean, range, percentage)

	Exposure groups			
	Pregnancy interval 1st to 2nd delivery		*Pregnancy interval 2nd to 3rd delivery*	*Total*
	Status at 1st delivery		Status at 2nd delivery	
	No 3rd delivery	A 3rd delivery		
Age				
Mean (range)	27.5 (13-54)	25.7 (13-43)	28.5 (16-48)	27.3 (13-54)
	N=131124	N=42694	N=42694	N=216512
	%	%	%	%
13-19 yrs.	3.6	7.0	0.6	3.7
20-24 yrs.	22.5	31.7	17.0	23.2
25-29 yrs.	41.0	42.8	41.7	41.5
30-34 yrs.	26.7	16.7	34.1	26.2
35-39 yrs.	5.9	1.7	6.2	5.1
40-54 yrs.	0.4	0.0	0.3	0.3
Marital status				
Married	25.5	31.2	45.6	30.6
Cohabitant	67.5	59.4	49.7	62.4
Single	6.1	8.7	4.1	6.2
Divorced/widow	0.1	0.1	0.1	0.1
Unknown	0.7	0.6	0.5	0.6

Table 2 Interpregnancy interval, 1st contraceptive prescription, time to 1st prescription by exposure group (mean, range, %)

	Exposure groups			
	Pregnancy interval 1st to 2nd delivery		*Pregnancy interval 2nd to 3rd delivery*	*Total*
	Status at 1st delivery		Status at 2nd delivery	
	No 3rd delivery	A 3rd delivery		
Interpregnancy interval (mo.)				
Mean (range)	29.7 (0-170)	23.7 (0-151)	32.6 (0-149)	29.1 (0-170)
	N=131124	N=42694	N=42694	N=216512
	%	%	%	%
0-5 mo.	1.5	3.2	3.2	2.2
6-11 mo.	8.4	14.8	9.3	9.9
12-17 mo.	17.1	23.9	13.6	17.7
18-35 mo.	46.8	42.7	37.5	44.2
36-59 mo.	18.4	11.0	25.5	18.3
60-170 mo.	7.7	4.4	10.9	7.7
1st contraceptive method				
No method	58.0	69.8	61.7	61.1
Any method	42.0	30.2	38.3	38.9
Method choice				
COC	8.9	6.6	8.9	8.5
POP	26.0	19.0	20.3	23.5
Vaginal ring	1.2	0.9	1.5	1.2
Patch	0.7	0.7	0.8	0.7
Implant	0.6	0.3	0.6	0.5
Depot-Provera	0.6	0.6	0.7	0.6
LNG-IUD	4.0	2.1	5.5	3.9
Months to 1st contraceptive method	N=55009 %	N=12895 %	N=16372 %	N=84276 %
0-5 mo.	66.1	64.2	51.1	62.9
6-11 mo.	13.4	13.9	17.0	14.2
12-17 mo.	7.3	7.9	10.9	8.1
18-147 mo.	13.2	14.0	20.9	14.8
Mean (range)	7.9 (0-139)	8.4 (0-122)	10.8 (0-125)	8.6 (0-139)

Table 3 Mean interpregnancy interval in months by age and exposure group (SE-standard error)

	Age group (yrs)						
	13-19	**20-24**	**25-29**	**30-34**	**35-39**	**40-54**	**Total**
Exposure group	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
A	46.6 (0.43)	34.6 (0.14)	28.8 (0.08)	26.3 (0.08)	22.6 (0.15)	20.9 (0.60)	29.7 (0.05)
B1	34.2 (0.44)	26.6 (0.17)	22.0 (0.10)	19.0 (0.13)	15.7(0.33)*	16.6 (2.40)*	23.7 (0.08)
B2	40.7 (1.77)	37.7 (0.29)	33.8 (0.16)	30.2 (0.15)	23.2 (0.29)	16.5 (0.98)*	32.6 (0.10)

*Not significant

Table 4 First prescription of hormonal contraception by age (%) (entire study population)

	Age group (yrs)						
	13-19	**20-24**	**25-29**	**30-34**	**35-39**	**40-54**	**Total**
	N=7984	N=50309	N=89813	N=56656	N=11104	N=646	N=216512
First prescription	%	%	%	%	%	%	%
No method	41.7	51.4	60.5	69.4	79.4	86.5	61.1
Any method	58.3	48.6	39.5	30.6	20.6	13.5	38.9
Method choice							
COC	22.5	14.0	7.5	4.4	2.0	4.6	8.5
POP	21.0	24.6	25.4	21.5	15.8	7.7	23.5
Vaginal ring	2.0	1.7	1.2	0.8	0.4	0.3	1.2
Patch	2.9	1.5	0.5	0.2	0.1	0.2	0.7
Implant	1.9	1.0	0.4	0.2	0.2	0	0.5
Depot-Provera	3.4	1.2	0.4	0.2	0.1	0	0.6
LNG-IUD	4.7	4.6	4.1	3.4	2.0	0.6	3.9

