

Decreasing Elective Deliveries Before 39 Weeks of Gestation in an Integrated Health Care System

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OBJECTIVE: The American College of Obstetricians and Gynecologists has recommended that elective deliveries not be performed before 39 weeks of gestation, to minimize prematurity-related neonatal complications. Because a worrisome number of elective deliveries were occurring before 39 weeks of gestation in our system, we developed and implemented a program to decrease the number of these early term elective deliveries. Secondary objectives were to monitor relevant clinical outcomes.

METHODS: The electronic medical records of an integrated health care system involving nine labor and delivery units in Utah were queried to establish the incidence of patients admitted for elective induction of labor or planned elective cesarean delivery. These facilities have open staff models with obstetricians, family practitioners, and certified nurse midwives. Guidelines were developed and implemented to discourage early term elective deliveries. The prevalence of early term elective deliveries was tracked and reported back regularly to the obstetric leadership and obstetric departments at each facility.

RESULTS: The baseline prevalence of early term elective deliveries was 28% of all elective deliveries before the initiation of the program. Within 6 months of initiating the program, the incidence of near-term elective deliveries decreased to less than 10% and after 6 years continues to be

less than 3%. A reduced length of stay in labor and delivery occurred with the introduction of the program, and there were no adverse effects on secondary clinical outcomes.

CONCLUSION: With institutional commitment, it is possible to substantially reduce and sustain a decline in the incidence of elective deliveries before 39 weeks of gestation.

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LEVEL OF EVIDENCE: III

Induction of labor in the United States has more than doubled as a proportion of all births, from 9% in 1989 to 21% in 2002, with a sharper increase in elective than in medically indicated inductions.¹ The induction rate in Utah has also increased and has been higher than that reported nationally.² Although these birth certificate data could not distinguish between elective and indicated induction of labor, they did show that women who had labor induced were also likely to deliver on weekdays (Monday through Friday) compared with the weekend and during the day and early evening hours compared with women who did not have their labors induced, raising the possibility that many of these inductions were performed for reasons of convenience.² Similarly, an evaluation of deliveries in the State of New York indicated that a quarter of their induced deliveries lacked documentation of a medical indication.³ Also, the delivery of infants between 37 and 38 weeks of gestation has increased over the past decade and now accounts for approximately 17.5% of live births in the United States.^{4,5}

It is known that perinatal morbidity is higher in infants delivered before 39 weeks of gestation, with cesarean delivery being an independent risk factor for increased respiratory morbidity at term.^{6–16} A retrospective analysis of 179,701 births showed that the

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incidence of severe respiratory distress syndrome was 22.5-fold higher for infants born at 37 weeks of gestation and 7.5-fold higher for infants born at 38 weeks of gestation compared with those born at 39 to 41 weeks of gestation.⁶ Transient tachypnea of the newborn, persistent pulmonary hypertension, admissions to neonatal intensive care units, prolonged hospital stays beyond 5 days, and other morbidities are significantly increased in those early term elective deliveries.^{6-9,17-19}

Although the American College of Obstetricians and Gynecologists has stated that elective delivery should not be performed before 39 weeks of gestation to minimize prematurity-related neonatal complications,^{20,21} there existed in our region the widespread perception among obstetric care providers that this recommendation was unwarranted. A review of our delivery records confirmed that a significant number of early term elective deliveries were being performed before 39 weeks. We therefore considered various options to address this common clinical problem and developed and implemented a program to decrease the number of these early term elective deliveries. We report here a program that has produced a sustained decrease in early term elective deliveries. Secondary objectives were to monitor relevant clinical outcomes.

MATERIALS AND METHODS

Intermountain Healthcare is a vertically integrated healthcare system that operates 21 hospitals in Utah and Southeast Idaho. Fifteen of these hospitals use the StorkBytes perinatal data program. StorkBytes is an obstetric and delivery database application that captures maternal history, labor progression (uterine and fetal tracings, along with clinician charting), and delivery and recovery data in Labor and Delivery. The application was created in Intermountain Healthcare in 1989, can be programmed to include discreet data fields and best-practice guidelines, and can also insert prompts/alerts to facilitate and track best-practice guidelines.

