

**BRIEF REPORTS**

# Effects of a Reduced-Visit Prenatal Care Clinical Practice Guideline

Christopher A. Partridge, MD and John R. Holman, MD, MPH

**Purpose:** A prenatal care guideline that decreased scheduled visits to 9 was introduced at a military community hospital in 2000. We hypothesized patients would have fewer clinic visits with no difference in maternal and neonatal outcomes under the new schedule.

**Methods:** We designed a retrospective cohort study involving patients who delivered after 20 weeks gestation during 1999 (1647) and 2000 (1710). We measured the number of antenatal visits to clinic and labor and delivery (L&D) per patient. We assessed maternal and neonatal outcomes. Power was adequate to detect a 25-g change in birth weight. Descriptive,  $\chi^2$ , and *t* test statistics were used.

**Results:** The number of prenatal visits decreased from  $10.9 \pm 2.8$  to  $9.2 \pm 2.6$  ( $P < .001$ ) per patient. Outpatient visits to L&D increased by 31 per month,  $P = .01$ . Post-term deliveries decreased from 10.4 to 8.1%,  $P = .01$ . Maternal and neonatal outcomes did not decline. Patient satisfaction did not change.

**Discussion:** Application of the prenatal care guideline was associated with a reduction in prenatal visits but a small increase in L&D visits that did not persist after the initial year. No adverse perinatal or patient satisfaction outcomes were noted.

**Conclusions:** This guideline is efficient in delivering prenatal care with no changes in perinatal outcomes or patient satisfaction. (J Am Board Fam Pract 2005;18:555–60.)

The beneficial effects of prenatal care have been documented in many observational studies over several decades.<sup>1–7</sup> The frequency of prenatal visits is variable and depends on multiple factors. Recommendations for uncomplicated pregnancies range from 3 to 4 visits in some European countries to 14 visits in the United States.<sup>8,9</sup> There are over 4 million births annually in the United States, making prenatal care one of the most frequent services offered to the population.<sup>10</sup> A reduction in unnecessary prenatal visits with no adverse impact on perinatal outcomes or maternal satisfaction would

provide a significant cost savings for providers of maternity care.

In 1989, the US Public Health Service Expert Panel on Prenatal Care recommended that the number of visits for low risk patients be reduced and become more “goal-oriented.”<sup>9</sup> Several studies have been done to validate these recommendations measuring outcomes such as patient satisfaction, cost savings, and the rates of low birth weight infants, preterm deliveries, cesarean deliveries, and preeclampsia. One study demonstrated that prenatal care visits could be reduced with no documented change in perinatal outcome or patient satisfaction.<sup>10,11</sup> Other studies show that the frequency of prenatal visits can be significantly reduced (10.8 to 8.6) with no change in perinatal outcomes but with less satisfaction with care.<sup>12</sup> One study of patients seen mainly by certified nurse midwives showed a significantly higher level of satisfaction with the reduced-visit prenatal care program.<sup>13</sup> Prenatal care in developing countries has been shown to be adequate with as few as 4 prenatal visits.<sup>14</sup> Finally, a systematic review published in the Cochrane database concluded that a reduction in the number of antenatal visits with an increased emphasis on the

Submitted 28 February 2005; revised 9 June 2005; accepted 21 June 2005.

From the Department of Family Medicine, US Naval Hospital, Camp Pendleton, CA 92055.

Conflict of interest: none declared.

Corresponding author: John Holman, MD, MPH, Department of Family Medicine, US Naval Hospital, Camp Pendleton, CA 92055 (e-mail: jrholman@cpen.med.navy.mil).

Presented at the American Academy of Family Physicians Annual Assembly Oct 2004.

The opinions contained herein are those of the authors and should not be construed as official or as reflecting the views of the Department of the Navy or the Department of Defense.

content with regard to services offered at each of the visits could be implemented without an increase in adverse perinatal outcomes.<sup>15</sup>

Recommendations for reduced visit prenatal care are already being instituted at some health care facilities.<sup>10</sup> Studies on goal-oriented prenatal visits have not been done involving family medicine departments, in undifferentiated populations of obstetrical patients, or within the United States military health care system. All previous studies have evaluated women who were identified to be low risk by certain perinatal characteristics. No prior studies have evaluated the effects of a reduced-visit prenatal care guideline on an otherwise undifferentiated population of prenatal patients. Our study was conducted to determine the effects that a prenatal care guideline that reduced the number of antepartum visits would have on maternal and neonatal outcomes at a military community hospital. We hypothesized that there would be no change in perinatal outcomes or patient satisfaction.