Table 5 Contraceptive method by interpregnancy interval, for the entire study population (%)

	IPI-group (mo)						
	0-5	**6-11**	**12-17**	**18-35**	**36-59**	**60-170**	**Total**
Total	N=4725 %	N=21334 %	N=38420 %	N=95690 %	N=39713 %	N=16630 %	N=216512 %
No use	90.2	80.3	70.2	59.3	51.4	40.1	61.1
COC	1.6	2.2	3.3	7.4	14.2	22.4	8.5
POP	7.0	15.7	23.1	26.4	23.6	21.8	23.5
Vaginal ring	0.3	0.4	0.5	1.1	1.9	3.0	1.2
Patch	0.3	0.3	0.4	0.6	1.2	2.0	0.7
Implant	0.1	0.1	0.3	0.5	0.7	1.1	0.5
Depo-Provera	0.1	0.1	0.2	0.4	1.2	2.3	0.6
LNG-IUD	0.4	0.8	1.9	4.2	5.7	7.3	3.9

Specification of work division between master student and supervisor

Spesifisering arbeidsoppgaver

mellom stud. med. Martha Emilie Johannessen og
hovedveileder Finn Egil Skjeldestad, ISM, UiT
for prosjektet

Hormonal contraception as a method for spacing interpregnancy intervals

Tabellen angir arbeidsoppgaver avtalt mellom student og veiledere i oppstartsfasen av prosjektet.

Oppgave	Stud.	Veiledere
Ide		x
Litteratursøk	x	(x)
Litteraturevaluering	x	(x)
Prosjektbeskrivelse	x	(x)
Protokol	Inngår som delprosjekt	x
Søknad REK		x
Andre søknader; finansiering		x
Lage "case-report-form"	Ikke aktuelt	
Identifisere deltakere		x
Rammer for datainnsamling - logistikk		x
Datainnsamling		x
Korrektur, samordne sjekklister	Ikke aktuelt	
Dataregistrering	Ikke aktuelt	
Korrektur data		x
Analyseplan		x
Analyser		x
Rapport/hovedoppgave (alle faser)	x	((x))
Andre oppgaver		Ikke spesifisert
Martha Emilie Johannessen låner data, fra prosjektdatabasen «**Use of hormonal contraception in Norway and the Nordic countries**» til mastergradsoppgaven. I utgangspunktet skal oppgaven publiseres i Tidsskr Nor Lægeforen eller internasjonalt tidsskrift. Oppgaveskriver er innforstått med at hun ikke har rettigheter til forfatterskap uten at hun kvalifiserer for det gjennom dette arbeidet og senere omskriving til artikkel. Avtale om publisering gjøres etter at oppgaven er innlevert.		

Tegnforklaring: x:hovedansvarlig; (x):med hjelp; ((x)):med noe hjelp

Tromsø 26. april. 2021

Martha Emilie Johannessen
Stud. med.

Martha E. Johannessen

Finn Egil Skjeldestad
Hovedveileder

Reference:
Ball SJ, Pereira G, Jacoby P, de Kerk N, Stanley FJ. Re-evaluation of link between interpregnancy interval and adverse birth outcomes: retrospective cohort study matching two intervals per mother. BMJ2014;349:g4333