Beginning in January of 2001, nine urban facilities participated in a process improvement program for elective deliveries. The electronic medical records of these nine facilities were queried to establish the baseline incidence of patients admitted for elective induction of labor or planned elective cesarean delivery. The indication for the induction of labor was defined in a coded data field, entered at the time of admission by the nursing staff. These patients were scheduled ahead of time. Inductions were considered elective if the admitting nurse entered the induction as elective or did not enter other maternal, fetal, or

logistical indications. In addition, cesarean deliveries were defined as elective only if they occurred before 39 completed weeks of gestation and were either entered as an elective repeat or did not have a maternal, fetal, or logistical indication listed. It was determined that approximately 28% of elective deliveries were occurring before 39 completed weeks' of gestation.

Within Intermountain Healthcare, continuing quality improvement initiatives are developed according to the service line quality teams. In the case of obstetrics, this is under the Women and Newborn Clinical Integration Program Team. This team is a multidisciplinary team consisting of physician and nurse leaders representing each of our facilities, a statistician, data manager, and administrative leaders within the organization.

Once the baseline rate of elective deliveries before 39 weeks of gestation was determined, the Women and Newborn Clinical Integration Program Team developed a program to specifically curtail this practice. In a series of presentations at local Obstetrics and Gynecology Department meetings, announcing the intent to prohibit the practice of early term elective deliveries, significant initial opposition to program implementation both by the physicians and the nursing staff was encountered. Many physicians did not appreciate the morbidity of neonates delivered before 39 weeks of gestation and wanted to maintain autonomy in determining the timing of delivery. The nursing staff did not want to be placed in an adversarial relationship with the physicians because they would have to enforce the policy. Therefore, extensive education of the medical and nursing staffs at each of the facilities was performed, which included data showing the incidence of neonatal intensive care unit (NICU) admissions (Fig. 1), respiratory distress syndrome (data not shown), and neonatal ventilator use (Fig. 2) for normal pregnancies and newborns without complications, by gestational age at near term and at term. Pregnancies and newborns were considered uncomplicated if there were no associated International Classification of Diseases, 9th Revision codes listing comorbid condition such as intrauterine growth restriction, preeclampsia, diabetes, etc.

To address the concerns of the nursing staff, practitioners pursuing early term elective deliveries were required to either obtain permission from their individual hospital Obstetrics and Gynecology Department Chair or attending perinatologist. A patient education sheet (brochure) was developed to explain Intermountain Healthcare's induction policy