Prenatal and labor and delivery (L&D) care is a large portion of the care delivered at military hospitals, and maintaining the highest standard of care using evidence-based medicine when available is of the utmost importance. This fact has been recognized by the Surgeons General of all services as well as Veterans Affairs (VA), resulting in the recent development of a VA/Department of Defense Uncomplicated Pregnancy Guideline introduced at a video teleconference on 12 December 2002. The ability to deliver good prenatal care with fewer outpatient visits may increase the enrollment capacity for primary care portals in a hospital and decrease overall cost. Obstetric specialty clinics can increase the variety of patients seen in their practices. Our initial objective was to determine the number of prenatal visits per patient delivering at the US Naval Hospital Camp Pendleton (NHCP) for a 1-year period before and after the introduction of the 9-visit prenatal care guideline. We hypothesized that the number of prenatal visits per patient would decrease over that time period with the introduction of a goal-oriented prenatal care clinical practice guideline. Our second objective was to compare perinatal outcomes over the same time periods. We hypothesized that there would be no change in these outcomes.

## Methods

During 1999, a multidisciplinary group at the NHCP (including obstetricians, family physicians, certified nurse midwives, and nursing staff) developed a prenatal care guideline based on the best available evidence regarding the frequency of visits and recommended interventions. This research resulted in the development of a prenatal care guideline for 9 routinely scheduled maternity visits. Previous care had involved the traditional monthly visits from 12 to 32 weeks, every-2-week visits from 32 to 36 weeks, and weekly visits from 36 weeks until delivery, totaling 12 to 14 visits depending on delivery date.<sup>9-14</sup> Table 1 compares recommendations for scheduled visits between classic prenatal care and using the reduced-visit prenatal care guideline. We used a retrospective cohort design collecting prenatal and birth data from hospital databases for mothers who delivered their infants during the calendar years 1999 (preguideline period) and 2000 (postguideline period) to evaluate the effects of this guideline on perinatal outcomes. Data were gathered from the inpatient Clinical Information Systems (CIS) database, Ambulatory Data Systems (ADS) database and the Standardized Inpatient Data Record (SIDR). There was some crossover of patients who had part of their prenatal care before the guideline was introduced and part after the guideline was introduced. Patient demographics, number of prenatal visits, birth weight, gestational age, and Apgar scores were obtained

**Table 1. Comparison of Visit Schedules between Classic Care and New Guideline\***

Visit	Classic Care (weeks)	New Guideline (weeks)
First	7 to 12	7 to 12
Second	≤12	≤12
Third	16	16 to 18
Fourth	20	24
Fifth	24	28
Sixth	28	32
Seventh	32	36
Eighth	34	38
Ninth	36	40
Tenth	37	
Eleventh	38	
Twelfth	39	
Thirteenth	40	

\* Initial visit with registered nurse, remainder of visits with obstetrician/gynecologist, CMN, or family practitioner.

from CIS. The number of outpatient visits to L&D was obtained from ADS. Delivery data, newborn data, transfer data, comorbidities, and complications were obtained from the SIDR. Patient satisfaction was assessed by reviewing the standard Department of Defense patient satisfaction survey.

The subject population included women who received their prenatal care at NHCP and had a perinatal outcome documented in our inpatient databases. In the preguideline group, 276 patients had incomplete data on the inpatient record and 223 in the postguideline group. These records were excluded from analysis. All women in the study group initially began care using a goal-oriented prenatal guideline. Because of the study design, 850 women analyzed in the postguideline group actually initiated their care before the guideline implementation but were transitioned to the new guideline during their pregnancy. All providers were educated and given point-of-care tools to assist them in using the guideline. Feedback was given to providers on their use of the guideline during monthly staff meetings. An extensive patient education program was also included using handouts to inform patients of recommended testing, evaluation, and common pregnancy anticipatory guidance for each visit. Patients with complicated pregnancies exited the guideline and were cared for according to community standards. Some patients were transferred for their prenatal care to tertiary care facilities and did not deliver at NHCP, so they were not included in the final analysis. Patients who exited the guideline but continued their prenatal care at NHCP were included in the data analysis as an intention to treat

and were assumed to have followed the goal-oriented guideline for the duration of their pregnancy. Descriptive statistics,  $\chi^2$  for differences in categorical rates, and Student's *t* test for paired differences were used in the statistical analysis.