Design: Patient series	
Level of documentation	II
GRADE	2

Objective	Material and methods	Results	Discussion/comments
«To re-evaluate the causal effect of interpregnancy interval on adverse birth outcomes, on the basis that previous studies relying on between mother comparisons may have inadequately adjusted for confounding by maternal risk factors».	**Recruitment:** Birth data from *Midwives' Notification System* (population-wide database of all births in Western Australia). Linkage of births to the same mother provided by Data Linkage Western Australia (Department of Health). ➔ Comparing two birth intervals for each mother – she acts as her own control **Inclusion:** mothers who had their first 3 births as liveborn singletons within 01.01.1980-31.12.2010, while resident in Perth (at time of each birth). (84 151 mothers whose 3rd birth were live singletons while mother is resident in Perth) **Exclusion:** births ≥45 weeks gestation, mothers <14 y/o, records missing data, ≥1 birth outside study period or Western Australia, non-liveborn singletons for ≥1 birth. **Study population:** 40 441 (48%) mothers who each delivered 3 liveborn singleton neonates in Perth. **Main outcome:** adverse birth outcomes – preterm birth (GA <37 weeks), SGA (<10 centile in Australia), low birth weight (BW <2500 g) **Main exposure(s):** IPI, 7 categories – 0-5, 6-11, 12-17, 18-23 (reference), 24-59, 60-119 and ≥120 mo. **Explanatory variables:** maternal age, parity, birth year, socioeconomic status. **Confounding factors:** change in fertility, unplanned pregnancy, maternal illness, family/social disruptions – *not accounted for!* **Statistical analysis:** conditional logistic regression Comparing results from "between mother" analysis (unmatched) and "within mother" (matched) analysis.	**Short IPI** *Within mother analysis of IPI indicated a much weaker effect of short IPI on the odds of preterm birth and low BW compared to between mother analysis.* - Preterm: OR 1.07 vs. 1.41 (95% CI: 0.86-1.34 vs. 1.31-1.51) - Low BW: OR 1.03 vs. 1.26 (95% CI: 0.79-1.34 vs. 1.15-1.37) *SGA remained small for both models:* OR 0.98 vs.1.08 (CI: 0.92-1.06 vs. 0.87-1.34) **Long IPI** (>59 months) *Both matched and unmatched model shows high odds of SGA and low BW.* - Weaker effect on odds of preterm birth in the matched model compared to the unmatched model. - (hypothesis of physiological regression) *Other comments:* - *Vague/imprecise conclusion (should be that matched analysis shows weaker effect of short/long IPI on some adverse birth outcomes …).* - *Generalisable to all women in Australia? Maybe not (b/c of sociodemographic situation of mothers w/ 3 children). Results generalisable to other high-income countries? Why not.* *Remember: maybe no causality, but short IPI **remains** strong predictor of risk of adverse birth outcomes (likely rather due to correlated maternal risk factors, according to this study).*	**Checklist:** • **Is the objective precisely worded? YES** • **Is the study based on a random selection from an appropriate patient group? YES** • **Did they ensure that the population wasn't selected? YES («pop. wide» database)** • **Were the inclusion criteria for the population clearly defined? YES** • **Is the percentage of answers sufficiently high? 48%, low** • **Were all the patients in the same stage of disease? YES, mothers who gave birth to 3 children in Perth in 1980-2010 (different IPIs).** • **Was the follow-up sufficient (in type/scope/time) to uncover the endpoints? Not relevant (retrospective study – therefore yes)** • **Were objective criteria used to evaluate the endpoints? YES (preterm before week 37, BW <2500 g, SGA when <10 percentile)** • **When comparing patient series - is each series adequately described and is the distribution of the prognostic factors described? Not relevant** • **Was the data registration done prospectively? Yes, historically! Data was registered prospectively and analysed "retrospectively".** **What did the authors discuss as the study's …** **Strengths –** within mother analysis allows each mother to act as own control. Large study population **Limitations –** mothers of ≥3 vs. of 2: different sociodemo. sit. (younger + from area w/ lower socioeco. status), IPIs based on successful pregnancies, lower thresholds for birth outcomes would be more clinically significant **Do the authors reference other literature that strengthens/weakens their results? This study disproves other literature, so there is no supporting literature.**
Conclusion **«This study questions the causal effect of short interpregnancy intervals on adverse birth outcomes and points to the possibility of unmeasured or inadequately specified maternal factors in previous studies».**			
Country Perth, Western Australia			
Year of data collection 1980-2014			

Reference:	Design: Patient series	
Nabukera SK et al. Pregnancy spacing among women delaying initiation of childbearing. Arch Gynceol Obstet 2008.	Level of documentation	IIa
	GRADE	2

