



## DISCUSSION

## Labour induction for late-term or post-term pregnancy



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## ARTICLE INFO

## Article history:

Received 3 August 2015

Received in revised form 22 January 2016

Accepted 24 January 2016

## Keywords:

Parturition

Estimated due date

Perinatal mortality

Stillbirth

Induction of labour

## ABSTRACT

**Problem and background:** Approximately one in four women in Australia have their labour induced, and prolonged pregnancy is likely the most common reason for induction. Clinical guidelines recommend offering induction at 41 weeks, because it is thought that induction lowers the risk of stillbirth without increasing the Caesarean rate. However, the evidence behind this recommendation warrants closer investigation.

**Questions:** What is the risk of stillbirth as women go past their due dates, and what are the benefits and risks of elective labour induction?

**Findings:** A large body of evidence shows that the relative risk of stillbirth increases starting after 37–38 weeks, but more recent data show the absolute risk does not rise substantially until 42 weeks, when it reaches 1 in 1000. As women get closer to 41 weeks, it is appropriate for midwives to discuss the benefits and risks of elective induction and expectant management. Meta-analyses that have studied the effects of elective induction were driven by the Hannah Post Term trial, which was limited by high rates of cross-over between groups.

**Conclusion:** Ultimately, after receiving accurate, evidence-based information and guidance from health care providers, women have the right to decide whether they prefer to induce labour, or wait for spontaneous labour with appropriate foetal monitoring, as both are reasonable options.

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## Summary of Relevance:

**Problem or Issue**

- Prolonged pregnancy is the most common reason for labour induction in Australia.

**What is Already Known**

- Clinical guidelines recommend offering induction at 41 weeks, because recent meta-analyses have shown that induction lowers the risk of stillbirth without increasing the Caesarean rate.

**What this Paper Adds**

- Clinicians should be aware that results from these meta-analyses are largely driven by the Hannah et al. PostTerm

trial, a study limited by high rates of cross-over between groups. The highest risk of Caesarean is among women who choose expectant management but then end up with an elective or medically indicated induction.

**1. Introduction**

Approximately 23–27% of pregnant women in Australia have their labour induced, depending on the state from which data are collected.<sup>1,2</sup> Researchers have not reported how many of these women are induced for reaching late-term or post-term, which are defined as pregnancies that reach 41 weeks 0 through 6 days, or 42 weeks 0 through 7 days or beyond, respectively.<sup>3</sup> However, in Queensland, the vague diagnosis of “prolonged pregnancy” is listed as the most common indication for labour induction. Furthermore, only 13.1% of women in New South Wales reach 41 completed weeks of pregnancy.<sup>2</sup> Given that half of all women will not go into labour spontaneously until 40 weeks and 5 days,<sup>4,5</sup> and only 13% of

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<http://dx.doi.org/10.1016/j.wombi.2016.01.007>

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women in New South Wales reached this gestational age, it is likely that a substantial number of women are being induced electively for going past their due date, even before they reach 41 or 42 weeks.

One controversy surrounding elective labour induction for late- and post-term pregnancy is that the evidence on the relationship between labour induction and Caesarean rates is conflicting, depending on whether researchers look at observational studies or data from randomised trials. In New South Wales, Australia's most populous state, nulliparous women with singleton, vertex infants born at 37 weeks or greater had an overall Caesarean rate of 28.1%. Intrapartum Caesarean rates were higher in women who had labour induction (34%) compared to women with a spontaneous onset of labour (15.5%).<sup>6</sup> Similarly, among nulliparous women who gave birth at term to vertex infants in Queensland, Caesarean rates were 40% for women who were induced, and 14% for women who had spontaneous labour without augmentation.<sup>1</sup>

Many guidelines, such as the NICE guidelines in the United Kingdom, and the Practice Bulletin on post-term pregnancies from the American College of Obstetricians and Gynecologists, recommend “offering” or “considering” induction between 41 and 42 weeks.<sup>7,8</sup> Adding to the push to induce at 41 weeks, recent data from well-publicized meta-analyses have demonstrated that elective labour inductions decrease the stillbirth rate without increasing the Caesarean rate.<sup>9,10</sup> The evidence from these meta-analyses can be confusing to clinicians, who may clinically witness the correlation between elective labour induction and increased Caesarean rates. Therefore, the purpose of this evidence-informed opinion paper is to evaluate the effects of elective labour induction at 41–42 weeks by examining both historical and current evidence.

