

LABOR INDUCTION PRACTICES IN A RURAL MIDWESTERN HOSPITAL

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Keywords: Rural, Labor Inductions, Nursing Shortage, Pilot Study

ABSTRACT

National databases indicate that induction of labor has risen dramatically in the United States over the last ten years. However, little is known about induction practices in rural areas. The purpose of this pilot study was to explore the induction practices of physicians in a 21-bed, rural hospital. Data were collected from the 2003 hospital birth records and from interviews with physicians. Findings showed an induction rate of 37.8%. Inductions resulted in 58% of the hospital's unplanned cesarean sections. Several physicians said that they scheduled inductions to guarantee the availability of a qualified labor and delivery nurse. However, none of the physicians were aware of the high rate of inductions at this rural hospital. This pilot study lends support for a large, randomized study of labor inductions in the rural area. This study also indicates a need to examine the impact of the nursing shortage on rural induction practices.

INTRODUCTION

According to the National Vital Statistics Report from the Center for Disease Control (CDC), induction of labor in the United States (U.S.) has more than doubled in the last ten years, rising from 9.5% in 1990 to 20.6% in 2003 (Martin, Hamilton, Sutton, Ventura, Menacker, & Munson, 2005). The explanation for the overall rise in labor inductions remains undetermined (Glanz, 2003). However, there is speculation that this rise is due to patient and physician preference for convenience. Although there are medical reasons for inducing labor, there are also risks associated with the procedure and additional costs (Rayburn and Zhang, 2002). The leading cause of obstetrical liability claims is induction of labor that results in uterine hyperstimulation (Simpson, 2004). Induction of labor contributes to the rising health care cost in the United States because of the intensive monitoring that is required, as well as the lengthened hospital stay, increased intrapartum interventions, and increased number of cesarean sections that are associated with it (Glantz, 2005; Crowley, 2000; Symon, 2000).

The rise in the U.S. induction rate is based on national data collections that do not differentiate between rural and urban hospital sources (Glantz, 2003). Twenty percent of the total U.S. population lives in rural areas that cover 80% of the country's landmass (Bushy and Leipert, 2005). This massive rural area is marked by limited resources, few and far between health centers, and a growing nursing shortage (Bushy and Leipert, 2005).

Although some studies note a disparity of birthing outcomes between rural and urban areas, few have explored the labor induction practices in rural areas. The purpose of this study was to explore the induction of labor practices in a rural, Midwestern hospital. Information from this pilot study contributes a rural focus to the body of knowledge concerning the current rise in induction rates.

BACKGROUND

Induction of labor is defined as the stimulation of uterine contractions to cause the delivery of an infant before spontaneous labor occurs (Kirby, 2004). Labor is typically induced by using one or more of the following methods: cervical ripening agents, artificial rupture of membranes, and uterine stimulation with oxytocin (Duff and Sinclair, 2000). Each method presents an element of risk to the pregnant woman and fetus. Complications associated with artificial rupture of membranes include an increased risk of prolapsed cord and/or cord compression; a commitment to delivery within a narrow window of time; rupture of *vasa previa*; and increased risk of intrauterine infection (American College of Obstetricians and Gynecologists, 1999).

Complications of cervical ripening agents vary according to pharmaceutical agent used, the dose and the fetal/ maternal context (Sanchez-Ramos and Hsieh, 2003). Two common cervical ripening agents are misoprostal (Cytotec), a synthetic prostaglandin, and dinoprostone (Cervidil), a prostaglandin. High doses of misoprostal (50 micrograms every 6 hours) can cause uterine hyperstimulation resulting in compromised fetal oxygenation (ACOG, 1999). In a meta-analysis of 44 randomized clinical trials, Sanchez-Ramos and Hsieh (2003) found that the use of misoprostol (Cytotec) as a cervical ripening agent reduced cesarean section deliveries but raised neonatal intensive care admission from 14% to 18% and doubled the number of abnormal 5 minute APGAR scores. These researchers found that women receiving this drug in high doses were more likely to experience tachysystole and uterine hyperstimulation than women who were not given this agent.