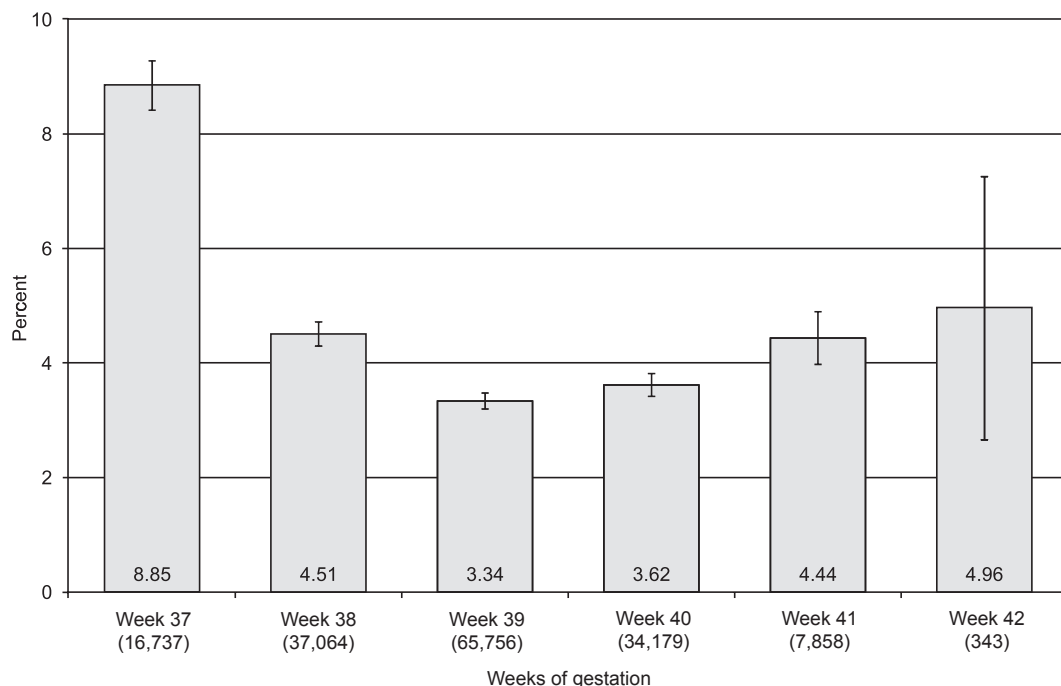


Fig. 1. Rate of neonatal intensive care unit admissions for normal pregnancies by gestational age. Two standard deviations shown by vertical lines. Data from Intermountain Healthcare.

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(www.ihc.com/xp/ihc/physician/clinicalprograms/womennewborns/electivelabor.xml).

The Clinical Program Leaders then went to each of the hospitals to promote the program. Performance was monitored system-wide, for each facility, and for each individual practitioner and reported regularly both to the obstetrics and gynecology staff and to individual practitioners. The proportion of elective deliveries less than 39 weeks of gestation was continuously tracked and presented as aggregate data for the entire hospital system, by region, and by hospital. Clinical Integration Program leaders had ongoing discussions with local hospitals and in certain circumstances with individual physicians to decrease the number of early term elective deliveries. In addition, data on length of stay, route of delivery, and various clinical parameters were collected. The study was presented to our system wide Institutional Review Board and was considered exempt.

Data were analyzed using MIDAS+ Statit Physician Profile & Review (Statit, Corvallis, OR). The χ^2 test was used to compare categorical outcomes. Odds ratios were used to calculate the probability of outcomes before and after the program was initiated, and the Student *t* test was used to compare continuous variables.

RESULTS

With the exception of an increase in the percentage of Hispanic patients, there were no meaningful changes in the population studied, as shown in Table 1. The baseline prevalence of elective deliveries occurring at less than 39 weeks of gestation was 28% before the initiation of the program (Fig. 3). Within 6 months of implementation of the program, the percentage of early term elective deliveries occurring before 39 weeks of gestation decreased from a baseline of more than 28% to less than 10%. Six years after implementation of the program, the rate of early term elective deliveries continues to be less than 3% (Fig. 3). To address concerns regarding potential increase in maternal or neonatal morbidity from potentially increasing gestational age by preventing early term elective deliveries, we evaluated selected outcome data, which is shown in Table 2. In comparing 39–41 week deliveries occurring before compared with after the program was initiated, there was a significant decline in postpartum anemia, meconium aspiration, Apgar scores less than 5 at 1 minute, and cesarean deliveries due to fetal distress. There was a slight increase in the rate of preeclampsia. There was no change in the rates of chorioamnionitis, endometritis, macrosomia, meconium aspiration syndrome, neonatal ventilator use, re-