Objective(s)	Material and methods	Results	Discussion/comments
To determine interpregnancy interval (IPI) patterns, factors associated with IPI among women delaying initiation of childbearing until their thirties, and ascertain if delay in initiation of childbearing is associated with increased likelihood for short interpregnancy interval of less than 6 months. **Conclusion** *First time mothers aged 35 and above have higher odds of having a second pregnancy shortly after their first pregnancy. Given the increasing number of firsttime mothers aged 35 and above, these findings are of relevance for preconception counseling for this unique population of women.* **Country** **Missouri, USA** **Year of data collection** 1978-1997	**Recruitment**: Missouri maternal linked file for 1978-1997 Contains live birth files linked to fetal and infant death files. - 1 577 082 births in the study period **Inclusion:** Maternal age 20-50 years at 1. pregnancy, mothers with records on consecutive 1. and 2. pregnancies, singleton pregnancy, both pregnancies occurred in the state of Missouri. - 485 118 cases met these criteria **Study population/sample size:** 242 559 mother-infant pairs, with mothers aged 20-50 at first pregnancy. **Main outcome**: IPI, grouped in 7 categories. (Short IPI = <6 mo) **Main exposure**: maternal age (*delayed initiation = >30 yrs at 1 pregn)*, demographic variables, and … - Health risk indicators: smoking, prenatal care use (intensive, adequate, intermediate, inadequate), BMI at 1. pregnancy - Obstetric risk factors measured adverse pregnancy outcomes: LBW <2500g, PTD (GA <37w) , SGA (bw <10th percentile) **Explanatory variables**: race, maternal age at 1. pregnancy (20-29 (reference), 30-34, 35-39, 40-50), marital status, educational status at 1. Pregnancy **Statistical analysis**: stratified analysis, multivariable logistic regression	The mean IPI was significantly shorter for women delaying start of childbearing (>= 30 years) compared to 20-29 yr olds. Observed intervals (P<0.0001) show a significant trend for shorter intervals as maternal age at 1st pregnancy increased: - 31 (+/- 24) mo for mothers aged 20-29 yrs - 25 (+/- 17) mo for ages 30-34 yrs - 21 (+/- 14) mo for ages 35-39 yrs - 19 (+/- 16) mo for ages 40-50 yrs Mothers aged >=35 at 1st pregnancy had increased odds for a short IPI (<6 mo) (35-39 yrs OR=1.26. 40-50 yrs OR =1.91) compared to mothers 20-29 yrs. - The odds persisted even after controlling other associated factors (race, educational status, marital status, BMI, previous adverse outcome, PNC use, year of 1. pregnancy). Mothers aged 30-34 yrs have lower odds for a short IPI (OR= 0.93). *Comments:* Short IPI defined as <6 mo, many other studies use 18 mo. Difficult to compare findings.	**Checklist:** • **Is the objective precisely worded?** YES • **Is the study based on a random selection from an appropriate patient group?** YES, pop-based data • **Did they ensure that the population wasn't selected?** YES. But study pop turned out to be mostly white married women with higher educ. • **Were the inclusion criteria for the population clearly defined?** YES • **Is the percentage of answers sufficiently high?** 79%, YES • **Were all the patients in the same stage of disease?** YES • **Was the follow-up sufficient (in type/scope/time) to uncover the endpoints?** YES • **Were objective criteria used to evaluate the endpoints?** YES – IPI, demogr variables, age. • **When comparing patient series - is each series adequately described and is the distribution of the prognostic factors described?** They compare age groups within the same patient series, the age grs are not described separately. • **Was the data registration done prospectively?** YES, data was collected prospectively and analysed "retrospectively". **What did the authors discuss as the study's …** **Strengths –** Pop-based data collected prospectively – eliminates the cohort effect. **Limitations –** Not generalisable bc the study pop is not representative of the general US pop, only of older mothers in Missouri. No info on potential confounders such as fertility treatment - may impact IPI. Use of 2. database means issues of incomplete data and reliability. Low proportion of stillbirths compared to national average – underreporting? Use of LMP in estimating GA. Small nr of mothers with 1 pregn at 40. **Do the authors reference other literature that strengthens/weakens their results?** Yes, supporting literature.

Reference: Thiel de Bocanegra H, Chang R, Howell M, et al. Interpregnancy intervals: impact of postpartum contraceptive effectiveness and coverage. Am J Obstet Gynecol 2014;210:311.e1-8.	**Design: Patient series**	
	Level of documentation	II
	GRADE	1