In a meta-analysis of 52 studies involving dinoprostone, Sanchez-Ramos and Hsieh (2003) found that a 10 mg sustained-release dose of dinoprostone resulted in uterine hyperstimulation with fetal heart rate changes. However, nonsustained-release subgroups of this drug were not associated with any negative effect.

Uterine stimulation with oxytocin is often used in conjunction with cervical ripening agents and is the most common method of labor induction (Duff and Sinclair, 2000). Complications of oxytocin administration are primarily related to the dosage administered (Crane and Young, 1998; ACOG, 1999). The most common complication is uterine hyperstimulation, accompanied by compromised fetal oxygenation (ACOG, 1999). Rare complications include uterine rupture and abruptio placentae (ACOG, 1999). Crane and Young (1998) noted that labor induction with oxytocin was associated with postpartum bleeding, increased instrumental deliveries and higher cesarean section deliveries. Currently, there is physician controversy over what constitutes an effective, safe dose practice of oxytocin administration for the induction of labor (Simpson, 2004). Medical indications for inducing labor include gestational diabetes, maternal renal disease,

chronic pulmonary disease, chronic hypertension, chorioamnionitis, fetal demise, pregnancy induced hypertension, preeclampsia, eclampsia, fetal compromise, premature rupture of membranes, prolonged pregnancy, hospital distance, psychosocial variances, and risk of rapid labor (ACOG, 1999). The number of women with medical indications for induction has remained stable and ACOG has not increased induction indicators (Glanz, 2003).

Prolonged pregnancies have been associated with a 2-10 times increase in infant mortality (Crowley, 2000). In a detailed analysis of induction data from 1989- 1998, MacDorman, Mathews, Martin, and Malloy (2002) found that induction of labor for prolonged pregnancies resulted in a 23% decrease in infant mortality. However, the researchers also found that preterm or term induction of labor resulted in a 20% increased risk of infant mortality.

Duff and Sinclair (2000) examined data from 8044 deliveries over a three-year span of time from 1994-1996. Out of the 8044 deliveries, 3262 were post-term deliveries and out of that figure, 1008 were induced. Duff and Sinclair concluded that there was no evidence of improved outcomes for the deliveries that were induced. On the other hand, they noted that the induced group had a slightly greater blood loss, slightly lower APGAR scores, a 17% increase in epidural use and a 5% higher cesarean section rate than the spontaneous delivery group.

One problem with inductions for prolonged pregnancies is the possible inaccuracy of the due date. In Duff and Sinclair's study (Duff and Sinclair, 2000), 82.9% of the women were certain about their last menstrual period, and even so, 11.2% of this certain group had their due dates revised.

Macrosomia, as a medical indicator for induction of labor, is defined as a birth weight of over 4000 grams. Induction of labor for macrosomia is intended to reduce the risk of shoulder dystocia and need for delivery by cesarean section (Rayburn and Zhang, 2002). Sacks and Chen (2000) conducted a review of the literature from 1980 to 1999 to examine the utility of macrosomia prediction in decreasing negative birth outcomes. Their findings indicated that shoulder dystocia occurred in up to 58% of babies who did not meet the criteria for macrosomia. They also noted that shoulder dystocia was not reduced by labor induction for infants who were estimated to weigh 4000 grams.

Induction of labor for specific medical concerns account for only half of the inductions in some hospital settings (Yeast, Jones and Poskin, 1999; Dublin, Lydon-Rochelle, Kaplan, Watts and Critchlow, 2000). Other indicators such as distance to the hospital, psychosocial variances, and history of rapid labor allow providers and patients to elect induction of labor for marginal reasons such as maternal discomfort and convenience for both provider and patient (Dublin et al. 2000; Rayburn and Zhang, 2002). Baxley (2003) cited two benefits of electing an induction: 1) labor and delivery nurses can be staffed appropriately, and 2) inductions are typically scheduled for daytime hours when emergencies have a better response time.