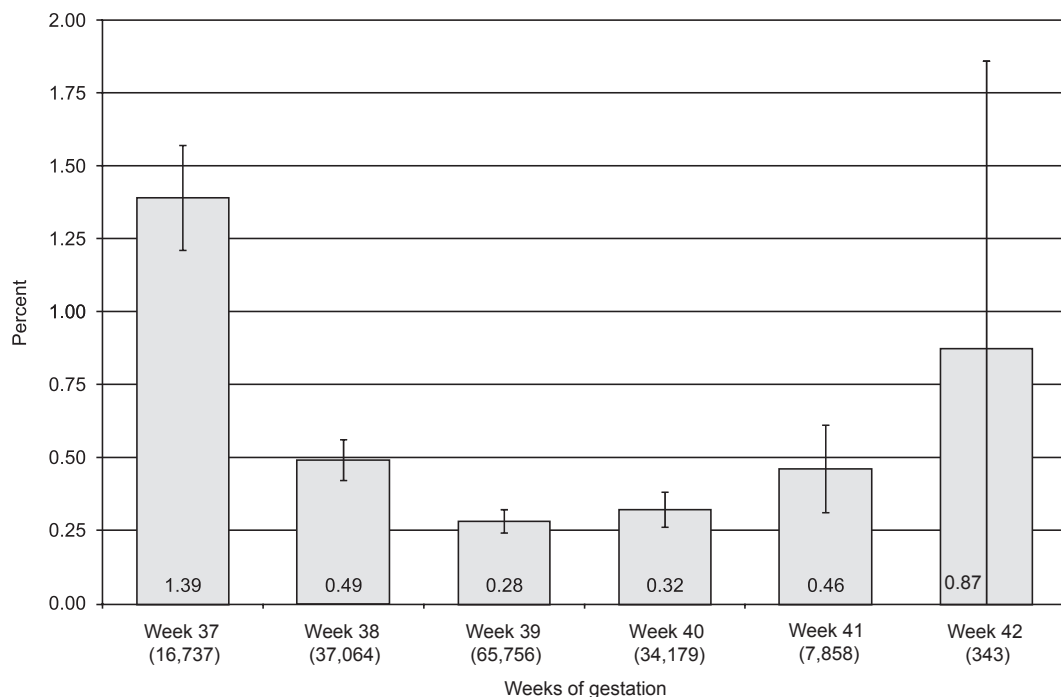


Fig. 2. Rate of ventilator use for deliveries without complications by gestational age. Two standard deviations shown by vertical lines. Data from Intermountain Healthcare.

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spiratory distress syndrome, or neonatal sepsis. The stillbirth data were also analyzed by weeks of gestation (Table 3) and there was a decline in the stillbirths, but only in the 37 and 38 weeks groups. As shown in Figure 4A and 4B, we did not find a significant increase in indicated inductions, but found that the overall induction rate showed a significant and steady decline from 43.7% in the first year of implementation to 36.9% by 2007. There was also a decrease in the hours that laboring patients spent in Labor and Delivery from

before and to after the program was instituted. (8.3 ± 5.6 hours for the preprogram period, compared with 7.8 ± 5.2 , $P < .01$).

DISCUSSION

Quality issues in medicine have come to public attention, especially since the publication of "To Err is Human: Building a Safer Health System," by the Institute of Medicine in 1999 (<http://www.iom.edu/CMS/8089/5575/4117.aspx>). It is not that physicians and healthcare providers intend to harm patients. Physicians have an obligation to provide safe care. Although guidelines established by American College of Obstetricians and Gynecologists do not support elective deliveries before 39 weeks of gestation, we found that a significant number of patients were being electively induced or delivered by cesarean below this age cutoff.

How did this practice become established? The reasons are myriad. First, the majority of deliveries occurring between 38 and 39 weeks of gestation do not result in harm. The absolute number of newborn respiratory complications is low. If an obstetrician performs 200 deliveries a year and 10% of his or her patients are electively delivered at 38 weeks of gestation, only one neonate would be admitted to the NICU per year. In addition, the obstetrician does not

Table 1. Demographic Data: Before and After Initiation of the Program (1999–2000 and July 2001 to June 2006)

	1999–2000	July 2001 to June 2006	P
Average annual deliveries	11,813	16,337	<.001
Average maternal age (y)	26.4	26.9	<.001
White (%)	83.3	85.4	<.001
Hispanic (%)	7.5	10.2	<.001
African American (%)	0.6	0.4	<.001
Percent nulliparous (%)	38.2	37.6	.34
Average gestational age at delivery (wk)	39.5	39.4	<.001
Average birthweight (g)	3,484	3,494	<.001
Percent male newborns	50.3	51.1	.21