## 2. Findings

### 2.1. Historical and current evidence on the normal length of pregnancy

There is no direct relationship between the normal duration of pregnancy and the effectiveness of labour induction at a predetermined gestation. However, because many women and clinicians may begin to discuss elective induction before or around the “due date” of 40 weeks, it is important for us to determine where the conceptual definition of a due date originated. The traditional estimated due date (EDD) of 40 weeks is based on Naegele's rule, which assumes the pregnant woman had a 28-day menstrual cycle and ovulated on the 14th day. Naegele's rule is actually based on writings from the year 1744, when a professor from the Netherlands named Hermann Boerhaave used the records of 100 pregnant women to determine an estimated due date. He did so by adding seven days to the last period, and then adding nine months.<sup>11</sup> However, Boerhaave never explained whether clinicians should add seven days to the beginning of the last period, or to the last day of the last period.<sup>11</sup>

In 1812, a professor from Germany named Carl Naegele quoted Professor Boerhaave, and added some of his own thoughts. However, Naegele's text, like Boerhaave's, did not clarify whether clinicians should add seven days to the first day of the last period, or seven days to the last day of the last period. Today, healthcare providers around the world use a form of Naegele's rule that adds seven days to the first day of the last period, and then counts forward 9 months—a rule that is not based on any evidence, and may not have even been intended by Naegele.<sup>11</sup>

In Australia, the U.S., and other Western countries, induction is common at or even before 40 weeks,<sup>1,2,12</sup> so it is impossible to know exactly what percentage of women today would naturally go into labour and give birth before, on, or after their estimated due date. In the past, researchers described the average length of a

normal pregnancy by looking at a large group of women, and measuring the time from ovulation (or the last menstrual period) until the date the women gave birth—and calculating the average. However, because of the high rate of inductions, which artificially shorten the length of pregnancy, this method is not accurate. Instead, researchers have argued that the proper method to estimate the average length of pregnancy is time-to-event analysis, or survival analysis.<sup>4,5</sup> One of the results of time-to-event analysis is a Kaplan–Meier survival curve,<sup>13</sup> which can display the median time it takes women to go into labour spontaneously, after taking into account or “censoring” women who did not give birth spontaneously.

In 2001, Smith used survival analysis to determine the length of pregnancy in 1514 healthy women whose estimated due dates, as calculated by the last menstrual period, were perfect matches with estimated due dates from their first trimester ultrasound.<sup>4</sup> In this study, it was reported that 50% of all nulliparous women gave birth by 40 weeks and five days, while 75% gave birth by 41 weeks and two days. Meanwhile, 50% of all multiparous women gave birth by 40 weeks and three days, while 75% gave birth by 41 weeks. This means that the actual pregnancy was about five days longer than the traditional due date (using Naegele's rule) for nulliparous women, and three days longer than the traditional due date in multiparous women.

In another, smaller study, Jukic et al. used survival analysis to look at the normal length of a pregnancy.<sup>5</sup> They too found a median time from the first day of the last menstrual period to birth of 40 weeks, five days. They also observed that women who had embryos that took longer to implant were more likely to have longer pregnancies. Other researchers have found a variety of factors that can affect the length of pregnancy. By far, the most important predictor of a longer pregnancy is a family history of long pregnancies—including the woman's personal history, her mother and sisters' history, and her male partner's family history.<sup>5,14–17</sup>

### 2.2. The increase in perinatal mortality towards the end of pregnancy

Over the past 30 years, there has been considerable change and controversy in how researchers calculate and determine stillbirth rates towards the end of pregnancy.<sup>18–22</sup> In 1987, Yudkin et al. published a paper revealing that prior researchers had used the wrong denominator when calculating stillbirth rates by gestational age.<sup>23</sup> Earlier researchers had divided the number of stillbirths at a given week by the number of births at a given week—excluding women who were still pregnant in their denominator.<sup>23</sup> Since women who are still pregnant are still at risk for experiencing a stillbirth, this prior formula effectively ignored women who should be in the denominator. Yudkin proposed a new method of calculating the stillbirth rate, in which the number of stillbirths in a given week (say, at 41 weeks) were divided by the number of births and ongoing pregnancies at 41 weeks.<sup>23</sup>

However, the controversy did not subside, as other researchers began to also address the stillbirth statistical challenge. Some researchers argued that we should use a “prospective” or “cumulative” risk of stillbirth, in which the stillbirth risk quoted to a woman at 40 weeks would reflect her overall risk for stillbirth at 40 weeks plus her cumulative risk at 41 week, 42 weeks, and beyond.<sup>24</sup> Survival curves and Cox proportional hazards modelling have also been used to measure the risk of stillbirth, similar to how we measure time-to-event with the length of pregnancy.<sup>25,26</sup> However, at this time, most researchers are using a form of Yudkin's mathematical formula for calculating the stillbirth rate.<sup>21</sup>

When researchers use this formula (stillbirth rate = number of stillbirths at a given gestational week divided by # of ongoing pregnancies at the given gestational week), they have repeatedly

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