However, the risks involved with inductions must be weighed against medical and other indicators. In addition to the risks already noted regarding cervical ripening agents, oxytocin, and artificial rupture of membranes, other risks include increased use of epidurals, increased blood loss, increased cesarean sections, fetal hypoglycemia, and fetal distress

resulting in an increased admission rate to a Newborn Intensive Care Unit (Baxley, 2003; Crane and Young, 1998; Crowley, 2000; Dublin et al. 2000; Duff and Sinclair, 2000; MacDorman et al. 2002; and Sanchez-Ramos and Hsieh, 2003).

In spite of the noted risks, induction of labor has risen in the United States dramatically. The reason for this rise is speculated to be due to an increase in elective inductions (Martin et al. 2005). Rayburn and Zhang (2002) conducted a detailed analysis of the data used to determine the rising induction rate. They found that women who have high formal education, early prenatal care, are Caucasian and/or have private insurance are more likely to be induced than other women. The CDC's final report on births in 2003 (Martin et al., 2005) supports this finding, reporting that the induction rate for Caucasian women was 24.7% compared with 17.5% for non-white Hispanic women. Kirby (2004) noted that nulliparas are 10% more likely to be induced with a 40-week pregnancy and are 37% more likely to be induced with a prolonged pregnancy than multiparas of the same gestational status. This practice results in a doubling of the cesarean rate for the induced nulliparas. All of these findings raise the issue of election of inductions for reasons of convenience or preference rather than medical necessity.

The above induction findings are based on national databases that combine rural and urban hospital induction practices. Only a few studies have delineated rural induction practices from urban induction practices. Glantz (2003) examined a sample of 31,352 deliveries obtained from a variety of rural and urban hospitals in New York and noted a significant variability in induction practice between hospitals, physicians, and geographical areas. The researcher found no correlation between induction rate and risk status of the hospital. Other studies that compare rural versus urban delivery data, find disparity of outcomes between the two areas but do not specifically address induction practice in each area (Hulme & Blegen, 1999). In order to gain a better understanding of the rise in induction practices, Glantz (2003) proposed that more research is needed to examine these practices in the context within which they occur.

STUDY, DESIGN AND METHODS

The purpose of this pilot study was to explore the induction practice in a rural, Midwestern hospital using an exploratory study design. Internal Review Board approval for the protection of human subjects was obtained from both the hospital and the supporting school of higher education.

The hospital under study was a 21-bed hospital located in a rural Midwestern community of approximately 2,500 people. The closest tertiary medical center was 45 miles from this hospital. The labor and delivery unit had three beds to accommodate an average of 95 deliveries per year. There were eleven qualified labor and delivery nurses employed by the hospital. When there were no patients in the obstetrical unit, a labor and delivery nurse was either "on-call" at home within 30 minutes of the hospital or was working in the hospital as the charge nurse in the medical surgical unit while also covering the emergency room.

The medical staff for the hospital consisted of eight delivering family practice physicians. There were no nurse midwives or obstetricians on staff. An emergency cesarean section could be accomplished in 30-40 minutes of notice. Due to the limited availability of highly acute services and specialists, all women delivering at the hospital were considered low risk for complications of labor and delivery. Prenatal patients who with moderate risk factors were referred to the tertiary birthing center.

Electronic fetal monitoring was used for all inductions of labor. Due to the fact that the hospital did not have a nursery, mothers and babies roomed together. Infants born with critical complications were flown out to the tertiary birthing center.

Data were collected from the birth record of deliveries at this hospital for the year 2003. The delivery record utilized by the hospital was similar to the state birth record, containing routine data gathered for state statistics. For induced deliveries, a blind review of the patient medical record was used to collect data regarding the indications for induction. Data obtained included infant birth weight, APGAR scores, gestational age, post-delivery infant complications or abnormalities, indications for labor induction, method of induction, pain management, and length of labor. These data were analyzed using simple frequencies and descriptive statistics obtained through SPSS 11 statistical software.

In addition, all delivering physicians were invited to participate in a semi-structured, open-ended interview. The following questions were asked of each participating physician: 1) How do you decide when to induce labor? 2) What do you see as the benefits and the risks associated with induction? 3) What is your opinion about elective inductions? 4) Do you think there is a difference in induction rates between urban and rural hospitals? 5) Does the fact that this is a rural hospital influence your decision on whether or not to induce labor? Each interview was conducted with participating physicians on a one to one basis.