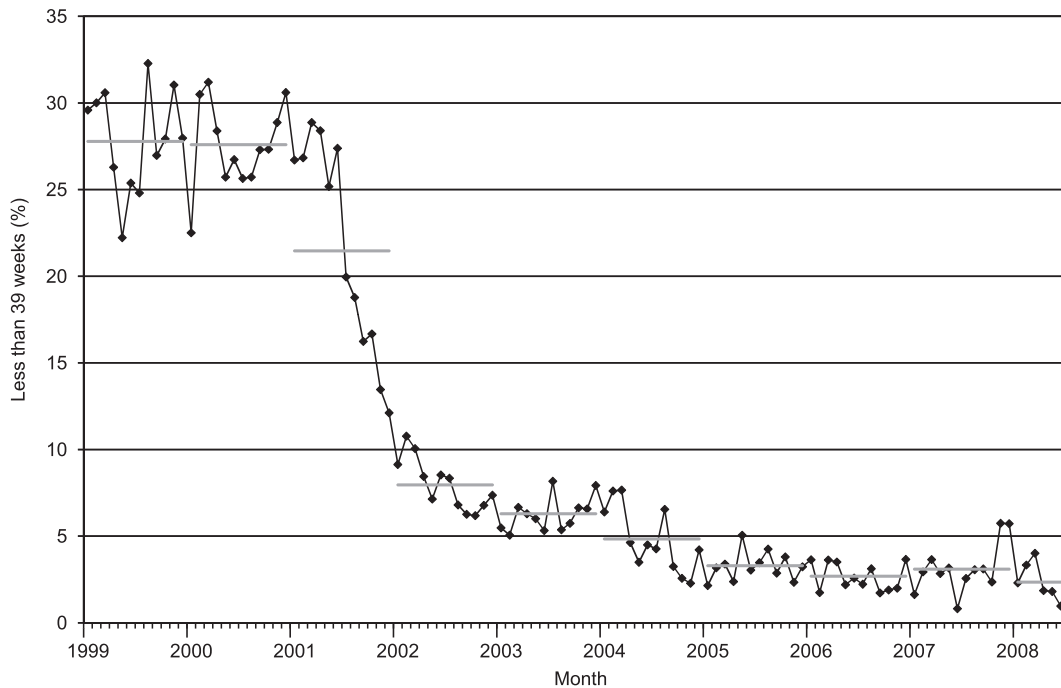


Fig. 3. Percent of elective deliveries before 39 weeks of gestation. Data from Intermountain Healthcare. Oshiro. *Decreasing Elective Deliveries Before 39 Weeks. Obstet Gynecol* 2009.

care for the neonate. Thus, there is a lack of awareness for any individual practitioner of the consequences of his or her actions. Over time, as each individual obstetrician does not see harm from delivering patients slightly early, there is a migration to an unsafe practice, or as Diane Vaughn called it, “the normalization of deviance.”²²

There are certainly other reasons that drive this practice. Busy clinicians are trying to more efficiently manage and coordinate their office schedule with their surgery schedule and patient deliveries. They may want to schedule deliveries based upon financial concerns,

convenience factors involving physician vacation schedules and patient request. Finally, patients themselves do not realize the consequence of a “slightly” early delivery. Thus, patient, physicians, and hospital staff have come to feel safer and safer about this practice, because there are significant perceived benefits and the perceived risks are thought to be rare.

The uniqueness in our endeavor was not that we confirmed the morbidity of elective deliveries before 39 weeks of gestation. The importance of this report is not only to shed light on this practice but also, more importantly, to be able to decrease it significantly.

Table 2. Selected Maternal and Neonatal Outcome Data: Before and After Initiation of the Program (1999–2000 and July 2001 to June 2006)

	1999–2000	July 2001 to June 2006	OR	95% CI
Preeclampsia	0.57	0.81	1.43	1.18–1.71
Postpartum anemia	1.58	0.46	0.86	0.77–0.97
Chorioamnionitis	0.69	0.72	1.04	0.88–1.24
Endometritis	0.18	0.21	1.19	0.85–1.67
Cesarean delivery due to fetal distress	0.11	0.06	0.57	0.35–0.92
Meconium aspiration	1.11	0.64	0.57	0.49–0.66
1-min Apgar score less than 5	2.99	2.40	0.80	0.73–0.87
Macrosomia	10.9	10.6	0.97	0.93–1.02
Stillbirth	0.09	0.03	0.59	0.36–0.98
Respiratory distress syndrome	0.53	0.57	1.08	0.89–1.13
Ventilator use	0.42	0.44	1.06	0.85–1.32

OR, odds ratio; CI, confidence interval.
Data are % unless otherwise specified.



Table 3. Stillbirth Data (1999–2000 and July 2001 to June 2006)

Weeks of Gestation	1999–2000			July 2001 to June 2006			Odds Ratio	95% CI
	Stillbirths	Deliveries	%	Stillbirths	Deliveries	%		
37	17	4,117	0.41	22	13,077	0.17	0.406	0.22–0.77
38	19	9,954	0.19	21	28,209	0.07	0.390	0.21–0.72
39	10	13,752	0.07	28	51,721	0.05	0.744	0.36–1.53
40	10	7,925	0.13	14	24,140	0.06	0.459	0.20–1.03
41	2	1,938	0.10	3	5,571	0.05	0.522	0.09–3.12
All	58	37,686	0.15	88	12,2718	0.07	0.466	0.33–0.65

CI, confidence interval.