## Results

Table 2 shows the demographic comparison between the 2 groups. A higher rate of twins occurred during the preguideline year along with a small increase in the parity in the postguideline year. The small difference in the abortion rate is not clinically significant. There was no difference in the transfer rate. The mean number of prenatal visits decreased from  $10.9 \pm 3.9$  to  $9.2 \pm 2.6$  ( $P < .001$ ) per patient. Table 3 lists the data from prenatal and L&D visits. Outpatient visits to L&D increased by 31 per month,  $P = .01$ . Table 4 shows the obstetrical outcomes for the study. Post-term deliveries decreased from 10.4 to 8.1%,  $P = .01$  with 171 deliveries after 42 weeks occurring in the preguideline year and 139 deliveries occurring in the year after guideline introduction. Table 5 documents the neonatal outcomes of the study. Birth weight decreased from  $3441 \pm 511$  to  $3402 \pm 516$  g along with a decrease in large-for-gestational-age (LGA) infants from 13.0 to 10.6%,  $P = .03$ . The other variables showed no clinically significant differences. Patient satisfaction with the clinics as measured by the regular Department of Defense patient satisfaction survey did not change over the study period (data not shown). During the preguideline period, 12.6% of pregnancies had

**Table 2. Demographic Data for Pre- and Post- 9-Visit Guideline Patients**

	Preguideline	Postguideline	<i>P</i> Value
Deliveries	1923	1933	
Data incomplete	276	223	
Available for analysis	1647	1710	.05
Age in years	$23.6 \pm 4.57$	$23.9 \pm 4.76$	.11
Gravidity	$2.1 \pm 1.30$	$2.2 \pm 1.30$	.58
Parity	$1.2 \pm 0.96$	$1.4 \pm 1.22$	.01
Aborted	$0.58 \pm 0.94$	$0.50 \pm 0.88$	.03
Gestational age at delivery in weeks	$39.05 \pm 2.77$	$39.13 \pm 1.94$	.19
Percentage cared for by family practitioner	22.7	21.8	.35
Percentage transferred to tertiary facility	7.2	7.5	.12
Percentage with complications*	12.6	16.2	<.001
Percentage of twins	1.06	0.21	<.001

\* Defined as any complication listed in the inpatient record such oligohydramnios, twin gestation, gestational diabetes.

**Table 3. Comparison of Prenatal Visits**

	Preguideline	Postguideline	P Value
Clinic visits per delivery	10.9 ± 3.9	9.2 ± 2.6	<.001
Outpatient visits to L&D* per month	370 ± 40.6	401 ± 16	<.001
Outpatient visits to L&D per delivery	2.5 ± 0.2	2.9 ± 0.4	.01

\* L&D, labor and delivery.

complications coded on the SIDR. During the postguideline period, this percentage increased to 16.2% ( $P < .001$ ). No differences were noted in admission to the level 2 nursery at NHCP. There were no maternal deaths and 13 neonatal deaths in 1999 and 9 in 2000.

### Discussion

This study revealed that the change from the “classic” prenatal care delivery to a reduced visit, goal-oriented guideline was associated with a reduction in prenatal visits, a small increase in L&D visits, and no increase in adverse perinatal outcomes. The reason for the increase in L&D visits is unclear. It is possible that these visits could have been reduced with better anticipatory guidance or the increase in visits was justified and helped prevent complications. Analysis of outpatient visits to L&D for 2001 to 2004 showed fewer visits than the preguideline year. Perhaps the increase in the first year after the guideline introduction was not related to guideline implementation because the trend after introduction of the guideline is consistently lower. Based on 3000 deliveries per year, there would be 5100 fewer prenatal visits per year in the outpatient clinics using this guideline. The post-term delivery rate, birth weight, and LGA rate were lower. With fewer

patients delivering after 42 weeks, there were fewer LGA infants, thus decreasing the overall birth weight. This finding may be related to the recommendations for management of postdates pregnancy in the goal-oriented guideline. Once a patient reaches 41 weeks estimated gestational age (EGA) without delivery, the provider and patient employ active management with plans for an induction date before the patient reaches 42 weeks EGA.