Physician responses were recorded by the researcher and transcribed following each interview.

RESULTS

There were 90 deliveries at this hospital during the year under study. Of these deliveries, 37.8% (34) of the deliveries were induced; an additional 17.8% (16) of the deliveries were augmented after spontaneous labor started; 7.8% (4) were planned cesarean section deliveries; and 33 (36.7%) had spontaneous deliveries requiring no intervention.

As noted in Table 1, reasons given for the 34 inductions included: continuing the pregnancy would compromise the fetus (1); patient convenience (1); gestational diabetes (3); suspected macrosomia (5); prolonged pregnancy (6); maternal discomfort (7); and undocumented reasons (11). The six inductions for prolonged pregnancy included women who were at or beyond their estimated due date. One of the six inductions for prolonged pregnancy resulted in the cesarean delivery of a premature infant. The baby was transferred to a tertiary birthing center in order to receive neonatal intensive care. The five inductions for suspected macrosomia resulted in deliveries of babies weighing less than 4000 grams. The largest baby weighed 3884 grams and the smallest baby weighed 3289 grams.

Table 1
Indications for Labor Induction According to Delivering Physicians

Physician	A	B	C	D	E	F	G	H
Total # deliveries	27	10	2	9	10	17	7	8
# of inductions	12	5	0	5	0	6	2	4
% inductions	44.4%	50%	0%	55%	0%	35%	28.5%	50%
<i>Fetal compromise if pregnancy con't</i>		<i>1</i>						
<i>Prolonged pregnancy</i>	<i>3</i>			<i>2</i>		<i>1</i>		
<i>Gestational diabetes</i>		<i>1</i>				<i>2</i>		
<i>Macrosomia</i>	<i>1</i>	<i>1</i>				<i>2</i>	<i>1</i>	
Maternal discomfort	3	1				1	1	1
Patient convenience	1							
Undocumented	4	1		3				3

* Medical indications for labor induction are in ***bold italics***.

Medical indicators for induction (macrosomia, prolonged pregnancy, gestational diabetes, fetal distress) accounted for less than half of the inductions at this rural hospital in the year under study. Over half of the inductions in this hospital were for elective (patient convenience, maternal discomfort) or undocumented reasons.

Induction practice varied among the eight delivering physicians from 0% to 55%. The physician with the most deliveries had an induction rate of 44.4%, citing elective or undocumented reasons for 2/3 of the inductions. Six of the eight physicians cited elective or undocumented reasons for induction.

Table 2 summarizes labor and delivery events and outcomes among spontaneous deliveries/ no interventions, augmented spontaneous labor by artificial rupture of membranes (AROM), augmented spontaneous labor utilizing oxytocin, induced labor using cervical ripening agents and/or oxytocin, and scheduled cesarean deliveries. Complications noted for the induced patients and their babies included one maternal postpartum hemorrhage, one fractured infant clavicle, and the one infant previously noted that was born prematurely and transferred to a neonatal intensive care unit. Induced and augmented labor led to the births of infants with slightly higher APGAR scores than infants spontaneously delivered.

Intrapartum interventions involving intrathecal to manage pain were used almost twice as much among induced patients when compared with spontaneous laboring patients. Induced patients had a 79.4% (27 of 34) intrathecal usage rate compared to 46.5% (8 of 18) intrathecal use by the spontaneous laboring patients.

Table 2
Labor and Delivery Summary of Events and Outcomes.

	Spontan- eous delivery	Augment- ation by AROM only	Augment- ation by oxytocin	Induction by cerv.ripening +/-or oxytocin	Scheduled Cesarean sections.	Total
Incidence	18	17	14	34	7	90
Intrathecal use	8	5	11	23	---	47
Cesarean section	2	0	3	7	(7)	19
Laceration	5 1 st deg. 4 2 nd deg. 1 3 rd deg.	6 1 st deg. 3 2 nd deg.	3 1 st deg. 1 2 nd deg.	9 1 st deg. 8 2 nd deg.	N/A	
APGARs						
1 min.	8.1	8.4	8.4	8.4	8.3	
sd	.65	.78	.92	.85	2.16	
5 min.	9.1	9.1	9.5	9.5	9.3	
sd	.34	.76	.65	.65	1.21	
Abnormal outcomes		1 shoulder dystocia 2 to NICU		2 shoulder dys. 1 fx clavicle 1 PP bleed 1 to NICU	1 to NICU	

* Artificial rupture of membranes.