Using a quality improvement program in a large, vertically integrated health care system, we produced a substantial and persistent reduction in the incidence of elective deliveries before 39 weeks of gestation.

Our success was facilitated by the following conditions. We have an electronic medical records system with specific coded data that allowed both identification and tracking of elective deliveries by gestational age at the time of admission to labor and delivery. We also have in place a quality improvement structure that is system-wide, and is composed of a committee that includes a nursing and medical director, local hospital physician and nursing representation, hospital administrators, and data analysis staff. We had eventual “buy-in” from a majority of the obstetricians, who recognized that the current practice was below best-practice standards and were willing to support and comply with the program. It is important to emphasize that it was not until internal or local neonatal morbidity data were presented that significant initial buy-in by the medical staff was seen. One of the arguments from our medical staff was that our patients were by and large healthier than those reported in the literature. Once we showed our own local data that there was a significant increase in neonatal admissions to the NICU as well as increases in respiratory distress syndrome and ventilator use, this obstacle was overcome. We also engaged patients by developing and publishing a patient informational brochure on the risk of delivering before 39 weeks. We regularly report the early term elective delivery data at the local Obstetrics and Gynecology Department and Quality meetings, giving feedback directly to practicing obstetricians and front-line nurses on labor and delivery. The hospital administrative leadership was highly committed and supportive of this process, because part of their compensation was based upon the meeting of our goals of decreasing early term elective deliveries.

It is important to mention the difficulty of implementing and sustaining the results of this program.

Just presenting the data and educating the obstetric providers was not sufficient. We found that there had to be oversight and policing of the program. Crucial to our success was having a committed Labor and Delivery nursing staff, along with strong local medical leadership in supporting, promoting, and enforcing the early term elective delivery guidelines and dialoguing regularly with the medical staff. We were able to generate and report morbidity data to the medical staff when requested and were able to assuage their fears of possible increase in maternal or neonatal morbidity because of a delay in early term elective deliveries. We also showed that there was true buy-in by showing that there was no shift in the indications for induction, but that there was an overall decline in the inductions in general. The desired results were not achieved overnight, but we did demonstrate that once achieved, they can be sustained.

There are limitations to this study. The indications for induction or cesarean delivery were entered by the nurse at admission, and in some circumstances the nurse could have left off some pertinent indications. However, such a situation would have been rare and unlikely, because elective conditions would have prevented the admission. It is more likely that there may have been a tendency for the admitting physician to be creative as to the indication for delivery. However, as shown in Figure 4A and 4B, there was not only a drop in the elective inductions without an increase in indicated inductions, but there was a decrease in the overall induction rate as well. This suggests that there was not a significant change in the designation of the induction type by providers.

Also, other data, such as outcome data, were retrieved from the database as entered and were not validated by manual chart review; they are thus subject to errors inherent with such entries. However, there were no changes in how the data were coded or entered before and after the initiation of the study and would have been consistent over time.