Objective	Material and methods	Results	Discussion/comments
"The purpose of this study was to determine the use of contraceptive methods, which was defined by effectiveness, length of coverage, and their association with short interpregnancy intervals, when controlling for provider type and client demographics." Conclusion does not answer to the objective. **Conclusion** *"To achieve optimal birth spacing and ultimately to improve birth outcomes, attention should be given to contraceptive counseling and access to contraceptive methods in the postpartum period."* **Country** **California, USA** **Year of data collection** 2002-2008	**Recruitment**: 2008 California Birth Statistical Master File (BSMF). - 331 132 women with 2nd or higher order birth **Inclusion:** women with ≥ 2 births who had their index birth in California before 2008. (index birth: the birth before the 2008 birth) **Exclusion**: multiple births, births before 1 jan -02, index birth outside of California, missing date, birth-intervals <30 days, missing/unlikely maternal age (<12 yrs), no service/ commercial health plan service. - 230 850 remaining women → Matched data from mother in BSMF to Medi-Cal claim or Family PACT program. **Study population:** 117,644 women (35%) who had their ≥ 2nd birth in California in 2008, with at least 1 Family PACT-program or Medi-Cal claim within 18 mo after the index birth (between 2002-2008 in Calif). **Main outcome**: IPI </≥ 18 mo (optimal IPI) **Main exposure**: *contrac effectiveness*: 4 tiers – 1 (LARCs – implant, intraut contrac), 2 (user-dep horm – pills, patch, ring, inj), 3 (barrier methods – condoms, diaphragm, spermicides), no method. *Contraceptive coverage*: tier 2 and 3 – algorithm based on method and quantity (no. of pill packs claimed, or condoms distributed). Max coverage 18 mo from index birth. **Explanatory variables**: age at index birth, provider, parity, education, race/ethnicity, foreign born	**Average length of contraceptive coverage** was 3.81 months (SD= 4.84) (table 3). - Tier 1 10.7 mo (SD 5.96) LARC - Tier 2 5.96 mo (SD 4.60) SARC - Tier 3 0.61 mo (SD 0.45) Barrier m **Methods used in 18 mo pp**, total percentage ("effectiveness") (table 3): - 55% received user-dep hormonal contrac as most effective contrac - 7% used barrier methods - 4% used LARC - 33% had no contraceptive claim **Compared to using barrier methods only** (table 4): 1) … LARCs had 3.89 times the odds of achieving an optimal IPI. 2) … user-dep horm methods had 1.89 times the odds of an optimal IPI. 3) … no method had 0.66 times the odds. For user-dep horm methods: odds of optimal IPI increased 8% for each month of contrac coverage. OR 1.08 (95% CI 1.08-1.09) **Other results** - 36% had short birth intervals. - Most initiated tier 2 as 1st method pp and started using it sooner (median 1.9mo) than tier 1 (2.2 mo) or 3 (3.0 mo) (see table 2). **Other comments** - Study-pop: 72% Latina, 13% non-hisp white. 51% foreign born. 43% < high school, 52% high school or some college. 22% <20 yrs at index birth.54% had >1 birth before 2008. Not generalizable to US-pop. - NB: switching methods – no overlap. - Predictors of optimal IPI (table 4): education ..	**Checklist:** • Is the objective precisely worded? YES • Is the study based on a random selection from an appropriate patient group? NO, register-based study • Did they ensure that the population wasn't selected? NO, Medi-Cal/Family PACT = lower socio-eco status (is reflected in study pop) • Were the inclusion criteria for the population clearly defined? YES • Is the percentage of answers sufficiently high? 35% of total no. of ≥ 2nd order births '08 • Were all the patients in the same stage of disease? YES, 1 birth in '08 and 1 in '02-08. • Was the follow-up sufficient (in type/scope/time) to uncover the endpoints? YES, 18 mo follow-up • Were objective criteria used to evaluate the endpoints? YES, effectiveness based on contrac method. Coverage based on claims. • When comparing patient series - is each series adequately described and is the distribution of the prognostic factors described? 1 patient series = not relevant. 4 case-series (1 for each tier) = not described • Was the data registration done prospectively? Historically prospective (register based) **What did the authors discuss as the study's …** **Strengths** – Large population-based sample, allows for adjustment of important covariables and thereby avoiding recall bias and sampling. No loss of follow-up. **Limitations –** Pregnancy-intention. Attitudes towards family planning, contraception etc. Underreporting of barrier methods (available at stores etc.), **not generalisable results b/c the group consists of women with low socioec status** **Do the authors reference other literature that strengthens/weakens their results?** Yes, supporting literature (some of which is their own).

Reference:
Starr KA, Martins SL, Watson S, et al. Postpartum Contraception Use by Urban/Rural Status: An Analysis of the Michigan Pregnancy Risk Assessment Monitoring System Data. Women's Health Issues. 2015;25(6):622-627.