The small increase in the vaginal delivery rate is most likely related to a decrease in vacuum and forceps-assisted operative deliveries. With the decrease in percentage of LGA infants, one could surmise that spontaneous vaginal deliveries would increase as the smaller infants would not need assisted deliveries. It is also possible that providers were intervening with operative vaginal deliveries less often in patients using continuous epidural analgesia for pain relief. These patients often have longer second stages of labor. The primary and repeat cesarean section rates rose slightly. These rates are still well under the national rate of nearly 25%. This change in delivery methods may also be related to change in providers and L&D management style from one year to the next. Review of staffing for 1999 to 2000 revealed no changes in

**Table 4. Comparison of Obstetric Outcomes (Percentage)**

	Preguideline	Postguideline	P Value*
Vaginal deliveries	76.4	78.0	<.0001
VBAC	0.5	0.7	
Operative deliveries	23.6	22.0	
Vacuum	4.4	1.9	
Forceps	2.2	1.0	
Primary cesarean section	12.1	13.1	
Repeat cesarean section	4.3	5.2	
Delivered before 37 weeks	8.4	8.2	.7
Delivered after 42 weeks	10.4	8.1	.01
Pitocin induction	7.0	6.5	.43

\*  $\chi^2$  analysis.

**Table 5. Comparison of Neonatal Outcomes**

	Preguideline	Postguideline	<i>P</i> Value
Birth weight	3441 ± 511	3402 ± 516	.03
Percentage of small for gestational age			
<2500 g (%)	3.5	4.0	.5
<1500 g (%)	0.2	0.4	.7
<1000 g (%)	0.2	0.1	.62
Percentage of large for gestational age			
>4000 g (%)	13.0	10.6	.03
>4500 g (%)	1.6	1.3	.41
1-min Apgar	8.1 ± 1.5	8.2 ± 1.3	.72
5-min Apgar	8.8 ± 0.9	8.8 ± 0.9	.56
10-min Apgar	8.1 ± 1.9	8.2 ± 1.6	.56
Admission to level 2 nursery (%)	8.9	8.7	.77
Neonatal deaths (%)	0.85	0.54	.43

obstetric, family physician, or midwife credentialed providers. There was a turnover of 20 house staff because of graduation.

A higher rate of complications was noted during the postguideline year. Although this may be a true increase in complications, a change was made in our inpatient electronic health record allowing for easier input of conditions complicating prenatal care. This is the most probable explanation for the increase.

Traditional models of prenatal care are associated with a number of visits to a provider that are probably not necessary for good perinatal outcomes. Our study supports previous work that shows a reduction in prenatal visits using a goal-oriented guideline is associated with no adverse change in perinatal outcomes or patient satisfaction. Our study is unique in that it evaluates an evidence-based prenatal care guideline that was specifically designed to recommend visits synchronous with prenatal testing or patient education.

Percentage of LGA and post-term births improved using our goal-oriented guideline. In addition, the standard deviation for prenatal clinic visits decreased from the preguideline year when compared with the guideline year. This is evidence that our guideline succeeded in reducing unnecessary practice variation during routine prenatal care.