Two inductions resulted in instrumental deliveries involving vacuum extraction. Seven inductions resulted in cesarean delivery, accounting for 58% of the hospital's unplanned cesarean sections for the year. The hospital had a total of 19 cesarean deliveries, twelve of which were not planned. The hospital's 21.1% cesarean section rate is lower than the national cesarean section rate of 27.5% (Martin et al. 2005). All eight of the physicians were interviewed for this study. The following is a summary of their responses to the five questions.

1. ***How do you decide when to induce labor?*** All of the physicians listed medical indicators as the deciding factors in inducing labor. Prolonged pregnancies, gestational diabetes, intrauterine growth retardation, fetal anomalies, macrosomia and pregnancy induced hypertension were particularly emphasized.
2. ***What do you see as the benefits and the risks associated with induction?*** The most important benefit to the mom and baby was noted to be a "resolution of the indication for the induction". The physicians identified the risks of induction as increased cesarean sections, increased postpartum bleeding, increased fetal

distress, and more pain in labor. Several physicians also noted that inductions added an increased cost factor to delivery with “more doctor and nurse time and more interventions used, such as scalp electrodes, etc.” One physician commented that “...The cost may be higher, but the provider liability for not doing the induction when medically indicated is much more costly”.

3. ***What is your opinion about elective inductions?*** All of the physicians indicated a concern for inductions of convenience. Their concerns ranged from strict resolve that there was never a place for elective inductions to acceptance of marginal (elective) indicators for induction such as maternal discomfort. One physician who delivered 10 of the 90 patients and had no inductions of labor for the year under study stated, “I do not participate in many inductions with my patients. But, if I do, there must be a significant reason for the interruption in nature’s process.” Another physician who had the most deliveries for the year under study and 44.4% of the inductions said, “I wouldn’t recommend that anyone who wants an induction get one. However, there are situations where induction deliveries may not be necessary, but become an option due to some significant reason such as if a woman is incredibly uncomfortable or can no longer be effective in her normal roles.” Five physicians stated that their patients frequently ask for inductions because of labor and delivery reality programs on television. Several of the physicians commented that the media often misinformed their patients about obstetrical practices. One physician said, “Every pregnant woman begs for an induction some time during pregnancy”. Another physician said that the media pushes inductions as a matter of convenience and that “convenience should never be the indicator for induction”.
4. ***Do you think there is a difference in induction rates between urban and rural hospitals?*** One physician thought that the rural induction rate was equal to the urban induction rate. This physician said, “Having practiced in an urban setting while in residency, I use the same philosophy here as I did there.” The remaining seven physicians felt that the rural induction rate was lower than the urban induction rate. All of these physicians made similar comments about “sticking to ACOG guidelines more than urban docs” because of the need to be “more careful in the rural area”. One physician said, “There’s more conscientious adherence to induction protocols in rural hospitals”. One physician commented, “Family docs probably have a lower rate of inductions. I suspect OB GYN docs have more inductions to allow them some control in their practice.” Another postulated, “It would be easier to talk a physician into an induction in the urban area than here.” All eight of the physicians made a comment to the effect that they did not see any evidence that would suggest that the induction rate in the rural area would be higher than urban areas.
5. ***Does the fact that this is a rural hospital influence your decision on whether or not to induce labor?*** Several of the physicians said that they sometimes schedule inductions in order to assure the availability of a labor and delivery nurse. All of the physicians made a comment about the problem of not always having a labor

and delivery nurse available for spontaneous deliveries. One physician commented that when nursing staff was not available for spontaneous deliveries, patients in labor were diverted to alternative facilities where they, as the patient's physician, may or may not have privileges. This physician said, "I know that there are times when we are threatened with the potential transfer of a patient to a surrounding area hospital for delivery due to the lack of OB nurses. This reflects poorly on the hospital and doesn't preserve our clientele. We avoid this at all costs."