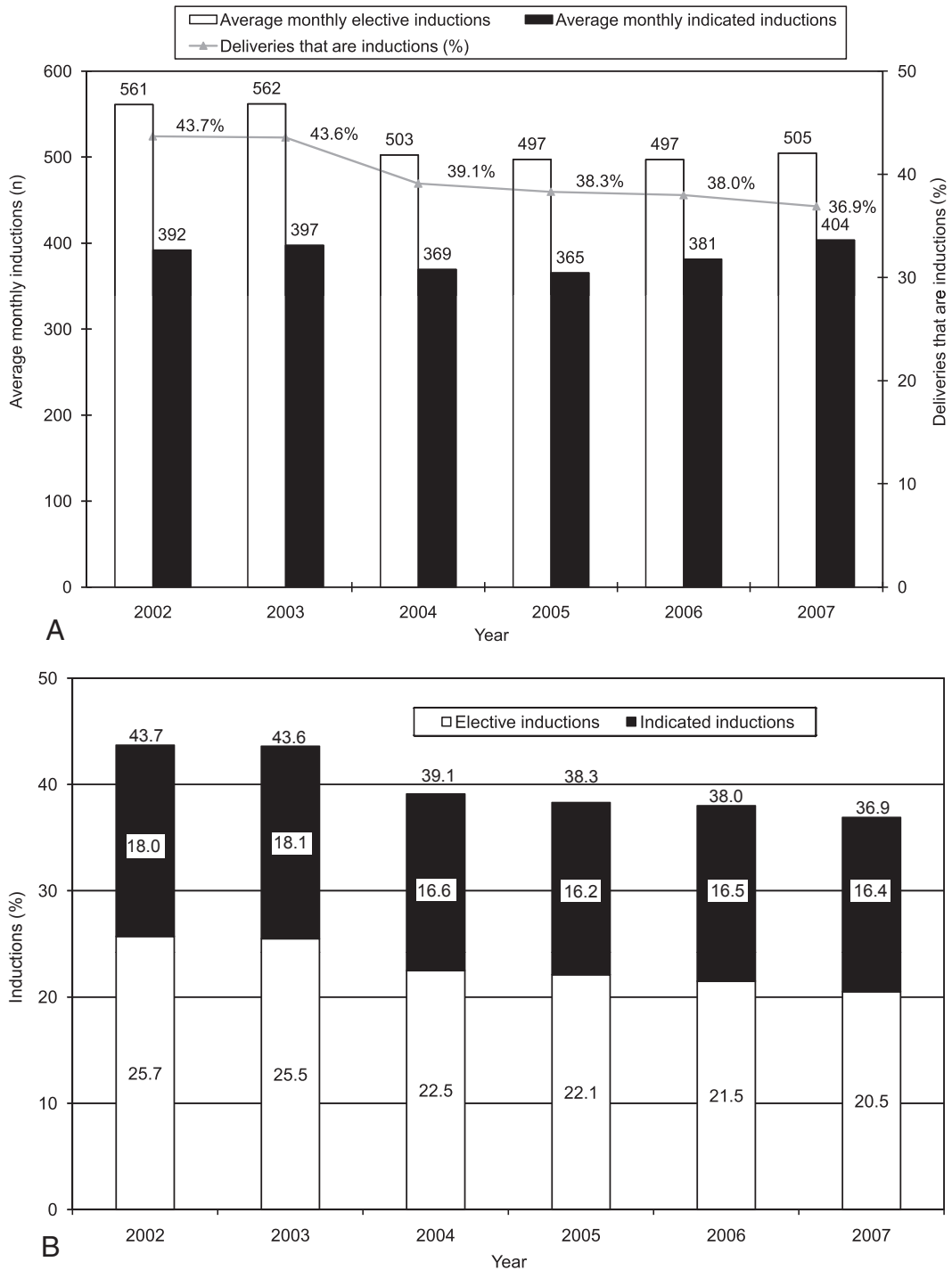


Fig. 4. A. Average monthly number of elective and indicated inductions. B. Yearly percentage of elective and indicated inductions. Data from Intermountain Healthcare.

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Finally, we acknowledge that other hospital and institutions may not have the same conditions nor the same resources. The health insurance environment is highly capitated. Intermountain Healthcare is the

largest hospital system in the state of Utah, with more than 50% of births occurring in Intermountain Healthcare hospitals. Intermountain Healthcare also has an affiliated health insurance program and has a physician



division that employs family practitioners, some obstetricians, nurse midwives, perinatologists, neonatologists, and pediatricians.

However, the hospitals do have an open staff structure, and the majority of obstetric providers are community physicians. Each individual hospital is very autonomous and located in an area where there are other competing hospitals where providers could do deliveries at non-Intermountain Healthcare Hospitals. Thus we feel that this program could work in other hospitals and in other areas of the country.

In conclusion, we were able to demonstrate that with institutional commitment, it is possible to implement a quality improvement process in an integrated healthcare system that resulted in a substantial and sustained decrease in elective deliveries before 39 weeks of gestation. Early elective delivery seems to be a problem nationwide.³⁻⁵ Indeed, quality organizations such as the National Quality Forum and the Institute for Healthcare Improvement have recently taken up prevention of elective deliveries before 39 weeks of gestation as a measure of quality.^{20,21} We hope this article will stimulate initiatives in other hospitals and institutions as well.

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