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Epidemiologic Considerations: Scope of Problem and Disparity Concerns

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Induction of labor

Induction of labor is defined as the artificial initiation of labor before its spontaneous onset for the purpose of delivery of the fetus and placenta. It continues to be among the most common performed procedures in obstetric practice in the United States and many other developed countries.¹

History of labor induction goes back to Hippocrates' time when nipple stimulation and mechanical dilatation of cervix uteri were used for the first time as a means of labor induction.² Although since then many other forms of mechanical methods have been used for induction and augmentation of labor, commercial availability of synthetic oxytocin did not occur until the 20th century.^{3,4}

Prevalence of labor induction by location and race/ethnicity

Variation exists in prevalence of the labor induction procedure across countries, with rates ranging from 1.4 percent to 35 percent.^{1, 5, 6} According 2010 data from the National Vital Statistics System, in the United States, labor induction procedure was performed in 23.4 percent of all deliveries.⁷ In the United Kingdom, induction of labor was performed in approximately 22.1 percent of all deliveries in 2011-2012,⁸ while in Australia the procedure was performed in 25.4 percent of all deliveries.⁹ Lack of reproductive health services in many developing countries limit the access to obstetrical procedures that are deemed to be of significant benefit such as labor induction. For that reason there is limited data on the labor induction procedure from developing countries, and thus rates from these countries should be interpreted with caution. The current estimate of the overall rate of labor induction in African regions is 4.4 percent.^{10, 11} This estimate is based on a study that involves seven African countries. Niger has the lowest induction rate of all African subregions at 1.4 percent.⁶ The frequency of induction of labor in Latin America and Asian countries is 11.4 percent and 12.1 percent respectively.¹¹

There is considerable variation in labor induction rates across and within populations. Furthermore, variations in labor induction procedures by education, health insurance and most importantly maternal race/ethnicity exist.¹² Moreover, the rate of labor induction varies by institution. The rate is much higher in community hospitals compared to teaching universities or federally sponsored hospitals.^{13, 14}

Trends in induction of labor

The increasing trend in induction of labor procedure is becoming a global phenomenon in developed countries. In the United States, the rate of labor induction has been steadily climbing from 9.6 percent in 1990 to 23 percent in 2005^{15, 16} and reached an all-time high with more than 936,000 induction deliveries (23.2 percent of all births) performed in 2011.^{7, 17} Similar increases in the temporal trends in induction of labor procedure has been observed in other industrialized countries.¹⁸⁻²¹ In Australia, the rate of labor induction procedure has increased from 25.3 percent in 1998 to 29.1 percent in 2007.²² Whereas in the UK, the rate of labor induction procedure remained relatively stable between 2004-05 (20 percent of all deliveries) and 2011-2012 (21.1 percent of all deliveries).⁸ These differences between regions are intriguing, but should be interpreted with caution.

The recently observed increase in labor induction procedure in developed countries can be attributed to an increase in the elective induction of labor rate.^{12, 23-25} However, the widespread availability of cervical ripening agents, routine use of ultrasound during pregnancy, other fetal monitoring, and litigations constraints may also partly contribute to the rising trends, but relative contributions from other potential factors are not well examined. Therefore, understanding population-based trends in induction of labor procedure, including trends in medically indicated versus elective induction of labor, and potential factors that are responsible for the rising trend of the procedure can help identify target areas for reducing the overall induction rate.

Induction of labor is justifiable in circumstances when the risk of waiting for labor to start spontaneously is judged by clinicians to outweigh any risks associated with inducing. It is frequently used for postdate pregnancy to prevent adverse perinatal outcomes. Other medical and obstetrical complications that justify the need for labor induction include fetal death, intrauterine growth restriction, prelabor rupture of membranes, hypertensive disorders of pregnancy, chorioamnionitis, multiple pregnancy, maternal chronic medical conditions and other potential risk factors.

Elective induction, the direct initiation of labor in a pregnant woman without a clinically indicated medical or obstetrical reason, is among the most controversial obstetrical procedure that account for 10-15% of all deliveries in the US. The American College of Obstetricians and Gynecologists (ACOG) formally recommended to avoid labor induction unless there is a justifiable reason of maternal or fetal compromise.^{15, 26} The Society of Obstetricians and Gynecologists of Canada (SOGC),²⁷ the Royal College of Obstetrician and Gynecologists (RCOG)²⁸ and the National Institute for Clinical Excellence (NICE)¹⁹ have similar guidelines discouraging this practice as well. While the reasons for increasing trends in elective induction of labor remain largely unknown, it has been suggested that a combination of attitudinal, logistical, and clinical factors may play a role. These factors include: a request by pregnant women for relief from physical discomfort, convenience such as societal pressures to gather loved ones for the birth of the baby or concerns for adverse perinatal outcomes.²⁹⁻³¹ Other potential contributing factors to the rising trends include changes in attitude towards elective labor induction, the widespread availability of cervical ripening agents, and litigations constraints, but relative contributions from other potential

factors need to be determined. A recent study by Guerra et al.,³² reported that nullipara women and women with BMI > 30 kg/m² are more likely to be electively induced.

Impact of elective induction of labor on adverse perinatal outcome

Induction of labor performed following an appropriate medical and obstetrical indication is potentially life-saving procedure. However, there is limited data on the impact of elective induction on perinatal outcomes. Therefore, there is conflicting evidence on whether elective induction of labor has any effect on adverse perinatal outcome. Several studies described adverse perinatal outcomes attributable to elective induction of labor including cesarean delivery, post-partum hemorrhage and neonatal intensive care unit admission.³³⁻³⁸ On the other hand, several randomized clinical trials reported no increased risk for cesarean delivery or operative vaginal delivery among women who were electively induced compared to those whose pregnancy was allowed to take its natural course.³⁹⁻⁴² Furthermore, Heimstad et al.,³⁸ reported that the risk of postpartum hemorrhage to be similar in electively induced as compared with that of expectant management. Similarly, past observational studies that examined the impact of elective induction on adverse perinatal outcomes have turned up conflicting findings about its effects.^{36, 43-45}

There are important methodological limitations in these studies. Most of these studies are either underpowered or/and did use spontaneous labor rather than expectant management (allowing the pregnancy to take its natural course) as their comparison, which is clinically irrelevant. Furthermore, the absence of a universal accepted definition of what constitutes a medically indicated or an elective labor induction has been a barrier for generalizing the results across these studies. Therefore, there is a conflict in health care providers' opinions with regard to the elective induction of labor procedure. While some argued that, if it is done on at-risk women, the procedure does not contribute significantly to adverse perinatal outcome; others suggest that it should not be done for no medical reasons because it may present increased risk for adverse maternal and fetal outcomes. Regardless of the uncertainty surrounding risks and benefits, elective labor induction is becoming an increasingly important public health concern. A large-scale methodologically rigorous study is under way in the US, sponsored by the National Institute of Health/the National Institute of Child Health and Human Development to look specifically the impact of elective induction of labor on adverse maternal and infant outcomes.

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