Being a retrospective study of existing data, potential biases include the incorrect recording or coding of data. The computer systems rely on the accurate documentation of the providers when patients are admitted for delivery or seen for an outpatient visit. One may also be concerned about the

relatively low number of prenatal visits before the guideline. This is partially explained by the transfer of patients during their pregnancy for care at Camp Pendleton and that only their prenatal visits at our facility are recorded. It could also be that providers were already adopting a more goal-oriented approach to prenatal care even without the goal-oriented prenatal guideline. There may be important neonatal or obstetrical outcomes that should have been assessed but were not. Rare or unusual perinatal complications may not have occurred because of low incidence and would not have been assessed. The inclusion of high risk pregnancies that delivered at NHCP in the data analysis may have biased the data toward greater changes in birth weight or problems with neonatal outcomes than if these pregnancies were excluded. Some natural removal of the highest risk pregnancies occurred because of care transfer to a tertiary care facility for delivery of the highest risk pregnancies. However, a few multiple gestations, preterm labor patients, fetal anomalies, and severe preeclampsia patients did deliver at this community hospital. Inclusion of high-risk pregnancy data in the analysis imparts a conservative bias making the results even more meaningful in pregnancies that are purely low risk.

Further study is needed regarding the specific satisfaction of patients with the goal-oriented guideline. Our satisfaction measure was global and did not specifically address the new guideline. Other investigations may evaluate further reductions in prenatal care visits and their effects on perinatal outcomes.

## Conclusion

Family physicians provide prenatal and L&D care to low-risk populations. Reducing unnecessary prenatal visits as a part of a prenatal care guideline may allow for more or longer clinic appointments and improve overall access or overall clinic revenue without adverse maternal or neonatal outcomes.

The goal-oriented prenatal care guideline for low risk pregnancy we developed in 1999 formed the basis of the Department of Defense and Veterans Affairs uncomplicated pregnancy prenatal care guideline published in 2002. It is available at the US Army Quality Management Office website (<http://www.qmo.amedd.army.mil>).

## References

- Gortmaker SL. The effects of prenatal care upon the health of the newborn. *Am J Public Health*. 1979; 69:653–60.
- Shiono PH, Klebanoff MA, Graubard BI, Berendes HW, Rhoads GG. Birth weight among women of different ethnic groups. *JAMA* 1986;255:48–52.
- Murray JL, Bernfield M. The differential effect of prenatal care on the incidence of low birth weight among blacks and whites in a prepaid health care plan. *N Engl J Med* 1988;319:1385–91.
- Tyson J, Guzick D, Rosenfeld CR, et al. Prenatal care evaluations and cohort analyses. *Pediatrics* 1990;85:195–204.
- Malloy MH, Kao T, Lee YJ. Analyzing the effect of prenatal care on pregnancy outcome: a conditional approach. *Am J Public Health* 1992;82:448–50.
- Mustard CA, Roos NP. The relationship of prenatal care and pregnancy complications to birthweight in Winnipeg, Canada. *Am J Public Health* 1994;84: 1450–7.
- Blondel B, Pusch D, Schmidt E. Some characteristics of antenatal care in 13 European countries. *Br J Obstet Gynecol* 1985;92:565–8.
- American College of Obstetricians and Gynecologists. *Standards of Obstetric-Gynecologic Services*. 7th ed. Washington (DC): American College of Obstetricians and Gynecologists; 1989:16.
- Rosen MG, Merkatz IR, Hill JG. Caring for our future: a report by the expert panel on the content of prenatal care. *Obstet Gynecol* 1991;77:782–7.
- McDuffie RS Jr, Beck A, Bischoff K, Cross J, Orleans M. Effect of frequency of prenatal care visits on perinatal outcome among low-risk women: a randomized controlled trial. *JAMA* 1996;275:847–51.
- Berglund AC, Lindmark GC. Health services effects of a reduced routine programme for antenatal care: an area-based study. *Eur J Obstet Gynecol Reprod Biol* 1998;77:193–9.
- Sikorski J, Wilson J, Clement S, Das S, Smeeton N. A randomised controlled trial comparing two schedules of antenatal visits: the antenatal care project. *BMJ* 1996;312:546–53.
- Walker DS, Koniak-Griffith D. Evaluation of a reduced-frequency prenatal visit schedule for low-risk women at a free-standing birthing center. *J Nurse-Midwifery* 1997;42:295–303.
- Munjaja S, Lindmark G, Nystrom L. Randomized controlled trial of a reduced-visits programmed of antenatal care in Harare, Zimbabwe. *Lancet* 1996; 348:364–9.
- Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gulmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database Syst Rev* 2001;4:CD000934.