Design: Patient series	
Level of documentation	II
GRADE	2 (-)

Objective(s)	Material and methods	Results	Discussion/comments
«We sought to examine rural/urban differences in postpartum contraceptive use.." **Purely descriptive!** **Conclusion** ***«We did not observe strong variation in postpartum contraceptive use based on geography. Low uptake of highly effective contraception across rural and urban areas suggests a need for education and outreach regarding these methods."*** **Country** **Michigan, USA** **Year of data collection** 2004-2008	**Population:** 9400 (1.5% of birth pop) women who had a live birth in 2004-2008 were **surveyed** by MI-PRAMS, phase 5 **(14-page self-administered** questionnaire). Response rate: 7427 (79%) - nonresponders contacted by mail and telephone MI-PRAMS data merged with RUCA-codes (-> zip codes). Other variables linked to residence and contraception included (see "explanatory variables"). 7073 observations available. **Excluded:** multiple gestations >3, diminished mental capacity, deceased. Currently pregnant, trying to conceive, same-sex relationships, postp contrac not stated, missing zip-codes. **Participants:** 6468 women 2-4 mo postp, not desiring pregnancy, participating in 2009 MI-PRAMS survey. **Main outcome:** contraceptive use – **sterilisation**, **LARC** (IUD, implant), **moderately effective** (pills, patch, ring, inject.), **abstinence**, **less effective** (condoms, withdrawal, natural family planning, diaphragm, spermicide, lactational amenorrhea, no method) **Main exposure:** urban/rural status (4 categ.) **Explanatory variables:** age, ethnicity, marital status, insurance, education, obstetric variables (parity, delivery met., etc.), comorbidities (BMI, smoking, etc.), pregnancy-intention, contraception at time of index pregnancy.	Postpartum contraceptive use (**mostly 4 mo postp**): - 14,5% used sterilization - 6,7% LARC - 37,3% mod. effective hormon. methods - 38,4% less effective methods or no meth. - 3,2% abstinence No geographic pattern discerned by multivariable analysis. - Use of sterilization was higher among rural residents vs. urban residents (ca. 19,8% vs. 13,7%) - LARC use was highest in large rural cities (10,8% vs. 5,1-6,7% in other categories) Odds of method use varied significantly by age, parity, BMI, and breastfeeding status. - Lower odds (OR 0,52) of using LARC when not discussing contraception with prenatal healthcare provider. - No. of prenatal visits and weeks since delivery - not associated with pp contraception method. --- ***Comments***: *- "The average time since delivery was 16.5 weeks." (categories for weeks after delivery in table 1: <12, 12-15, 16-19, 20-23, >=24. In other words – from <3 mo to >6 mo).* ***--> no info on which methods were initiated when** or for how long **(only a general time period as described above)** = data on postpartum contraception use (not contraception use in an IPI-context).*	**Checklist:** • **Is the objective precisely worded? YES** • **Is the study based on a random selection from an appropriate patient group? YES** • **Did they ensure that the population wasn't selected? YES** • **Were the inclusion criteria for the population clearly defined? YES** • **Is the percentage of answers sufficiently high? 79%!!! (very good)** • **Were all the patients in the same stage of disease? YES, postpartum women** • **Was the follow-up sufficient (in type/scope/time) to uncover the endpoints? 2-4 mo pp, too early relative to obj.** • **Were objective criteria used to evaluate the endpoints? No (Survey, not relevant)** • **When comparing patient series - is each series adequately described and is the distribution of the prognostic factors described? NO, urban/rural groups are not described (only the entire popul.)** • **Was the data registration done prospectively? Survey at one timepoint!** **What did the authors discuss as the study's Strenghts:** RUCA – nuanced measure of rurality and novel to use it in family planning research **Limitations:** only 1 geographic database used, retrospective (no causality assessment), "old" data – 0,6% used outdated method (also before ACA – LARC expensive). **Do the authors reference other literature that strengthens/weakens their results? YES, supporting literature**

Reference:	Design: Patient series	
White K, Teal SB, Potter JE. Contraception after delivery and short interpregnancy intervals among women in the United States. Obstet Gynecol. 2015;125(6):1471-1477.	Level of documentation	II
	GRADE	1-2