DISCUSSION/CLINICAL IMPLICATIONS

The induction rate at this rural mid-western hospital was found to be 37.7% which is almost twice the national rate of 20.6% (Martin, et al., 2005). This is particularly noteworthy because all of the pregnant women reflected in this figure were considered to have low risk pregnancies. Although 44.1% of the inductions cited medical indicators, the data indicated that some of the medical indicators (such as macrosomia) were inaccurately assigned.

According to Rayburn and Zhang (2002), the question of physician convenience should be raised concerning the labor inductions that were scheduled without medical indicators. It is possible that physician convenience or patient convenience may have been underlying factors for some of the inductions in this study. However, given the physicians' concern about safe staffing of nurses, the most likely reason for the undocumented induction of labor in this rural hospital was to ascertain availability of qualified labor and delivery nurses.

All of the physicians noted the fact that labor and delivery nurses were not always available for spontaneous deliveries. Some physicians described scheduling an induction as a way of guaranteeing safe staffing of a qualified nurse. The fact that almost all of the physicians perceived the induction rate at the hospital to be less than the urban average instead of double the national average, may indicate that the physicians were not aware of the degree to which induction of labor practice might be influenced by nurse staffing issues in this small rural hospital. A future study is needed to explore the degree to which rural physicians schedule inductions to meet nurse staffing needs.

The national nursing shortage is compounded in rural hospitals by the fact that small hospitals cannot compete with the salaries offered by larger medical centers. In addition to the wage and benefit inequity, small, rural hospitals do not have the capacity to care for high acuity patients. Anecdotal data indicates that because of the low acuity of patients, rural hospitals are perceived by some nurses to be less challenging and therefore less desirable to work in than metropolitan medical centers. In recent years, there has been a rural exodus by nurses who are enticed by the greater opportunities and wages offered by metropolitan medical centers.

Staffing of qualified labor and delivery nurses in small rural hospitals is a well-known but undocumented problem. Orientation in labor and delivery for inexperienced new registered nurses is extremely difficult in small, rural hospitals where there is a limited number of deliveries per year. It takes a long time to provide enough obstetrical experiences

to prepare a new nurse to become comfortable enough to work alone –as is often the case--in a rural labor and delivery unit. Many small, rural hospitals participate in a health system partnership with urban hospitals that have busy birthing centers. There is an opportunity within health system partnerships for nurses employed in action-packed birthing centers to invite new rural nurses to spend part of their orientation period at the urban birthing center and to mentor them in acquiring labor and delivery skills.

In the hospital under study a labor and delivery nurse would be expected to take a patient load in the medical/surgical unit and cover the emergency room when the obstetrical unit was empty. This fits with Bushy and Leipter's observation (Bushy and Leipter, 2005) that rural nurses need to be 'expert generalists' (p. 1). Bushy and Leipter urge nursing educators to be intentional about introducing students to the unique challenges of rural nursing.

There are a number of limitations of this study. The use of a convenience sample of one small, rural hospital limits the interpretation of the results. Data gathered from only one calendar year limited the researcher's ability to examine long-term factors such as maternal and infant outcomes. Another limitation of this study was that not all delivery documentation was complete. None of the delivering physicians were obstetricians and there were no nurse-midwives on staff. A larger, randomized study is needed to explore the induction practices in rural areas. Additionally, more research is needed to explore the possible correlation of the rural nursing shortage with rural induction of labor rates.

In conclusion, this study was significant to nursing because the findings added to the limited body of knowledge that addresses rural labor induction practices. The findings support the need for nurses to be well informed as patient educators concerning the indications for labor induction. Nurses need to help patients understand the need for a medically indicated induction as well as present the potential risks of an induction without medical indicators. Nurse managers in rural areas need to be resourceful and creative in advocating for staffing to cover spontaneous deliveries. A global perspective of nursing is needed that extends beyond the walls of one's own hospital and engages in mentoring partnerships that cross rural and urban boundaries.

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