Objective(s)	Material and methods	Results	Discussion/comments
Contraceptive use postpartum and risk of pregnancy *"To investigate women's patterns of contraceptive use after delivery and the association between method use and risk of pregnancy within 18 months."* **Conclusion does not answer to objective** **Conclusion** **Few use LARCs, leads to greater risk of unintended pregnancy** *"Few women use long-acting reversible contraceptives after delivery, and those using less-effective methods have an increased risk of unintended pregnancy."* **Country** **USA** **Year of data collection** 2006 – 2010	**Population:** 2006-2010 National Survey of Family Growth (NFSG) (with 1 interview and contraceptive calendar) – women and men 15-44 yrs old. - 12 279 female respondents, 20 492 pregnancies. **Inclusion: women who delivered ≥1 child (index-delivery) in the 3 years prior to the survey date (interview)**. **Exclusion:** not live birth, birth >3 years from survey date, multiple births, method calendar began after delivery date. Using pregnancy file: identified 14 292 live births, then 3 121 **singleton live births** within study period. Excluded 116 cases b/c of missing values etc. **Who was included: 3005 births** (15% of total no. of pregnancies) of live singleton neonates **Main outcome:** contraceptive use at 3, 6, 12 and 18 mo postp. IPI <= 18 mo. (Pregnancy intention for short IPI). **Main exposure:** contraception, 5 categories - fem sterilisation, vasectomy, LARC, horm methods (pills, patch, ring, injection), less effective (diaphragm, condoms, withdrawal etc.) **Explanatory variables: Age, education**, parity, ethnicity, marital status, insurance (Medicaid/private) - all measured at index delivery.	1) *Delivery to 3 mo postp*: increase in contraceptive use from 21% to 72%. Distribution at 3 mo (18 mo): - 13% sterilization (Female 11%) (15%) - 6% LARCs (9%) - 28% other hormonal methods - 25% less-effective methods. (24%) Contraceptive use was similar at 3, 6, 12 and 18 months. 2) Pregnancies among women within 18 months pp. Hormonal m: 12.6% (HR: 21.2 (CI: 6.2-72.8)) Sterilization/LARCs: 0,5% (reference) Less-effective m: 17,8% (HR 34.8 (CI: 9.3-31)) No method: 23% (HR 43.2 (CI: 12.3-152)) 3) At least 70% of pregnancies within 1 year after delivery were unintended. --- Other results: Short IPI 30-34 yrs (8.2%) , (ref.) 15-24 yrs (20.2%) (HR 2.37 (1.4-4.0) 25-29 yrs (15.3%). (HR 1.9 (1.2-2.9) Short IPI ≤ 18 mo: Para 1 vs. para 2+ (20.2/15.3%) NS Cox-regression < high school/>= high school (19.2/ 13%) "[…] approximately half of US women rely on less-effective or no method of contraception in the 18 mo after delivery." 434 women became pregnant within 18 months 61 ≤ 2 mo, 66 3—5mo, 159 6-11 mo, 148 12-18 mo ***Comments:*** Conclusion does not answer to objective.	**Checklist:** • **Is the objective precisely worded? YES** • **Is the study based on a random selection from an appropriate patient group? YES** • **Did they ensure that the population wasn't selected? YES** • **Were the inclusion criteria for the population clearly defined? YES** • **Is the percentage of answers sufficiently high? YES, response rate 78% (final sample is 15% of total no. of pregnancies)** • **Were all the patients in the same stage of disease/Were all the patients followed up after birth? YES (birth ≤ 3 yrs of suv.)** • **Was the follow-up sufficient (in type/scope/time) to uncover the endpoints? YES, as defined < 18 mo pp. But not relevant since retrospective.** • **Were objective criteria used to evaluate the endpoints? NO, survey data as answered by respondents (recall bias)** • **When comparing patient series - is each series adequately described and is the distribution of the prognostic factors described? Subanalysis; all risk factors** • **Was the data registration done prospectively? NO** **What did the authors discuss as the study's …** **Strengths** Contraceptive calendar is a well validated method (reduce reporting bias?). **Limitations** Recall bias. Excluding miscarriage + abortion underestimates pregnancy risk postpartum (but maternal, neonatal health risks more relevant). **Do the authors reference other literature that strengthens/weakens their results? YES, supporting literature.**

Reference:
Brunson MR, Klein DA, Olsen CH, Weir LF, Roberts TA. Postpartum contraception: initiation and effectiveness in a large universal healthcare system. Am J Obstet 2017;217:55.e1-9.

Design: Patient series	
Level of documentation	II
GRADE	1-2

Objective

"We aimed to determine the initiation trends and relative effectiveness of pp contrac methods, with typical use, on prevention of short delivery intervals (<27 months) among women with access to universal healthcare, including coverage that entails no copayments and allows unlimited contrac method switching."

Conclusion

"Postpartum initiation of LARC is highly effective at the prevention of short IDIs, whereas pill, patch, or ring methods are associated with rates of short IDIs similar to users of no prescription contraception. This study supports LARC as firstline recommendations for postpartum women who wish to retain fertility but avoid early repeat pregnancy."

Country

USA

Year of data collection

October 2010 – March 2015

Material and methods

Population: women enrolled in military healthcare insurance program (TRICARE Prime) between 01.10.2010-30.09.2015.
- includes active duty memb, retirees <65, spouses and unmarried children <26, etc.

Database: *Military Health System Management Analysis and Reporting Tool* contains medical and pharmacy billing records of TRICARE Prime, and enrolment status.
Coding systems used to review patient records - to ***identify most eff contrac method initiated in first 6 mo. after index delivery***.

Inclusion: TRICARE Prime enrolees admitted to hospital for childbirth, abortion, XU, or miscarriage between 01.10.2010-30.03.2015 (index birth).
Exclusion: pp-intervals with endpoint other than childbirth – disenrolled, no new delivery by 27 mo post-delivery or by end of study period.

Who was included? 450,875 pp periods among 373,840 women who were enrolled in TRICARE Prime and admitted for childbirth between Oct 2010- March 2015 with short IDIs (≥6 months and <27 months).

Main outcome: *IDI </>=27 mo* (chosen as endpoint to best approximate IPI </>=18 mo)

Main exposure: *contrac method* – tubal ligation, partner vasectomy, IUD, ENG-implant, DMPA, short-acting user-dep horm methods (pills, patch, ring), no prescription method (e.g. barrier, withdrawal, no method).

Explanatory variables: Age, eligibility status (active duty, family members/military retirees), sponsor's rank (jr/sr enlisted, warrant/jr/sr officer) … *Rank as proxy for socioeco status.*

Statistical analysis: Cox proportional hazard models and regression

Results

Contraceptive methods initiated within 6 mo pp *among women of all ages (table 2, P<.0001):*
- 7% self or partner sterilization
- 13,5% IUD
- 3,4% ENG-implant
- 2,5% DMPA (injection)
- 36,8% pills, patch and ring
- 36,7% no prescription method

Probability of short IDI among all women: *17,4%*
Varied by age (table 1):
- Highest among women 20-24 yrs (21,2%)

Short IDI also varied signific w/ contrac method (table 3):
- 1,2% of women receiving sterilisation method
- 5,8% IUD
- 7,1% ENG-implant
- 11,6% DMPA
- 20,7% pill, patch, ring
- 22,9% no prescription method

Hazards of short IDI varied among contracept method – compared w/ no prescription method *(table 4)*:

- Tubal ligation	aHR 0.008, 95% CI .005-.012
- Partner vasectomy	aHR 0.05, 95% CI 0.04-0.06
- IUD (80% lower hazard)	aHR 0.19, 95% CI 0.18-0.20
- ENG-implant (80%)	aHR 0.21, 95% CI 0.19-0.23
- DMPA (60% lower)	aHR 0.39, 95% CI 0.36-0.42
- Pill, patch, ring (20%)	aHR 0.80, 95% CI 0.78-0.81

Hazard of short IDI varied by age – compared to >40:

- 20-24 yrs	aHR 5.03, 95% CI 4.50-5.63
- 12-19 yrs	aHR 4.79, 95% CI 4.26-5.40

Other results and comments:
"Higher socioeco status had higher hazards of short IDI compared w/ lowest status."
- Opposite of results in other studies …

Military women have higher rates of unintended pregnancy than general US pop. B/c of lower contrac use during deployment than at home.
→ *Not generalisable to the US pop at large.*

Discussion/comments

Checklist:
- **Is the objective precisely worded? YES**
- **Is the study based on a random selection from an appropriate patient group? YES, total population**
- **Did they ensure that the population wasn't selected? YES. Kids of military personnel <26**
- **Were the inclusion criteria for the population clearly defined? YES (-), badly def exclusion criteria**
- **Is the percentage of answers sufficiently high? YES, 100%**
- **Were all the patients in the same stage of disease? YES**
- **Was the follow-up sufficient (in type/scope) to uncover the endpoints? Contrac within 6 mo. pp, IDI up to 27 mo. pp**
- **Were objective criteria used to evaluate the endpoints? YES, records and prescriptions**
- **When comparing patient series - is each series adequately described and is the distribution of the prognostic factors described? 1 patient series**
- **Was the data registration done prospectively? Data registered prosp and analysed "retrospectively"**

What did the authors discuss as the study's …
Strengths – Large study group, 6 yrs of continuous enrolment info, data on military and military-covered civilian healthc providers. Ideal study pop b/c access to universal healthcare.

Limitations – Retrosp design, depend on coding accuracy, no differentiation between COC and POP or barrier methods and no methods. Measuring IDIs rather than IPIs makes comparison w/other studies challenging

Do the authors reference other literature that supports/weakens their results? YES, both supporting and undermining literature.